Town of Vermilion

Integrated Waste Management Study

Prepared by: Fabrizio Bertolo, *Senior Waste Specialist*
Sewit Yenie, *Senior Environmental Research Analyst*

Senior Review: Kirstin Castro-Wunsch, P.Eng.

Date Completed:
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Advanced Enviro Engineering Ltd.
Providing Solutions for Business and Environment Since 1992

February 05th, 2016

Derek Young
Director of Transportation and Utilities
Town of Vermilion
5021-49th Avenue
Vermilion, Alberta, T9X 1X1

Dear Mr. Young,

We are pleased to submit the following report to you, completed by Advanced Enviro Engineering Ltd. and its consultants in February 2016.

If you have any questions or require further information, please contact Fabrizio Bertolo at 780-488-7926.

Sincerely yours,
Advanced Enviro Engineering Ltd.
APEGA Permit to Practice Number P10783

Kirstin Castro-Wunsch, P.Eng.
Senior Environmental Engineer
CEO

EXECUTIVE SUMMARY

Advanced Enviro Engineering Ltd. (AE) conducted an Integrated Waste Management Study for the Town of Vermilion. The study included a review of the current waste management system, a waste sort, a survey of Vermilion residents to measure interest in a range of solid waste options, interviews with Town staff, Councilors and other municipalities, and an analysis of feasible collection and diversion options.

Based on results of this work, Advanced Enviro made recommendations for a comprehensive solid waste management system that is environmentally responsible and meets the needs of its citizens in a cost effective manner.

REVIEW OF CURRENT SYSTEM

The Town of Vermilion's existing waste management system, which includes curbside garbage and yard waste collection, and recyclables drop off at the Vermilion Recycle Centre, is fully funded through a monthly fixed charge per household.

In 2014:

1. Garbage Collection

The Town of Vermilion provides weekly automated curbside residential garbage collection (360L) for 600 households and weekly automated garbage collection (3yd^3. dumpster) for approximately 866 households. The Town owns and uses one (1) side loader fully automated truck (Pak-Mor) for garbage collection. Garbage can also be dropped off at the Transfer Station by residents at no cost.

The 2014 cost for garbage collection and disposal were:

- Residential garbage collection: $90.53/tonne or $7.69/month/hh
- Disposal (includes transportation): $94.53/tonne or $8.02/month/hh
- Resident garbage collection fee: $18.04/month/hh

Approximately 1,493 tonnes of residential garbage was sent to the landfill in 2014 or 380 kg/capita; compared to the provincial average of 272 kg/capita.

- Based on the waste sort and data obtained from the Town, the current Town's diversion rate is 24%.

2. Recycling

Recyclables diversion options currently provided by the Town to residents are limited to drop-off service at the Vermilion Recycle Centre (VRC) at 4018-52 Avenue.

Two hundred thirty seven (237) tonnes of recyclables were dropped off at the VRC by Town residents in 2014.

In 2014 costs for recyclable items processing were:

- Processing cost (VRC): $274.55/tonne ($3.71/hh/month)
- Resident recyclable collection fee: $7.87/month/single dwelling for recyclables processing ($21.74/month/unit for multi dwellings and condos)

3. Organics

The Town provides residential weekly automated organics (yard waste) collection in the summer with $3yd^3$ dumpster (green bins). Organics is collected using a fully automated side-loader truck (Pak-Mor). Organics collected from the green bins are piled up at the shop yard without any further management. The material is then eventually mixed with marginal mixed soil and used in public work projects.

In 2014, approximately 94 tonnes of organics (yard waste) were collected.

The 2014 organics collection costs were:

- Automated organics collection: $48.76/tonne ($0.26/hh/month)
- Currently the Town does not charge residents for organics collection

4. Vermilion Transfer Station

3,702 tonnes of waste was received and processed at the Vermilion Transfer Station in 2014.

There is no charge to commission members for residential waste.

Materials accepted, at the Transfer Station, and brought to the Ryley landfill for disposal include residential garbage and commercial waste.

The 2014 costs paid to the Vermilion Regional Waste Management Authority for waste management including transportation and disposal of garbage at Ryley landfill and for the Town's former landfill monitoring was $95.55/tonne ($349,945.00).

5. Commercial Waste and Cardboard Collection

Town provides weekly waste and cardboard collection services to 261 commercial businesses for $14.92/pickup/week for garbage and $7.87/month for cardboard. For additional pickups the Town charges $32.82/pickup.

In 2014 this program collected approximately 1,606 tonnes (estimate data) of commercial garbage and 263 tonnes of commercial cardboard.

The 2014 cost for commercial garbage and cardboard collection and disposal/processing were:

- Garbage collection and disposal: $241,226 or $150.19/tonne or $76.99/business/month.
- Commercial recyclables (cardboard) collection and processing: $115,848 or $440.49/tonne or $36.99/business/month.
- Single businesses are currently charged on average $91.3/month.
- The cost for commercial garbage and recyclables management is currently not fully paid by businesses, but residents are covering part of the cost through utility bill.

6. Bi-Annual Cleanup Program

7. Communication Programs

- Town website (http://vermilion.ca)
- Social media (Facebook and Twitter)
- "Talk of the Town" newsletter that goes out with utility bill every month

8. Fee Structure

Residents in Vermilion currently pay $25.91/month (single houses) for waste management services. Table below provides a general breakdown of the program component costs.

Vermilion Fee Structure

Waste Service	Utility Fee (month/household)
	Single houses
Waste Collection & Disposal	$18.04
Recycling	$7.87
Total	**$25.91**

Total cost for residential waste management in Vermilion is approximately $21.00/hh/month, but residents are currently charged $25.91/hh/month.

The difference of $4.91/hh/month (approximately $86,335/year) currently paid by residents for garbage/recyclables management services are actually used by the Town to cover commercial waste management costs.

Based on the current diversion rate and on services provided by the Town, great opportunity exists for the Town of Vermilion to significantly increase diversion within a relatively short time frame.

INTERVIEWS

Interviews were conducted with Mayor, Councillors, Town Manager, Transportation and Utilities Director, Transportation and Utilities Foreman, and Transfer Station staff and main points raised by interviewees are summarized below.

- Interviewees support the use of roll-out bins (carts) for garbage and implementation of curbside recyclables collection every two weeks alternatively.
- Interviewee then suggested the need for new markets for recyclables items.
- Interviewees agree on cutting the cost by reducing garbage collection frequency and start other programs over time.
- Interviewees are willing to spend more money on better communication programs.
- Interviewees suggested the need for better collaboration regarding recycling and other waste and diversion programs with the County.
- Interviewees agree that the Town could have a 50% - 65% diversion rate by 2020 while educating the residents during the first three years of transition.
- Interviewees think that the Town has a composting facility because Town collects yard waste and piles it at the shop yard.

WASTE COMPOSITION

A waste sort was conducted for the Town of Vermilion's residential garbage and organics (yard waste) in September 2015 at the Vermilion Transfer Station to measure waste generation data specific to the Town of Vermilion, to measure current program compliance, and to identify target areas for efficiency.

1. Composition of Garbage from Roll-Out Bins (Carts) to Landfill

During the waste sort, the following observations were noted:

- Organics comprise 62%, by weight, of the total garbage sorted.
- Twelve percent (12%) of the total garbage sorted was comprised of recyclables, 2% were items that could be taken to the Transfer Station and 9% were potential recyclable items.

2. Composition of Garbage from 3yd^3 Dumpster Bins to Landfill

During the waste sort, the following observations were noted:

- Organics comprise 58%, by weight, of the total garbage sorted.
- Twelve percent (12%) of the total garbage sorted was comprised of recyclables, 15% were items that could be taken to the Transfer Station and 3% were potential recyclable items.

3. Composition of Organics (yard waste) from 3yd^3 Green Bins

During the waste sort, the following observations were noted:

- A truck load of yard waste (4,700kg) was sorted.
- Contamination was insignificant (0.1%).

4. Annual Waste Composition Results

- Based on the waste sort and data obtained from the Town, a total of approximately 1,493 tonnes of residential garbage was disposed in 2014.

- Based on the data analyzed, materials such as electronics, batteries, paint and scrap metal are entering the waste stream. Nine percent (9%) of the garbage sorted should have been separated and disposed of at the Transfer Station.

5. Annual Capture Rates of Recyclables and Organics

- Based on the 2014 annual waste generation data and data obtained from the waste sort; the recyclables program has a capture rate of 35% (Recycle Centre and Transfer Station) and the organics program has a capture rate of 9%.

- Approximately forty five percent (45%) of organics (896 tonnes) and sixteen percent (16%) of recyclables (320 tonnes) ended up in a landfill in 2014.

6. Annual Diversion Rates

Annual diversion rates reflect the quantity of waste that is diverted from landfill through the recycling programs (Recycle Centre, Transfer Station and green bins).

- The organics program has a diversion rate of 5% through the green bin program.
- The recycling program has a diversion rate of 19% through the Recycle Centre and Transfer Station.
- Total diversion can be increased to 85% if an organics program for food and compostable paper waste was implemented and separation of yard waste and recyclables increased.

SURVEY RESULTS

A total of 202 responses (103 online responses and 9 9hard copy responses were received and analyzed.

The survey results provided direction in the following areas:

1. Response rates are overall representative of the population.

2. 98% of the respondents indicated that waste diversion and reduction is important to them, while 2% of the respondents do not think it is important.

3. 74% of the respondents think that the Town should divert 40% or more and out of the 74%, 47% think that the Town should divert more than 50% of waste from landfill in the next five years.

4. 80% of the respondents generate less than 1 to 2 bags of garbage per week. Since less than 2% of the population generate 5 or more bags per week, bi-weekly (every two weeks) garbage collection with a 240L roll-out bin (cart) or a limit of 4 bags is possible to implement.

5. 35% of the survey respondents at least compost their yard waste at home, 66% at least use the green bin to dispose of their yard waste, 40% at least dispose of their yard waste with garbage and 33% at least haul their yard waste to the Transfer Station.

6. Out of all the survey respondents, 16% compost their food waste at home, 69% dispose of their food waste with garbage while 14% do both. 1% did provide response to this question. As the organic component of waste represents over 50% of the total waste generated by residents (31% food waste, 2% compostable paper waste, 24% yard waste), a 50% diversion goal for the Town of Vermilion in the next five years cannot be achieved without an organics program.

7. 43% of the survey respondents are willing to use curbside food waste collection service, while 28% are not willing and 29% are unsure either they would use the service or not.

8. 71%, 80% and 54% of the survey respondents are willing to use roll-out bins (carts) for curbside collection of garbage, recycling and organics respectively. This shows that a smooth transition to roll-out bins (carts) for curbside waste collection services is possible.

9. 37% of the survey respondents support a garbage limit while 56% don't. 43% of the respondents support fees based on the amount of garbage while 54% don't.

10. In general respondents use the different services offered at the Vermilion Recycle Centre.

11. 50% of the survey respondents use the Vermilion Recycle Centre once a month, 27% use it twice a month and 7% use it weekly while 16% have never used it.

12. The most preferred operation hours at the Vermilion Recycle Centre are 12pm-8pm and 9am-5pm and the current operation days, Tuesday thru Saturday.

13. On average 2% of the respondents use the Vermilion Regional Transfer Station frequently, 33% use it occasionally and 50% have never used it. Transfer Station use should be encouraged and the potential to provide further services there

exists. Usage could be increased through providing residents education about services provided at the transfer station and providing recycling bins to decrease two stops (i.e. at the Transfer Station and Recycling Centre).

14. The current Transfer Station operation hours and days are convenient to residents (9am-4:45pm Monday thru Saturday).

15. 40% of the survey respondents ranked waste reduction as the most important factor, 37% ranked convenience as the second important factor and 31% ranked cost as the third important factor.

16. 76% of the respondents are satisfied with the Bi-Annual Cleanup program offered by the Town. Some requested for the program to be carried out in spring and fall, to be more frequent, to allow bigger items and to advertise the program well.

17. Based on the survey results the top waste program options that the Town should consider implementing include:
    - Curbside recyclables collection (42%)
    - Curbside organics collection (20%)
    - More educational programs on how to reduce waste (20%)

18. 42% of the survey respondents are willing to pay $27 - $30 per month, 12% are willing to pay $31 or more per month (currently $27.41/hh/month). These responses indicate that Town residents are willing to pay up to $30 per month for curbside garbage, recycling and organics collection services.

19. As marjority (63%) of the residents indicated that they want educational initiatives to be communicated to them about the same time, Town could add a regular section on waste reduction on the monthly newsletter to keep resident upto date.

20. Based on the survey results the top preferred communication methods about waste programs are:
    - Brochures with utility bills (44%)
    - Newspaper (20%)
    - Town's website (18%)

These survey results provide the Town with strong direction. Often residential survey responses can be divided relatively evenly among the "yes" group and the "no" group so that responses are in the 45 to 55 per cent range. This division is not seen in the

Vermilion survey, instead there is a strong, “across the board” support for options as listed above. The Town can therefore be confident that the recommended strategies are in line with residents.

ACTION PLAN

Based on the review of the current system, waste sort, the survey results, application of solid waste management “best practices”, cost analysis and Advanced Enviro’s experience and knowledge of successful programs, Advanced Enviro recommends the following Solid Waste Management Strategy for the Town of Vermilion.

1. Adopt the following waste reduction goal

The Town of Vermilion currently has no specific goal for waste diversion and/or reduction. Based on the residential survey, about seventy four percent (74%) of the respondents think that the Town should divert more than 40% of waste from landfill in the next five years and forty seven percent (47%) think that the Town should divert more than 50% of waste from landfill in the next five years. This clearly indicates that the Town could set a target of 50% diversion in the next five years.

Based on the residential survey, forty two percent (42%) of the survey respondents are willing to pay $27 - $30 per month and twelve percent (12%) are willing to pay $31 or more per month. Ninety eight percent (98%) of the respondents indicated that waste diversion and reduction is important to them. These responses indicate that Town residents are in favor of a Waste Reduction Strategy with an associated goal and the majorities are willing to pay up to $30 per month for that strategy to be implemented.

2. Composting

Waste management strategies targeted to organics provide municipalities with the biggest “bang for your buck” because organics are the largest component of the waste stream and provide the greatest diversion potential. In order to achieve this goal, the Town must enhance its current organics diversion program.

This program has a low capture rate (9%) and 60% of the garbage stream is comprised of organics (mainly food waste). This low capture rate is likely due to three factors: 1) service is not convenient for residents, 2) the limited time period for curbside collection of organic waste (6 months) is not of a sufficient duration to change residents’ set out habits, and 3) organic collection is limited to yard waste.

The Town should implement year round Curbside Organics Collection (every two weeks in the winter and every week in the summer) with 240L rollout bins (carts) for yard and food waste in 2016. Year round organics collection will increase the rate of organics diversion and decrease garbage disposal rate.

It is recommended to evaluate (preferably with an external compost consultant) different options for organic waste composting in Vermilion including building and operating a compost pad (possibly on the former Class II landfill by the Transfer Station).

It is recommended to collaborate with Vegreville and evaluate to contract their organics for processing at the Vermilion compost pad.

3. Garbage Collection

The Town of Vermilion's waste stream composition (based on the Sept 2015 waste sort), shows a high percentage of organics (60%) and recyclables (15%) in the sorted garbage. In addition, based on the interviews and survey carried out by Advanced Enviro in Oct 2015, interviewees and survey respondents support a garbage limit.

The current waste management system does not include a sufficient incentive to reduce waste. The presence of 285 3yd^3 dumpsters in back alleys allow uncontrolled and blameless garbage generation. Implementation of an automated garbage collection with 240L roll-out bins (carts) throughout the Town in 2016 would allow increase of both garbage generation control and diversion rate. Furthermore, one cart limit every two weeks should be implemented at the same time as year round curbside collection of organics is implemented. Bag/cart limits achieve approximately a 20% reduction in waste generation through behavioral changes as a result of an increased awareness of waste habits. Implementing limits also significantly increases capture rates for diversion programs as it forces residents to use the diversion programs already in place. This option will therefore increase the diversion rates for the Town's curbside recyclables and organics programs.

Current garbage pick-up system in not efficient as the lift cycle for the truck currently in use is very long. Once Vermilion implements automated garbage collection with 240L roll-out bins (carts) throughout the town, it is recommended to evaluate the use of different side loader trucks with faster lift cycle for residential collection in order to increase efficiency and reduce costs. Current truck (Pak-Mor) can be dedicated to commercial services.

4. Curbside Recycling Collection and Recycling processing

The Town diverts approximately 19% of the available recyclable waste stream. Based on the waste sort, recyclables comprise twelve percent (12%) of the sorted garbage.

Recyclables programs are limited to drop-off at Vermilion Recycle Centre**.**

The recommendation is to implement a bi-weekly (every two weeks) curbside manual collection (blue bags) throughout the year. The current service is not convenient for all residents and allows to capture recyclables by residents already committed to waste reduction but doesn't intercept the waste generated by other residents.

The current high cost for recyclables processing at VRC ($274/tonne) and the lack of competitive MRFs in the area suggest that alternative suitable options need to be evaluated by the Town:

- Review Recyclables Processing Contract.
- Evaluate other options for processing residential and commercial recyclables by 2016 (end of current contract with C&S Enterprising). Town could put out a request for EOI (expression of interest) to find a suitable long term options (response can be from public, Town itself or private) that would include taking recyclables elsewhere for processing (e.g. Edmonton, Vegreville, etc.).

5. Adopt a Strong Public Education Program and Enhanced Social Marketing

The survey, waste sort results, and interviews with council members and Town staff reinforced the need and desire for public education programs. All successful waste management strategies necessitate a strong public education campaign. Relatively low capture rates for the recycling program indicate the need for increased education to increase participation and capture rates.

The Education Program should:

1. Identify a key staff member responsible for education program delivery
2. Provide social marketing training to the education program coordinator
3. Inform the public of the Town's Waste Management Strategy (Recommendation 2) and Goals (Recommendation 1)
4. Provide information on Vermilion's waste stream and waste generation rates (information provided in Section 1)
5. Inform the public of the associated benefits and costs of alternative waste management strategies

6. Incorporate social marketing techniques to market the social good of participating in existing and new diversion programs
7. Create environmental education programs for schools that target students from grade one to six; as this is when recycling behaviour is largely formed for life and they are extremely influential in teaching their families how to minimize waste and follow program rules
8. Integrate all solid waste management programs under the Town's solid waste management strategy
9. Town should educate residents first before implementing program changes
10. Identify a theme that is used for all diversion programs that reinforces an integrated approach to solid waste diversion (i.e. Whistler's "Towards a Sustainable Future, Stony Plain's "Paint Your World Green", etc.)

6. Commercial Diversion

Municipal solid wastes include residential and ICI waste. Although, the scope of this project is limited to residential waste it is recommended that the Town consider options for commercial waste, as it comprises 66% of municipal solid waste.

Total cost for collection and processing of commercial waste (garbage + recyclables) in 2014 was $113.98/business/month but the single businesses are currently charged approximately $91.3/month.

The cost for commercial garbage and recyclables management is currently not fully paid by businesses, but residents are covering part of the cost through utility bill.

Town should evaluate to increase current rates for commercial garbage pickup (and not recyclables service) in order to fully cover cost for commercial services and at the same time increase diversion. Town has unique opportunity to set rules.

7. Transfer Station

Transfer Station in Vermilion is currently managed by the Regional Waste Management Authority and the Town is charged approximately $60/tonne for waste received from residents and from Town's truck (residential and commercial garbage).
The Town in collaboration with the Regional Commission should evaluate the implementation of a card system for waste acceptance at the Transfer Station in order to identify waste generators. Card system would also allow to manage waste quantities control, and in the future to evaluate waste acceptance limit at the Transfer Station.

A drop off system for recyclables must to be implemented at the Transfer Station as a large amount of recyclables are mixed in with garbage and are not diverted. Recyclables collected should be then taken to the VRC for processing.

Town of Vermilion should evaluate and implement with the Regional Authority a strategy to reduce the presence of recyclables and organics in the garbage accepted at the Transfer Station. Strategy should be based on differential fees at the Transfer Station (e.g. fees applied for recyclables or organics present over a certain percentage in garbage loads).

8. Out of Town usage of Municipal System

Based on interviews and survey responses many of the services provided by the Town of Vermilion are used by out of Town residents (mostly from the County of Vermilion).

It is recommended to implement in collaboration with the County a communication campaign aimed to contrast illegal dumping in Town, with specific material and education programs. Town and County should also be present at the main events in the area (e.g. Vermilion agricultural fair) promoting environmental initiatives including battle against illegal dumping.

Specific fines for illegal dumping of waste by out of Town users in $3yd^3$ dumpster and green bins should be implemented and applied.

RECOMMENDATIONS

Based on the review of the current system, waste composition data analysis, survey results and cost analysis and through application of solid waste management “best practices” and Advanced Enviro’s experience and knowledge of successful program, Advanced Envro recommends the following for the Town of Vermilion to make an informed decision regarding its waste management system going forward.

1. Set a goal for the diversion rate and share it with the community. Increase the residential diversion rate to 50% by 2020.

2. Develop and document a Solid Waste Management Strategy.

3. Consider components of the successful diversion programs chart when developing Solid Waste Management Strategy.

4. Implement an ongoing public education program that incorporates social marketing and integrates all collection and diversion programs under one theme and strategy.

5. Implement year round Curbside Collection of Organics (every two weeks in the winter and every week in the summer) with 240L rollout bins (carts) for yard and food waste by April 2016.

6. Evaluate different options for organic waste processing including building and operating a compost pad.

7. Implement Automated Garbage Collection with rollout bins (carts) throughout the Town in 2016.

8. Implement a Cart waste limit – Reduce the garbage collection frequency from weekly to every two weeks.

9. Evaluate the use of different side loader trucks for garbage collection in order to increase efficiency and reduce costs.

10. Implement a biweekly (every two weeks) curbside blue bag collection for recyclables throughout the year.

11. In two years' time evaluate implementation of a weekly curbside collection for recyclables.

12. Review Recyclables Processing Contract (Vermilion Recycling Centre).

13. Evaluate the feasibility for more cost effective options for processing recyclables in Vermilion. Put out a request for EOI (public and private contractors can respond). Collaboration with Vegreville Material Recovery Facility is possible.

14. Adjust current rate for commercial garbage pickup services to fully cover management costs.

15. Implement a card system at the Transfer Station to unequivocally identify waste generators at the Transfer Station.

16. Provide drop off service for recyclables at the Transfer Station.

17. Implement with the Regional Authority a strategy to reduce the presence of recyclables and organics in the garbage accepted at the Transfer Station.

18. In collaboration with the County implement a communication campaign and a specific bylaw to reduce illegal dumping of waste by out of Town users in $3yd^3$ dumpster and green bins should the cart system not being implemented.

STRATEGY TIMELINE

The following table shows the recommended timeline for implementing the solid waste management strategy.

ACTION STRATEGY	TIMELINE
2016	
Finalize Waste Management Strategy and goals: – Increase the diversion rate to 50% by 2020 by implementing year round curbside organics collection (food & yard waste), recyclables collection and a waste limit – Commit to a long-term Zero-Waste Strategy	1st Half, 2016
Implement Automated Garbage Collection with 240L roll-out bins throughout the Town.	1st Half, 2016
Evaluate the use of different side loader trucks for garbage collection in order to increase efficiency and reduce costs (faster lift cycle).	1st Half, 2016
Adjust current rate for commercial garbage pickup services to fully cover management costs.	1st Half, 2016
Review Recyclables Processing Contract (Vermilion Recycling Centre).	1st Half, 2016
Evaluate the feasibility for more cost effective options for processing recyclables in Vermilion. Put out a request for EOI (public and private contractors can respond).	1st Half, 2016
Evaluate different options for organic waste processing including building and operating a compost pad (options evaluation and facility design to	1st Half, 2016

be carried out preferably by an external composting consultant).	
Develop and implement a public communication program (this will continue on an ongoing basis).	1st Half, 2016
Change bylaw to implement a new organics and recyclables collection services.	2nd Half, 2016
Implement year round Curbside Collection of Organics (every two weeks in the winter and every week in the summer).	2nd Half, 2016
Implement a biweekly (every two weeks) curbside blue bag collection for recyclables throughout the year.	2nd Half, 2016
Implement a card system at the Transfer Station to unequivocally identify waste generators (Town and out of Town users).	2nd Half, 2016
Continue the Public Education Program focusing on a review of initial results of the Waste Management strategy and informing the public of the next stages.	2nd Half, 2016
2017	
Change bylaw to implement a cart limit.	
Implement a Cart waste limit – Reduce garbage collection from weekly to every two weeks Reinforce public education program sharing with residents the benefits of every two weeks garbage collection.	
In collaboration with the County implement a communication campaign and a specific bylaw to reduce illegal dumping of waste by out of Town users in $3yd^3$ dumpster and green bins should the cart system not being implemented.	
Implement with the Regional Authority a strategy to reduce the presence of recyclables and organics in the garbage accepted at the Transfer Station.	
Provide a drop off service for recyclables at the Transfer Station.	
2018/2019	

Measure data against a baseline and share the results as part of the education campaign.
Continue the public education program sharing the diversion results.
Conduct waste audit to measure contamination and capture rate.
Review goals and set new targets for the next five years according to the diversion results.
Evaluate implementation of a weekly curbside collection for recyclables.
2020/2021
Measure data against the baseline and share results as a part of the education campaign.
Continue the public education program sharing the diversion results.

This implementation plan achieves significant diversion results within a two-year time frame. A similar program was designed for Strathcona County and diversion increased from 27% to 65% in one year. As experienced in Strathcona County, implementing change is often better when done all at once rather than drawing it out, as long as a strong public education program has prepared residents.

Advanced Enviro recognizes that Vermilion is well situated to realize significant diversion gains, which can be achieved through the implementation of a year round curbside organics and recyclables collection program with a garbage limit.

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1.0 INTRODUCTION

Advanced Enviro Engineering Ltd. (Advanced Enviro) was retained by the Town of Vermilion (Town) to complete an Integrated Waste Management Study (IWMS). This project examines the Town's current solid waste management programs, waste generation, measures public support for a range of diversion options; analyzes costs, diversion, implementation, and education factors. It provides recommendations and an action plan for the Town to move towards zero waste and to reduce costs. A solid waste sort of residential household garbage and organics as well as survey to measure public support was conducted.

The objectives of the waste sort were to measure waste generation data specific to the Town, current program compliance, and to identify areas to improve efficiency. A physical waste sort was conducted for two waste sub-streams: 1) **garbage** sent to landfill (roll-out bins and 3yd^3 dumpster bins) and 2) **organics** diverted from landfill (3yd^3 green bins). Additional information was gathered through interviews of key people and review of the existing waste management system.

The objectives for the survey were to inform residents of current diversion success, to measure interest in the development of diversion programs and their commitment to participate, and to develop a common vision of residents and council.

This report summarizes the following:

- Current waste management system
- Methodology, results and recommendations of the waste sort
- Other municipalities systems review
- Survey results and analysis
- Diversion Option Analysis
- Action Plan/Implementation Report

2.0 CURRENT WASTE MANAGEMENT SYSTEM REVIEW

This section provides a brief summary of the current waste management system and an analysis of annual waste and diversion data.

2.1 Existing System

The Town of Vermilion's existing waste management system is covered in a monthly fee of approximately $25.91/household/month (residential) includes the following programs:

1. Waste Collection
    - Weekly automated residential garbage collection
        - 600 households have 360L roll-out bins (carts)
        - Houses with back alleys have shared dumpster bins (one 3yd^3 dumpster bin per four households, a total of 285 dumpster bins)
        - Town owns a truck (Pack-Mor) and provides garbage collection service
        - Garbage goes to Vermilion Transfer Station then is transported to the Beaver Regional Landfill in Ryley
        - Residents can drop off garbage at the Vermilion Transfer Station
        - Residents are charged $18.04/household/month for garbage collection

2. Recycling
    - Drop-off at **Vermilion Recycle Centre** at 4018-52 Ave (East of the Airport Terminal Building) which is managed by a contractor (C&S Enterprising)
    - Town residents are charged $7.87/household/month ($21.74/month for multi dwelling and condominiums) to use the Recycling Centre
    - Out of town residents pay $8/month to drop off recyclables items
    - Materials accepted:
        - Plastics products (pre-rinsed plastic containers such as milk containers; ketchup, margarine containers, detergent containers, mini yogurt containers, etc.)
        - Plastic film (grocery bags, bubble wrap, boxboard liners)
        - Paper products (newsprint, glossy paper, telephone directories, office paper & mixed paper, books, corrugated cardboard, boxboard)
        - Tin products (tin cans, etc.)
        - Ink cartridge and household batteries
        - Mobile phones and accessories
    - Glass is no longer accepted

3. Organics Waste
    - Twenty six (26) green bins (3 yd^3 bins located throughout the town) are available for residents to dispose of their yard waste (garden waste, grass clippings and leaves) from May to October.
    - Organics collected from the green bins are piled up at the shop yard without any further management. The material is then eventually mixed with marginal mixed soil and used in public work projects.

4. Vermilion Regional Transfer Station
    - Located 1.5 km north of Vermilion on Pare Drive
    - The Town of Vermilion has an agreement with the County of Vermilion River No. 24, Villages of Kitscoty, Marwayne, Dewberry and Paradise Valley for a term of 20 years (January 1st, 2005 to December 31st, 2024). The Vermilion River Regional Solid Waste Management Authority, comprised of the County, Town and Villages mentioned above, manages and operates the waste transfer stations; receives, handles, and disposes of waste.
    - Materials accepted:
        - Cardboard and paper
        - Clean pesticide jugs
        - Used paint
        - Used oil, filters and oil containers
        - Propane bottles ($15)
        - Hazardous waste, rinsed chemical containers
        - Lead-acid batteries
        - Fridge and freezers ($25)
        - Electronic waste (TV and computers only)
        - Used mattress and furniture
        - Yard waste/branches
        - Metal and rolled wire
        - Concrete and rocks
        - Construction material
    - No fees for residents of Town of Vermilion

5. Bi-Annual Cleanup Program
    - Town offers a cleanup program for small household waste, tree branches in 3’ tied bundles, bagged garden waste, electronics (coffee pots, toasters, blenders, etc.), broken toys, books and magazines twice a year

6. Communication Program
    - Town website (http://vermilion.ca)
    - Social media (Facebook and Twitter)
    - “Talk of the Town” newsletter that goes out with utility bill every month
    - Signage at the Recycle Centre and Transfer Station. **Signs need to be updated as the items listed on the website and on signs are not consistent.**

7. Commercial Waste and Cardboard Collection
    - Town provides weekly waste collection services to 261 commercial businesses for $14.92/pickup/week for garbage and $7.87/month for cardboard. For additional pickups the Town charges $32.82/pickup.

Figure 2.1 Vermilion Regional Transfer Station and Vermilion Recycle Centre

2.2 Interviews

Interviews associated with waste management activities were held with:

- Bruce McDuff – Mayor
- Caroline McAuley – Councillor
- Clint McCullough – Councillor
- Robert Pulyk – Councillor
- Dion Pollard – CAO
- Derek Young – Director of Transportation & Utilities
- Keith Wilkinson – Transportation & Utilities Foreman
- Fran Schaumleffel – Transfer Station Staff

Some of the key themes mentioned during the interviews include:

- **Current collection system**

Majority of the people interviewed, like the cart (roll-out bin) system as it encourages recycling and is less labor intensive than collecting bags. The size of cart could be smaller than the current cart (360L) or use the same cart and reduce the collection frequency to bi-weekly (every two weeks). People with back alleys like the dumpsters but it is difficult to tie it to only four houses as other people (county residents) come and dump garbage. Some of the people interviewed think that dumpsters need to go away because they are usually abused, not efficient and would give more access for grading the back allies. Most agree on curbside recyclables and organics collection with alternative bi-weekly garbage and recyclables collection and monthly organics collection during the winter. Some of the interviewees point out that there might be storage problem if three carts are used for three waste streams. Some of the interviewees support pay-as-you throw or tag-a-bag for extra bag of garbage. Some think that there is good participation in the usage of the Recycling Centre and think that the participation would be greater if there was curbside recyclables collection. Most of the people interviewed think that the Town has a composting facility, which is confused with the yard waste pile that is not managed at the shop yard (3905-52 Ave) but all support the idea of having a proper composting facility especially if year round curbside organics collection is started.

Providing service to the commercial sector is unique to this community and more of an incentive to reduce waste but the service should be cost recovery. Currently, the fee is fairly inexpensive. Businesses have a cardboard bin and garbage bin. The cardboard bin is locked and accessed only by business owners but the garbage bins are not. Big bins have zero control and accountability; people throw whatever they want. Businesses need to start using their green bins as well. We need to look for efficient ways to keep cost down. Some interviewees would like to see commercial/industrial garbage being looked after by businesses which at the same time could create another business in Town.

Large item pickup service is discontinued as residents started to abuse it. Residents were putting out appliances such as fridge that has a $ 25.00 fee for Freon. The bi-annual cleanup program is good as people can put unwanted furniture so that others can take it. The Town's community driven Facebook page where people post free items for others to take is quite successful. On the other hand, seniors don't go on Facebook and scavenging at the Transfer Station is not allowed. It would be great if there is a place where people can take their unwanted items for others to use at the Transfer Station.

- **Recycling Centre**

Most of the people interviewed agree that there is no buy-in from county residents but they use the Recycling Centre. Non-residents are supposed to buy a card for $8.00 per month (equivalent to what Town residents pay) but since there is no system in place to check if residents paid, and the bins are outside and unmanned, it is easy to use the service for free. Most agree that the new location for the Recycling Centre is better, clean and convenient but would like to see it fenced and somehow monitored. Some suggested if the Recycling Centre could be open for longer hours or more evenings. The current operation system is labor intensive and has a high cost hence some pointed out the need for new markets for recyclable items and that would be a win-win situation. Most of the interviewees would like the recycling center to start accepting glass.

- **Transfer Station**

It is thought that County residents use the Transfer Station more than Town residents.

- **Goal**

Interviewees stated that the Town could set a goal of 50% - 65% diversion rate by 2020. In 2020, the system will already have been in place for three years and by that time the community will be ready for change and will not have any other options but to do it. However, this requires a great change in thinking, educating the residents, effective communication programs that show examples of end products using recycled items so that residents are encouraged to recycle. All interviewees agree on the importance of enforcement and bans, but they stated that the community is not there yet. But once the system is set then a controlled ban can be implemented. Few agree on newspaper, cardboard and some plastic ban from the landfill.

- **Complaints**

Some of the complaints interviewees received from residents include:

  - Absence of curbside recycling collection program
  - Garbage dumpsters and green bins fill quickly because other residents (from the County) are using them.
  - Business owners are not happy because people are abusing commercial dumpsters by dumping personal garbage.

- **Cost for the service**

Most interviewees stated that if residents see the benefits of getting other services, they would most probably pay more if it is necessary. If there is a better system and saves the community money as a whole then that translates back into taxes and people will be willing to pay. Residents could be informed of program changes via town hall meeting and get a buy-in then implement the new program. It has to be phased-in. Some stated

that they would like to start with cutting the cost, for example by collecting garbage every two weeks and start curbside recyclables collection every two weeks alternatively. Then if needed after educating the residents, the cost could be raised. The people interviewed believe that their community takes incentives well and are willing to change, for example the Town gave the following incentive, if people convert their toilet to low flash; the municipality paid $75 for locally bought toilet or $50 for toilets bought out of Town. That campaign was very successful and shows that people are willing to make changes.

- **Communication programs**

Interviewees stated that the Town currently has a brochure about recycling, recycling awareness day in June, had an open house at the Recycling Centre, weekend re-use event twice a year, and a monthly newsletter 'Talk of the Town' that goes with the utility bill which shows what is going on in the town. However, not so much about recycling has been put on the newsletter, which requires time and resources. Interviewees have also mentioned that schools have waste reduction programs in their curriculum, the college (Lakeland College) has an environmental committee, there is a college representative on the waste commission, and the Town's Facebook page is effectively used. Most of the people interviewed are willing to spend more money on communication and would like a good recommendation.

- **Collaboration with County**

Interviewees agree that there should be a user friendly regional recycling facility that provides service to both Town and County residents with a shared cost. They stated that the Town has a good relationship with the County, but at the moment the County does not believe in recycling, which is a bit challenging. The whole mindset of recycling needs to change. There is a need for the regional waste commission to start thinking this way and encourage waste reduction. They stated that they all (Town, County and the surrounding) need to work together as a region and implement an efficient and cost effective system with new technology that is convenient for all. The amount of waste generated by Town and County residents needs to be tracked at the Transfer Station.

Findings:

- **Interviewees support the use of roll-out bins (carts) for garbage and implementation of curbside recyclables collection every two weeks alternatively.**
- **Interviewee then suggested the need for new markets for recyclables items.**
- **Interviewees agree on cutting the cost by reducing garbage collection frequency and start other programs over time.**

- **Interviewees are willing to spend more money on better communication programs.**
- **Interviewees suggested the need for better collaboration regarding recycling and other waste and diversion programs with the County.**
- **Interviewees agree that the Town could have a 50% - 65% diversion rate by 2020 while educating the residents during the first three years of transition.**
- **Interviewees think that the Town has a composting facility because Town collects yard waste and piles it at the shop yard.**

2.3 Local Research (Desktop Review)

As part of this process the Town's website and a number of documents were reviewed:

- Town website (http://vermilion.ca)
- Town Facebook and Twitter pages
- Brochures (Recycling Program, Waste Collection Program)
- Talk of the Town newsletters
- Town of Vermilion Waste Management Report, July 1999
- Report to the Town of Vermilion with respect to Municipal Waste Minimization Strategies, Phase 1, March 11, 1996
- Residential garbage and recyclables tonnage provided by Town of Vermilion, Transportation and Utilities Department (2006 – 2014)

2.4 Solid Waste and Diversion Data Review

Solid waste and diversion data provided by the Town for 2010 to 2014 was reviewed and analyzed to establish annual solid waste generation and diversion rates and a baseline for measuring future progress.

2.4.1 Garbage to Landfill

The annual amount of residential garbage sent to landfill in 2014 was approximately 1,493 tonnes (accurate data is not available as residential and commercial waste is collected together with the same truck). This includes garbage collected at the curbside from roll-out bins and shared dumpster bins as well as garbage hauled to the Transfer

Station. Based on this data approximately 380 kg/capita is sent to landfill each year; compared to the provincial residential garbage disposal average of 272 kg/capita[1].

2.4.2 Recyclables and Organics

The Town of Vermilion diverted 237 tonnes of recyclables through the Recycle Centre and 139 tonnes through the Transfer Station in 2014. Based on one day organics pick up from twenty six (26) green bins, the Town collects approximately 4.7 tonnes which totals to approximately 94 tonnes during the five months organic collection.

2.4.3 Waste Diversion Rate

Table 2.1 shows the diversion rate for 2014. Diversion rate is equal to the quantity diverted divided by total waste generated. Diversion was achieved through recyclables dropped off at the Transfer Station and Recycle Centre and yard waste from the green bins.

Table 2.1 Residential waste tonnages and diversion rates in 2014

Waste Type (Tonnes)	2014
Landfilled	1,493
Recycled (Transfer Station)	139
Recycled (Recycle Centre)	237
Yard Waste (Green Bins)	94
Total Residential Waste Generated	1,963
Diversion Rate	**24%**

The Town of Vermilion's current residential waste diversion rate (2014) including yard waste (approximate data) is 24%. The percentage of waste that was diverted compared to the percentage that was landfilled in 2014 is illustrated in Figure 2.2.

[1] Based on 2010 Statistics Canada residential waste disposal data and Statistic Canada 2010 Population data

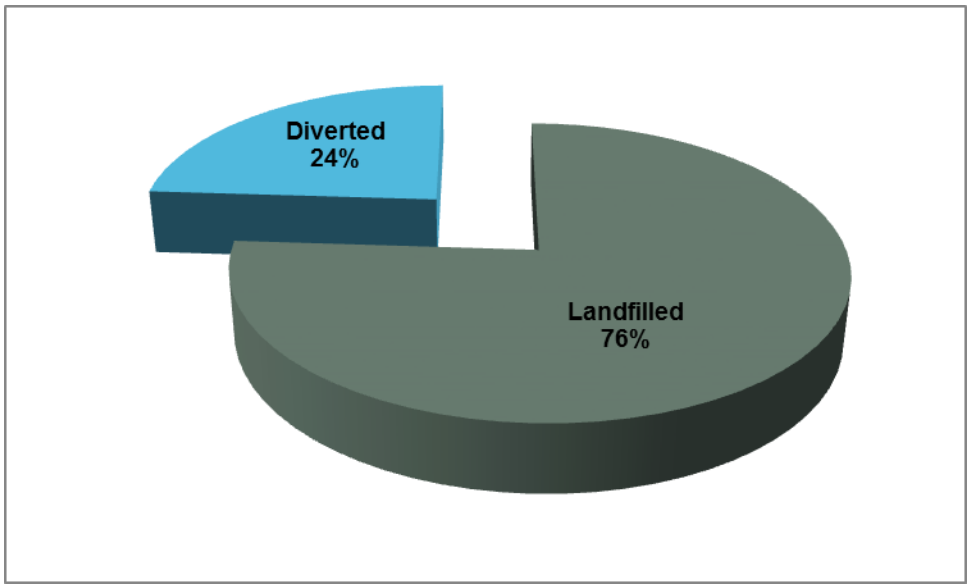

Figure 2.2 Landfilled and recycled residential waste in 2014

Findings:

The Town of Vermilion's current residential waste diversion rate (2014) is 24%.

3.0 WASTE COMPOSITION

3.1 Waste Sort Methodology

Residential garbage from fifteen (15) randomly selected households that use a roll-out bin (cart) each and from three (3) 3 yd^3 dumpster bins that are shared by four households each was collected by the Town on September 23rd, 2015 and transported to the sort location at the Vermilion Transfer Station (1.5 km north of Vermilion on Pare Drive) and was sorted. Households were not informed of the waste sort to ensure households' waste behaviour remained consistent. In addition, a truck load of yard waste from all green bins throughout the Town was collected by the Town and transported to the Town Public Works Yard (3905-52nd Avenue) on September 22nd, 2015 and was sorted on September 23rd, 2015. A team of two persons sorted all the waste.

Figure 3.1 Roll-Out bin (cart) and 3 yd^3 Dumpster Bin for garbage, Green Bin for yard waste

Figure 3.2 Garbage and yard waste delivered for sort

Figure 3.3 Waste sort facility set up before and during waste sort

Waste sort personnel sorted and weighed garbage from the selected roll-out bins and dumpster bins, and organics according to predetermined categories (Table 3.1). Sort categories were identified through interviews, information provided by Town employees and review of existing information (Town website).

Garbage and organics were sorted into pre-weighed 76L (20 gallons) plastic storage totes/baskets and weighed using an ANYLOAD EC100 Counting Scale. The tare weight (tote) was subtracted from the gross weight (tote plus waste) to obtain net weight (waste).

Weights were recorded and analyzed using Microsoft Excel 2010.

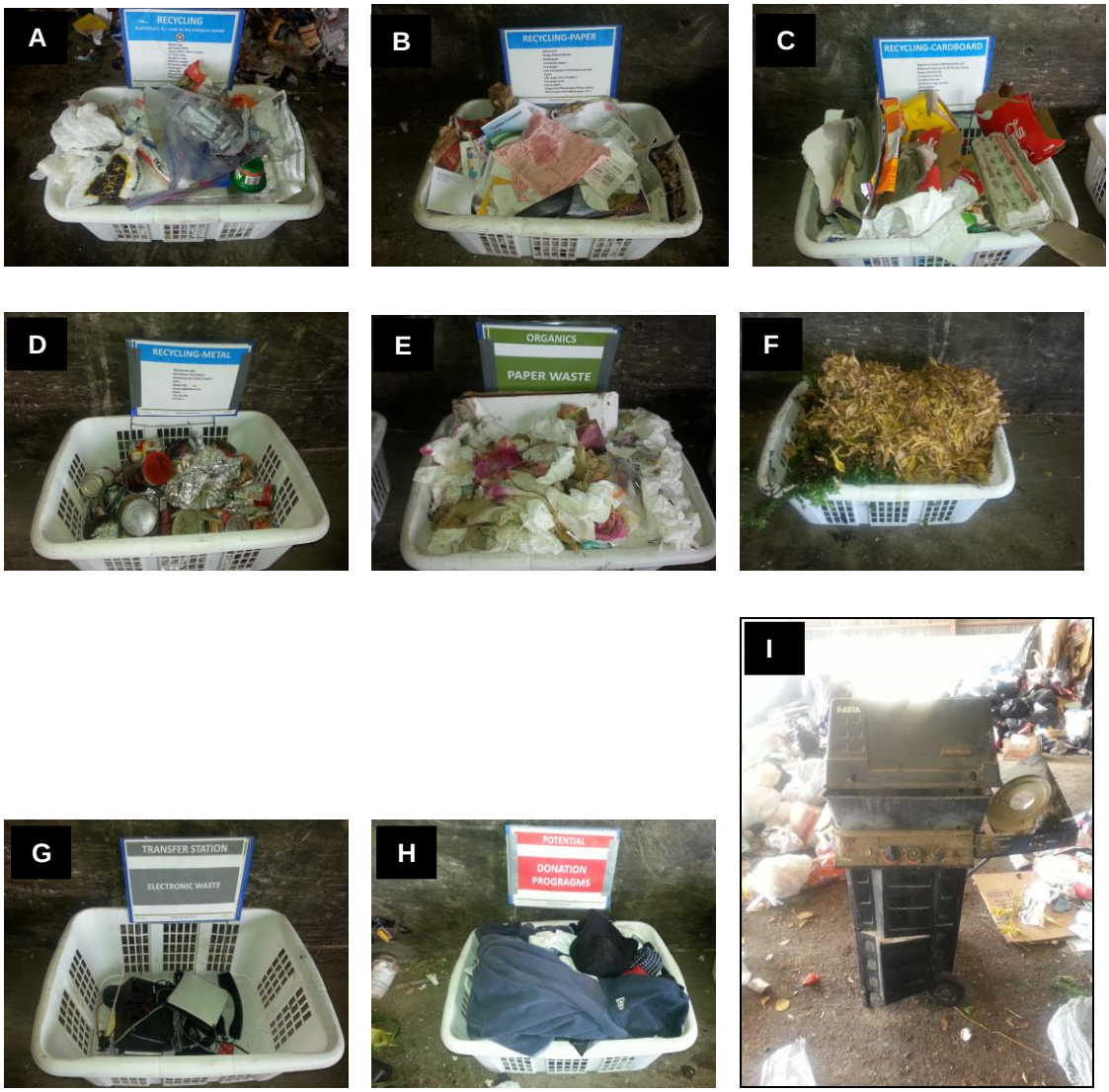

Figure 3.4 Examples of sorted waste: (A) Plastics, (B) Paper, (C) Cardboard, (D) Metal, (E) Compostable paper, (F) Yard Waste, (G) E-Waste (H), Donation Items, (I) BBQ found in one of the dumpsters

Table 3.1 Waste sort categories and subcategories

Town of Vermilion - Waste Sort Categories (2015)			
Category	**Subcategory**	**Abb.**	**Description / Notes**
Garbage	General Waste	**GW**	Non-recyclables & non-organics (e.g. plastic wrappers, chip bags, diapers)
Organics	Food Waste	**Or-FW**	Fruit and vegetable peels/rinds, egg shells, coffee grinds and filters, tea bags, meat, bones and trimmings, soup stocks, household organics (plants), animal litters
	Household Waste	**Or-HW**	Waxed paper, soiled boxboard / pizza boxes, used paper towels & tissue, paper cups/cutlery/plates, brown paper bags
	Yard Waste	**Or-YW**	Grass, branches, plant material
Recycling	Mixed paper	**R-MPa**	Office paper, newsprint, magazines, flyers, phone books, catalogues, cereal boxes, pasta boxes, tissue boxes, paper egg cartons and paper coffee cups (remove lids)
	Metal	**R-Ml**	Steel cans (place lid inside and pinch shut), aluminum foil/wrap, tins, iron
	Plastics 1-7	**R-Pl**	Plastics #1-7 (look for the triangular symbol with a number in the middle, usually on container bottom)
	Beverage /Deposit Containers	**R-Bev**	Tetra packs, glass/plastic bverage containers, milk jugs/gable top containers, pop cans
	Plastic Bags	**R-PlB**	Grocery bags, bubble wrap, boxboard liners
	Corrugated cardboard	**R-Card**	
Other Programs			
Transfer Station	Electronic Waste	**EW**	TVS and computers
	Household Hazardous Waste	**HHW**	Aerosols (any), batteries, light bulbs
	Tires	**Tire**	Passenger tires
	Paint	**P**	Tree branches, Christmas trees
	Scrap Metal	**Met**	
Landfill	Concrete	**C&D**	Clean concrete
Potentials			
Potentials	Glass	**P-Gl**	
	Donation Programs	**P-Don**	e.g., Clothing (good condition)

3.2 Waste Composition

Garbage in roll-out bins (carts) from fifteen (15) single family houses and garbage from three (3) 3 yd^3 dumpster bins were collected and sorted at the Vermilion Transfer Station.

3.2.1 Composition of Garbage from Roll-Out Bins to Landfill

During the waste sort, the following garbage (to landfill) characteristics were noted:

- General garbage was largely composed of plastic containers (not recyclables or not clean), styrofoam cups and plates, hygiene and sanitation products, diapers, food wrappers and snack/food bags, soiled plastic containers, soiled aluminum foil and foil gift wraps.
- Organics was largely composed of leftovers (e.g. bread, meat and vegetables, yard and paper waste, etc.
- Recyclables in garbage were largely composed of mixed paper, plastics (#1-7), cardboard and box board. Metal (food cans), glass and beverage/deposit containers were also regularly encountered.
- Majority of the organics in garbage were food waste and then yard waste.
- Potential recyclables were mainly composed of clothing (good condition) and books.
- Electronic materials were uncommon and included phones and cables.
- Household hazardous waste was uncommon and included aerosol containers and batteries.
- No tires, scrap metal, large items (household items) and tree branches were encountered during the waste sort.

A summary of garbage from roll-out bins composition by weight is provided in Figure 3.5. As illustrated, organics was the largest component of garbage by weight (62%), followed by garbage (15%). Twelve percent (12%) of sorted garbage was comprised of recyclables and 9% was comprised of potential recyclables. Items that should be taken to the Transfer Station comprised 2% of the total garbage sorted (Fig. 3.5).

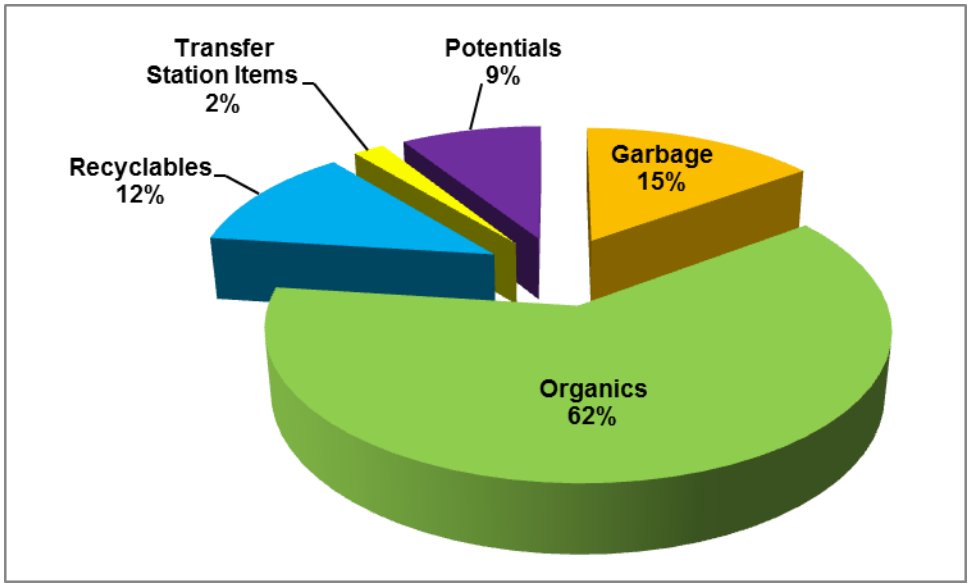

Figure 3.5 Composition of garbage (from roll-out bins (carts)) to landfill by weight

As shown in Figure 3.6, forty two percent (42%) of the organics found in the garbage is food waste while 12% is yard waste. Mixed paper, cardboard, metal, plastics, beverage containers and plastic bags comprised approximately twelve percent (12%) of the garbage sent to landfill.

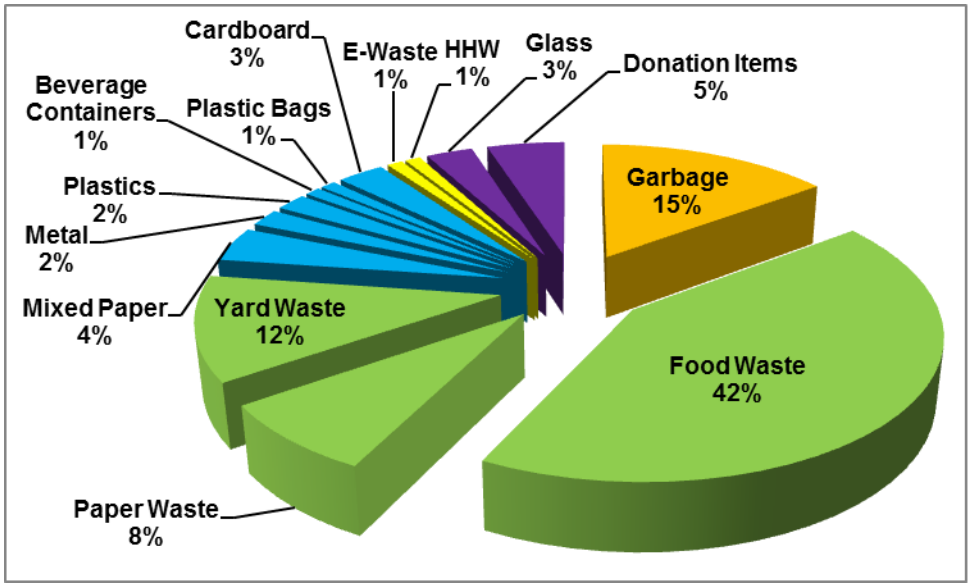

Figure 3.6 Composition of garbage (from roll-out bins (carts)) to landfill by weight by category

3.2.2 Composition of Garbage from 3yd^3 Dumpster Bins to landfill

During the waste sort, the following garbage from three dumpster bins (to landfill) characteristics were noted:

- General garbage was largely composed of diapers, plastic containers (not recyclables or not clean), styrofoam cups and plates, hygiene and sanitation products, food wrappers and snack/food bags, soiled plastic containers, soiled aluminum foil, foil gift wraps, toys, and broken glasses.
- Organics was largely composed of leftovers (e.g. bread, meat and vegetables, yard and paper waste, etc.
- Recyclables in garbage were largely composed of mixed paper, plastics (#1-7), cardboard and box board. Metal (food cans), glass and beverage/deposit containers were also regularly encountered.
- Majority of the organics in garbage were food waste and then yard waste.
- Potential recyclables were mainly composed of clothing (good condition) and toys.
- Electronic materials were uncommon and included radio and cables.
- Household hazardous waste was uncommon and included aerosol containers, and batteries.
- Construction waste was uncommon and included concrete.
- A barbeque (scrap metal) was encountered during the waste sort.

A summary of garbage from dumpster bins composition by weight is provided in Figure 3.7. As illustrated, organics was the largest component of garbage by weight (58%), followed by Transfer Station items (15%). Twelve percent (12%) of sorted garbage was comprised of recyclables and 12% was comprised of garbage. Potential recyclables comprised 3% of the total garbage sorted (Fig. 3.7).

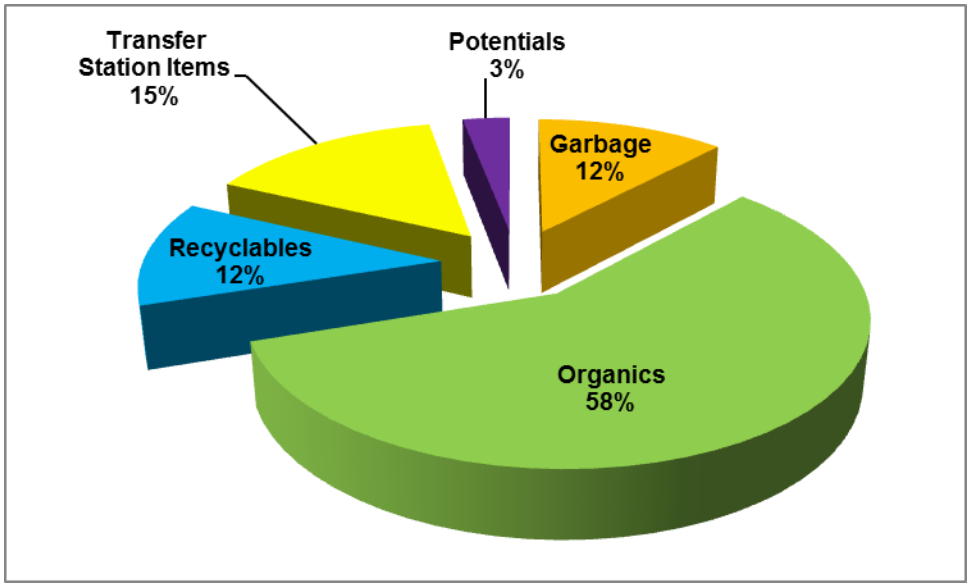

Figure 3.7 Composition of garbage (from 3 yd^3 dumpster bin) to landfill by weight

Figure 3.8 below illustrates that thirty one percent (31%) of the organics found in the garbage is food waste while 24% is yard waste. Mixed paper, cardboard, plastics, metal, beverage containers and plastic bags comprised approximately twelve percent (12%) of the garbage sent to landfill. Majority (14%) of the Transfer Station items is comprised of scrap metals and majority of the potential recyclables is comprised of glass (2%).

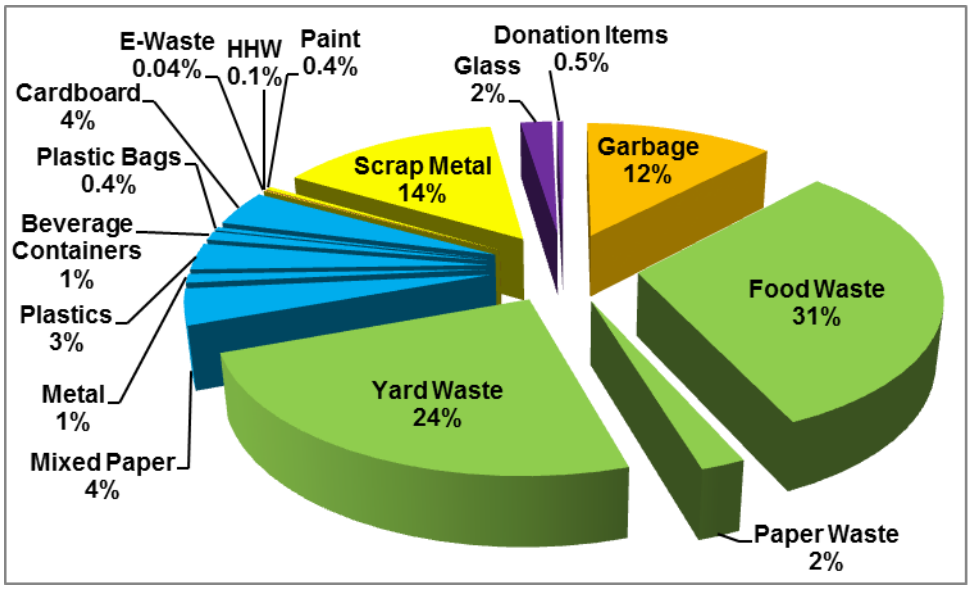

Figure 3.8 Composition of garbage (from 3 yd^3 dumpster bin) to landfill by weight by category

Table 3.2 summarizes the weight data for sorted garbage sent to landfill from selected roll-out bins (carts) and 3 yd^3 dumpster bins.

Table 3.2 Summary of garbage from roll-out bins and dumpster bins to landfill data

Composition of Garbage to Landfill					
		Roll-Out Bins		Dumpster Bin	
Category	Subcategory	Net Weight	% Weight	Net Weight	% Weight
Garbage	Garbage	16.8	15.3%	15.8	12.4%
Organic Waste	Food Waste	46.8	42.6%	39.8	31.2%
	Paper Waste	8.3	7.6%	2.7	2.1%
	Yard Waste	13.3	12.1%	31.0	24.3%
Recyclables	Mixed Paper	4.2	3.8%	4.4	3.5%
	Metal	1.8	1.6%	1.5	1.2%
	Plastics (#1-7)	2.0	1.8%	3.6	2.9%
	Beverage / Deposit Containers	0.9	0.8%	1.2	0.9%
	Plastic Bags	1.3	1.2%	0.6	0.4%
	Cardboard (corrugated)	3.0	2.7%	4.6	3.6%
Transfer Station Items	Electronic Waste	1.5	1.4%	0.1	0.04%
	Household Hazardous Waste	0.6	0.6%	0.1	0.1%
	Paint			0.6	0.4%
	Scrap Metal			18.3	14.4%
Potentials	Glass	3.6	3.2%	2.8	2.2%
	Donations Items	5.9	5.3%	0.5	0.4%
Total Garbage		**16.8**	**15.3%**	**15.8**	**12.4%**
Total Organics		**68.4**	**62.4%**	**73.4**	**57.7%**
Total Recyclables		**13.0**	**11.9%**	**15.9**	**12.5%**
Total MRF Items		**2.1**	**1.9%**	**19.0**	**14.9%**
Total Potentials		**9.4**	**8.6%**	**3.2**	**2.5%**
GRAND TOTAL		**109.7**	**100%**	**127.4**	**100%**

3.2.3 Composition of Yard Waste for Composting (Green Bins)

A truck load of yard waste (4,700kg) from green bins was transported to the Town Public Works Yard and sorted. Contamination was insignificant (approximately 4.17kg (0.1%) comprised of rocks, glasses, plastic contianers, plastic bags, coffee cups, Tim Hortons boxes).

Findings:

1. **Twelve percent (12%) of the total garbage sorted from roll-out bins (carts) and 24% of total garbage sorted from 3 yd^3 dumpster bins is yard waste which should have been taken to the green bins.**
2. **Fifty percent (50%) of the total garbage sorted from roll-out bins (carts) and 33% of the total garbage sorted from 3 yd^3 dumpster bins is organics (food and paper waste) that can be composted.**
3. **Twelve percent (12%) of the garbage sorted from roll-out bins (carts) and 12% of the garbage sorted from the 3 yd^3 dumpster bins is recyclables that could be taken to the Vermilion Recycle Centre.**
4. **There are more items that could be donated in the garbage sorted from roll-out bins (carats) (5%) than in the garbage from 3 yd^3 dumpster bins (0.4%).**
5. **There are more items that could be taken to Transfer Station in the garbage sorted from 3 yd^3 dumpster bins (15%) than in the garbage sorted from roll-out bins (carts) (2%).**
6. **Approximately twelve to fifteen percent (12% - 15%) of the total garbage sorted needs to be landfilled.**
7. **The green bins for yard waste seem to be the most effective as there was almost no contamination (0.1%).**
8. **3 yd^3 dumpsters allow improper disposal of large items (Fig. 3.4 (l))**
9. **Roll-out bins (carts) encouraged more separation and diversion.**

3.3 Annual Waste Composition Results

3.3.1 Estimated Annual Garbage Generation Rates

Table 3.3 provides an estimate of annual disposal of materials that end up in landfill based on garbage composition data.

Table 3.3 Estimated annual garbage sent to landfill by disposal material

Category	Subcategory	Estimated Annual Total Garbage Disposed (Tonnes)	Annual % of Weight Stream
Garbage	Garbage	199	13%
Organic Waste	Food Waste	553	37%
	Paper Waste	75	5%
	Yard Waste	269	18%
	Total Organics	**897**	**60%**
Recyclables	Mixed Paper	60	4%
	Metal	22	2%
	Plastics (#1-7)	37	3%
	Beverage / Deposit Containers	15	1%
	Plastic Bags	10	1%
	Cardboard (corrugated)	52	4%
	Total Recyclables	**196**	**13.1%**
Transfer Station Items	Electronic Waste	8	1%
	Household Hazardous Waste	8	1%
	Paint	3	0.2%
	Scrap Metal	105	7%
	Total TS	**124**	**8.3%**
Potentials	Glass	37	3%
	Donations	40	3%
All Categories	**Total**	**1,493**	**100%**

Based on the waste sort, annual tonnes of garbage disposed of are estimated to be 1,493 tonnes from roll-out bins (carts), 3yd^3 dumpster bins and garbage hauled to the Transfer Station. Based on the waste composition result, approximately 269 tonnes of yard waste could have been diverted through the green bin program. Figure 3.9 provides an estimate of the annual garbage that ends up in landfill in tonnes available to be captured by diversion programs.

Based on the waste composition results, the Town is not capturing the available organic stream (food, paper and yard waste) which comprises 60% (897t) of total garbage stream (1,493t).

Based on the waste composition results, if all recyclables and yard waste are captured; **approximately 39% (589t) of the total garbage stream could be diverted through current diversion programs**: 13% (196t) through the Recycle Centre, 8% (124t) through the Transfer Station, and 18% (269t) through the green bins program.

Based on the waste composition results, if the Town starts organics collection for food waste and compostable paper waste, approximately 42% (628t) of the total garbage stream can be composted. At the end the total garbage stream from roll-out and dumpster bins that need to be taken to Beaver Landfill in Ryley could be approximately 13% (199t).

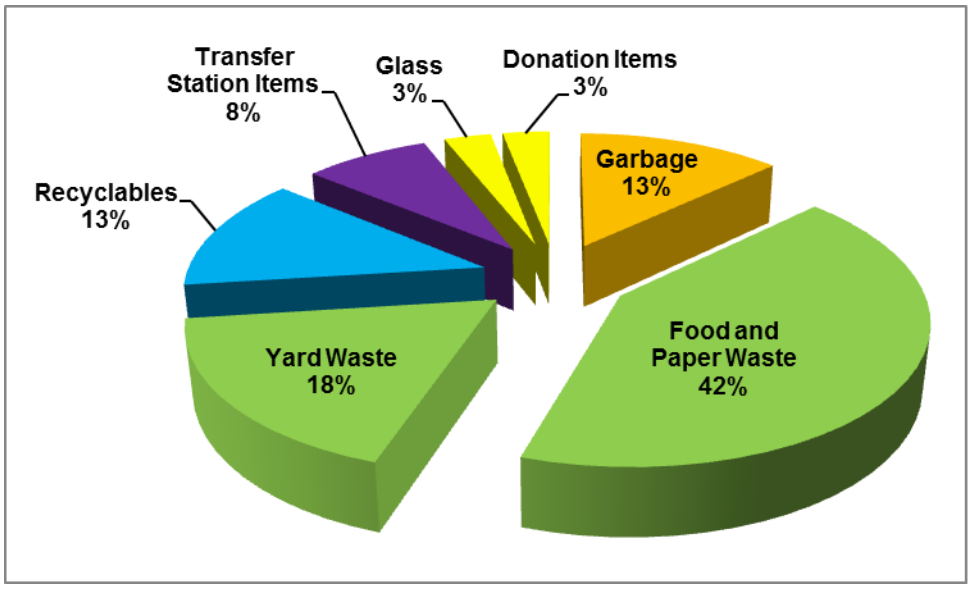

Figure 3.9 Percentage of garbage composition sent to landfill

Findings:

- **Overall thirty nine percent (39%) of total garbage could be diverted through existing programs as follows:**
  - **13% (196t) and 8% (124t) recyclables could be taken to the Vermilion Recycle Centre and the MRF at the Transfer Station respectively.**
  - **The green bin program could capture additional 269t (18%) of yard waste that is ending up at the landfill.**
  - **628t of organics (food and compostable paper waste, 42%) from roll-out bins (carts) and 3 yd^3 dumpster bins.**

3.3.2 Annual Curbside Diversion Capture Rates

Based on waste sort data, capture rates for the current diversion programs are provided in Table 3.4. Capture rate is equal to the total organics or recyclables collected through diversion programs (Recycle Centre, Transfer Station, green bins) divided by the total organics or recyclables available in the total waste generated by residents (roll-out bins, dumpster bins, green bins, Recycle Centre, and Transfer Station).

	Material	Annual Available (Tonnes)	Total Captured (Tonnes)	Capture Rate	Potential + Actual Diverted	Actually Diverted
Organic Waste	Food Waste	553	0	0%	28%	0%
	Paper Waste	75	0	0%	4%	0%
	Yard Waste	363	94	21%	18%	5%
	Total Organics	**990**	**94**	**9%**	**50%**	**5%**
Recyclables	Recycle Centre	433	237	35%	22%	12%
	Transfer Station	263	139	35%	13%	7%
	Total Recyclables	**696**	**376**	**35%**	**35%**	**19%**

Table 3.4 Capture and diversion rates for diversion programs

The green bin program has a capture rate of 9%, recyclables dropped off at the Recycle Centre has a capture rate of 35% and items that could be recycled through the Transfer Station has a capture rate of 35%.

Figure 3.10 shows the comparison of annual percentage of materials actually diverted through the Recycle Centre, Transfer Station and green bin program and annual percentage of materials that could potentially be diverted if 100% of organics (food waste, paper waste and yard waste) and recyclables in the total waste streams (roll-out and dumpster bins) are diverted.

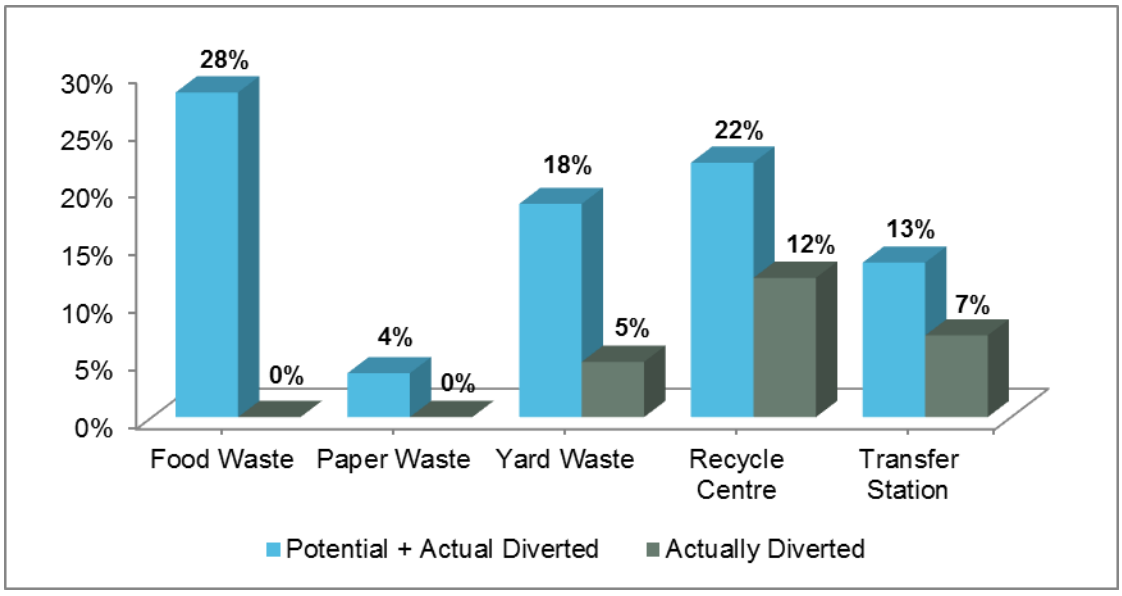

Figure 3.10 Actual and potential + actual diversion rates

Findings:

- **The green bin program has a capture rate of 9%, the Recycle Center and Transfer Station have a capture rate of 35%.**

- **Approximately forty five percent (45%) of organics and sixteen percent (16%) of recyclables (Recycle Centre and Transfer Station) end up in a landfill.**

3.4 Greenhouse Gas Savings

Table 3.5, below shows estimated annual greenhouse gas (GHG) savings that are achieved through Town of Vermilion's residential diversion program based on the 2014 data provided by the Town and the equivalencies of these savings.

Table 3.5 Greenhouse gas savings from diversion (2014)

GHG Savings (eCO_2)	Number of Items
766t of materials diverted from landfill is equivalent to any one of the following	
Annual CO_2 emissions from  **Passenger Cars**	32.5
CO_2 emissions from  **Barrels of Oil Used**	359
CO_2 emissions from  **Tanker Truck's Use of Gasoline**	2
Annual CO_2 emissions from  **Energy Use of Homes**	14.1
Carbon Sequestered from  **Tree Seedlings (grown for 10 years)**	3,954

Source: EPA GHG Equivalencies Calculator

4.0 OTHER MUNICIPALITIES SYSTEM REVIEW

Other Municipal Systems Review summarizes the findings from researches and interviews with other municipalities. The following municipalities were reviewed:

1. St. Albert, Alberta
2. Strathcona County, Alberta
3. Leduc, Alberta
4. Windsor, Nova Scotia
5. Leaf Rapids, Manitoba
6. Boulder, Colorado

4.1 Summary

Table 4.1 provides a summary of the solid waste management programs currently provided by selected municipalities in Alberta. Details on these programs are provided in the subsequent sections.

Table 4.1 Solid Waste Management Systems – Selected Municipalities

Municipality	Waste Collection		Recycling		Organics		Diversion Rate	Rates (/month/hh)
	Automated	Bag Limit	Curbside	Depot	Curbside	Depot		
Vermilion	√	-	-	√	Yard Waste	-	**24%**	**$27.41**
St. Albert	√	PAYT Subs.	Blue Bag	√	Food & Yard Waste	Yard Waste	**65.9%**	**PAYT subs. ($18.81 to $27.02)**
Strathcona County	√	1 Cart	Blue Bag	√	Food & Yard Waste (Carts)	Yard Waste	**61%**	**$25.50**
Leduc	√	1 Cart	Blue Bag	√	Food & Yard Waste	Food & Yard Waste	**52%**	**$21.50**

4.2 ST. ALBERT, ALBERTA

Table 4.2. St. Albert Solid Waste Management Program Summary

Community		St. Albert
Contact		Christian Benson, Solid Waste Program Coordinator Ph: (780) 418 6699 E-mail: ebenson@st-albert.net
Demographics		Population: ~ 60,138 (2011) # of Households: 20,918
Waste Tonnages		Residential: 119 kg/person (2013)
Diversion Rate		66% (residential waste diversion - 2013)
Waste Collection		Automated every two weeks (in house collection) Pay as You Throw system with 3 bin size: 60 liter $1.06/month 120 liter $4.50/month 240 liter $9.27/month Extra Garbage Bag Tags (refuse stickers) if required: $2.25 Extra garbage is not picked up at the curb, if property tagged can be taken to the waste bin at the Recycling Depot.
Recycling		Blue Bag (no limits) weekly collection. $4.90/month.
Organics		Automated food and yard organic collection. Weekly in summer, biweekly in winter (May-November). Residents can choose between two sizes of organic card with no different fee structure: 120 litre $5.72/month 240 litre $5.72/month
Waste Bans		None
Commercial		Private hauler for collection
	Large Item Collection	• 'Take-it-or-leave-it' event once/year. Every June people drop off items and pick up items they want at Servus Place north parking lot from 8am to 1pm • Christmas trees pick up. • Large Junk Drop Off Event. Residents need to use garbage tags to dispose of their junk. Each item will require two (2) garbage tags ($2.18/each)

	HHW	• Recycling depot accepts household hazardous waste (paint, household cleaners and chemicals, used oil, oil filters, oil containers, scrap metal) effective October 1, 2011 • One-day Household Hazardous Waste Roundup.
Recycling	**Depot**	• Manned Recycling depot. Municipally run. • Currently depot accepts electronics, newsprint, flyers, clean waste paper, mixed paper, magazines, phone books, cereal and food boxes, corrugated cardboard, metal cans, brown, green or clear glass jars. • The depot does not accept some electronics (microwaves, DVD and VHS players, radios, cameras, cell phones, lamps, vacuum cleaners, telephones, stereo), plastics, styrofoam, and miscellaneous & contaminated items. • Unmanned Compost Depot for people to bring their yard waste (branches, leaves, hay, straw, grass clippings, flowers, shrubs, soil, wood chips, sod). • Compost Give Away twice a year; spring and fall – people bring their utility bill to Public Works yard to prove they are a resident then they get 2 free bags of compost. • Cost to operate compost depot: $ 179,500/yr., which includes staff costs, equipment and contracts.
Public Communication		• Website • Editorials in Newspaper • Utility Bills • Collection Schedule
Goals		• Reduce solid waste generation to 125 kilograms or less per person per year by 2020 • Increase diversion rate to 65% by 2020

4.3 STRATHCONA COUNTY, ALBERTA

Table 4.3. Strathcona County Solid Waste Management Program Summary

Community	Strathcona County
Contact	Leah Seabrook, Coordinator Ph: (780) 416-6797 Email: Seabrook@strathcona.ab.ca
Demographics	Population: 87,998 (2011) # of Households: ~ 30,000 (single family & multi-family)
Diversion Rate	61% (2014) • Diversion rate is net of the contamination rate in the organic (data provided monthly from the Compost facility)
Waste Collection	Automated cart system – 1 cart limit (black in colour) Every two weeks collection. Extra waste and organics carts are available for an additional monthly fee.
Recycling	Manual Curbside Recycling – clear blue plastic bag. Weekly collection-no limits. Material collected and processed by Ever Green.
Organics	Automated cart system for food and yard waste (green carts) Extra organics carts are available for an additional monthly fee Weekly collection for 3 month and every two weeks for 9 month. Material processed at Henry Hill compost facility.
Waste Bans	Electronics, paint, oil, ties – Alberta Stewardship Program By-law that states what waste is and what organics are. Semi-permanent facility – Enviroservice program (open 6 months of the year) for materials like electronics, paint.
Commercial	Starting an ICI pilot project in 2010 – diversion of all materials where applicable. Would tailor to the specific waste streams generated in the business and will be targeting as much as they can

Program		
Fees		• Waste management services are rolled into one. Utility bill (recycling & waste collection are combined). The cost per household for 2014 was $25.50 per month. Extra waste and organics carts are available for an additional monthly fee.
Waste Collection	**Waste Limits**	• 1 cart limit each for garbage (carts must weigh less than 200 lbs) and organics. • No limit for recyclables.
	Large Item Collection	• Christmas trees are collected in January from curbside (cut into four-foot sections). • Large items (max 2 items) are picked up at curbside in spring and fall. • Items must be less than 6ft by 3ft and weigh less than 200lbs. (90kg) • Have to bring items to Enviroservice event (2X/month from May to October) or you are charged $6.00/item for curbside pickup which is only twice per year (spring & fall) and only two items allowed per household. • There are also re-use opportunities – Reuse Centre in Edmonton at 10004 – 103 A Avenue, Reuse Directory (where to take items) and Reuseit Network – free website to post descriptions & pictures of items to give away

Program		
	HHW	• Accepted at Streambank Avenue Recycling Centre during the Enviroservice event held every two weeks from May to October. • Electronics can also be taken to Staples Business Depot, ECO Station. • Extra waste can be taken to Enviroservice event for an extra fee. • Items such as commercial hazardous and biomedical waste, expired medication, explosives, radioactive waste, munitions, fireworks, and pressurized gases are not collected at Enviroservice events. • Accepted at Streambank Avenue Recycling Centre • Enviroservice event replaces the household hazardous waste roundup. • Only drop-off twice/month from May to October.
	Depot	• There are 4 recycle stations within Strathcona County which are municipally operated (Baseline Road Recycling Station, Ardrossan Recycling Station, South Cooking Lake Recycling Station and Streambank Avenue Recycling Station). • All recycling stations are open 24/7. • All stations except Streambank Avenue accept corrugated cardboard, glass jars, metal cans, mixed paper, newspaper, all kinds of plastics and Styrofoam. • Streambank Avenue Recycling Station accepts grass clippings, leaves and yard waste. • The recycle stations are not manned 24/7 but there is staff present and rotating between stations each day. • The depots allow people in apartments, condos and commercial businesses to recycle because the program is not set up for them. • It is open 24/7 and is not manned and thus sometimes there is a lot of contamination in the bins and outside lots of negligence.
Landfill		• Roseridge Regional Landfill – located out by Morinville, AB.

Program	

Public Communication	• Strathcona County Reduction of Abandoned Products Program (SCRAP):
	  ○ Flexible program to encourage residents to remove abandoned products on their own initiative
	  ○ Offers information on how to safely dispose of or recycle abandoned products
	  ○ Educates residents on wetlands environmental contamination problems
	  ○ Formalizes partnerships with industry and the County residents to sustain this education and awareness program
	• Green gardening workshops about plants that conserve water and how using compost can really green your garden on April 17, 2012 for $10 per person.
	• County sales Category A compost to the residents.
	• Run backyard composting workshops and sell composters in the spring at a subsidized rate for residents.
	Annual calendar containing all the information regarding collection schedule, special events, recycle station, etc.

Goals	• They would like to reduce waste, reduce transportation to far away landfill, increase environmental awareness and provide efficient and economical services

4.4 LEDUC, ALBERTA

Table 4.4. Leduc Solid Waste Management Program Summary

Community	City of Leduc
Contact	Kerra Chomlak Ph: (780) 980-8442 Email: Seabrook@strathcona.ab.ca
Demographics	Population: 27,241 (2013) # of Households: ~ 9,789 (2011)
Diversion Rate	52% (2013) Diversion rate is net of the contamination rate in the

		organic (data provided monthly from the Compost facility)
Waste Collection		Automated cart system – 1 cart limit (65 gallons) Every two weeks collection Material disposed at the Leduc Landfill
Recycling		Manual Curbside Recycling – clear blue plastic bag. Weekly collection-no limits
Organics		Automated cart system – 1 cart limit (65 gallons) Weekly collection for 6 month and by-weekly for 6 month.
Fees		• Waste management services are rolled into one. Utility bill (recycling & waste collection are combined). The cost per household for 2014 was $21.50 per month.
Cards		Leduc owns the carts and provides the maintenance and new deliveries with internal staff. The initial delivery was provided by Ever Green in combination with the carts provider.
Waste Collection	**Waste Limits**	• 1 cart limit each for garbage and organics • At the Recycling center one bag of household waste is accepted free of charge and any additional bags are $2/bag. • No limit for recyclables
	Large Item Collection	• Christmas trees are collected in January from curbside • Large items are picked up at curbside for one week in May
	HHW	Accepted at the Recycling Centre all year round
	Depot	There is a manned recycle station in Leduc that accept blue bag recycling products, E-waste, household hazardous waste, old clothing and additional bags of waste year round.
Public Communication		• Web site • Annually calendar
Goals		• Increase diversion rate to 65% by 2021

4.5 WINDSOR, NOVA SCOTIA

Organics Ban at Landfill

In 1999 Nova Scotia's Environment Department implemented a ban on organics from landfills and required that 50 per cent of waste to landfills be diverted by 2000. In order to comply with this ban, Windsor, Nova Scotia a town of 3, 725, implemented an Organicarts program. Windsor has achieved waste diversion results of approximately 60% and has experienced success with both commercial and residential waste.

A key to the success of the Organicarts Program has been an extremely effective public communications program.

4.6 LEAF RAPIDS, MANITOBA

Plastic Bags Ban

In April of 2007, Leaf Rapids, Manitoba became the first community in North America to legislate a ban on single-use plastic shopping bags. With the support of various community members, business leaders and municipal councillors over 2 years a bylaw banning single use plastic bags was created. Under the bylaw (attached in Appendix A): " ***the Town of Leaf Rapids will be Single Use Plastic Shopping Bag free effective April 2, 2007 and retailers in the Town of Leaf Rapids will not be permitted to give away or sell plastic shopping bags that are intended for single use."*** Enforcement of the bylaw is based largely on complaints.

Before implementing the ban, the City distributed 5 free reusable bags to each household. Retailers were then required to charge $0.03/bag. After approximately one year, the ban was put in place. Education and public communication were keys to the success of the program.

4.7 BOULDER, COLORADO

Zero Waste Community

In 2006, the City of Boulder in Colorado passed a resolution to pursuit Zero Waste as a long term goal. A copy of this resolution is provided in Appendix B.

The city's current solid waste management program includes the following programs:

1. Recycling Cart: comingled collection of recyclables with collection every other week. Costs for this program are covered by the base trash rate.
2. Organics Collection: food collection in a 32 gallon cart, yard waste in up to 3 bags – every other week.
3. Yard Waste Drop-Off Site.

The total budget for this program is $320,000/year which comes out of a "trash tax" paid by both the commercial and residential sectors (67% from the commercial trash tax and 33% from residential).

The current program also includes the following initiatives to encourage commercial waste diversion:

1. Free Recycling Coupon: The City provides a coupon for recycling collection for first three months of service if the business signs up for long term service.
2. Business Incentive: Businesses receive $2.50 per subscribed cubic yard of compost collection.
3. Wood Waste Drop off: 50% off standard disposal rate.
4. Yard Waste Drop off: 40% off standard disposal rate.

The typical cost per household/month is:

• Bag Service	$3.50/month
• Trash Bill	$10.50/month
• Cart Service	$11.50/month
• Trash Tax	$3.50/month
Total	$29.00/month

In its plan to achieve Zero Waste (the City has selected 85% diversion as a goal) the City has or is considering implementing the following programs:

1. Full organics curbside collection
2. Curbside recyclables collection
3. Recycling depot
4. Institute reporting requirements for recycling haulers
5. Develop Recycle Row project – a one stop-shop where Boulder residents and businesses can access facilities to meet all their waste reduction and recycling needs:
    a. E-Recycling facility

   b. ReSource – used building materials yard
   c. Household hazardous waste and small business hazardous waste facility
   d. Yard waste drop-off centre
   e. Yard and food waste composting centre
   f. County recycling drop-off centre
   g. Education centre – where visitors can learn about green building techniques, alternative energy and energy conservation options

   The goal is to create a market development zone for recycling-related business.
6. Implement and expand commercial assistance programs (i.e. Free Recycling Coupon)
7. Ban e-scrap
8. Coordinate a multi-family complex volunteer coordinator network – goal is to increase recycling in multi-family complexes
9. Construction and demolition recycling bond
10. Investigate more aggressive residential “pay as you throw” ordinance
11. Implement minimum multi-family unit recycling requirement
12. Legislate commercial recycling goal
13. Increase or rebate the Trash Tax for commercial business
14. Institute a commercial source-separation ordinance
15. Mixed Waste Construction and Demolition Debris Recycling Centre
16. Implement local producer “take back” laws

5.0 SURVEY

The survey was designed in a questionnaire format to provide the Town of Vermilion residents with information regarding their current waste management system and some waste reduction alternatives. Questions were based on the consultants’ experience regarding suitable waste management alternatives and the input provided by the Town staff.

The survey was mailed out to 1,466 households with utility bills. The survey was also put on Survey Monkey, survey software and questionnaire tool, and made available for the residents. One hundred and four (104) online responses of which one (1) duplicate response was disqualified and ninety nine (99) hard copy responses were collected. A total of **202 responses** were analyzed. A sample of the survey form is in Appendix C.

5.1 Response Rates and Results

In order to test for non-response bias; the responses (representing their households) by population category were compared to the actual population percentages. For example, the percentages of responses from respondents between the ages of 25 to 44 were compared to the percentage of Town of Vermilion adult population between these same ages. As illustrated in Figure 5.1, the response rate of residents between age 20 and 24 is lower than the actual percentage of population; while the response rate from the age categories 25 to 65+ is well represented. In general responses follow the approximate distribution of the population.

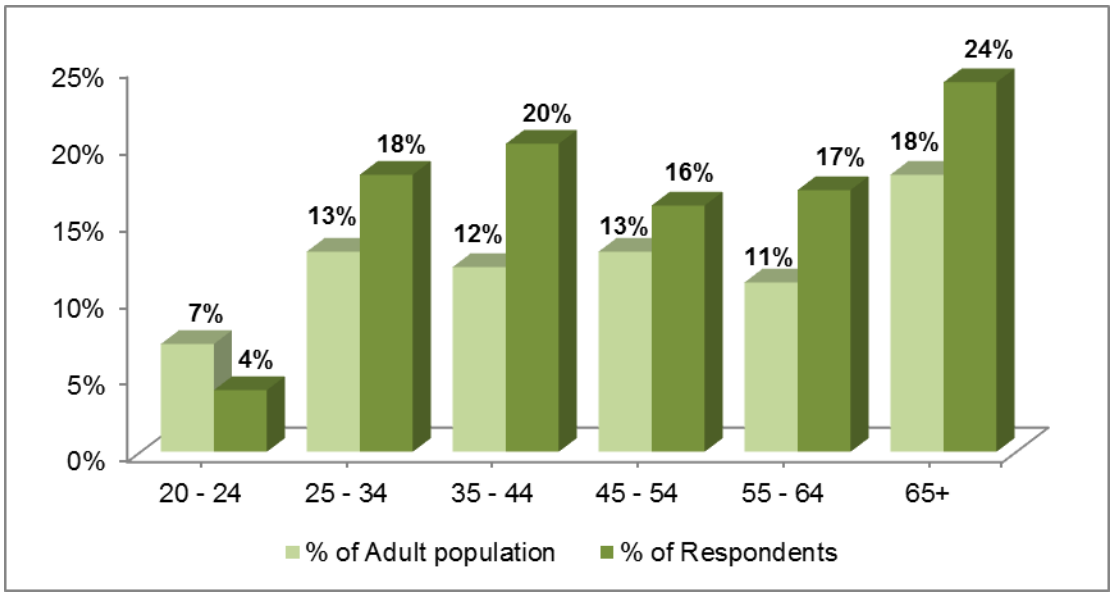

Figure 5.1 Comparison of response rates to population percentage

Table 5.1 Population percentage and response rate

Population	Town of Vermilion	%	Survey Total	%
Total Population	3,930		202	5%
Under 19	990	25%	1	0%
20 - 24	270	7%	9	4%
25 - 34	530	13%	37	18%
35 - 44	470	12%	40	20%
45 - 54	530	13%	32	16%
55 - 64	435	11%	34	17%
65+	705	18%	49	24%

Based on a population of 3,930 and assuming random sampling, responses provide a confidence interval of 6.72 with a confidence level of 95%. For example, if 85% of the respondents answer yes to a particular question then the Town can be 95% sure that the actual population would respond yes between 78% and 92% of the time.

Responses for each survey question are provided below.

The purpose of Questions 1 and 2 is to gage the demographic that responded to the survey. Analysis of the population response was provided at the beginning of this section and was used to identify the potential for non-response bias.

Question 1: What is your age?

□ Under 19	□ 35 – 44	□ 65+
□ 20 – 24	□ 45 – 54	
□ 25 – 34	□ 55 – 64	

As illustrated in Figure 5.2, fifty four percent (54%) of Town's survey respondents were in the 25-54 age categories, while forty one percent (41%) were in the age group 55-65+. According to the City's 2014 Census Report about thirty eight percent (38%) and twenty nine percent (29%) of the Town's population are within the age group of 25-54 and 55-65+ respectively. **This shows that the response rates are overall representative of the population.**

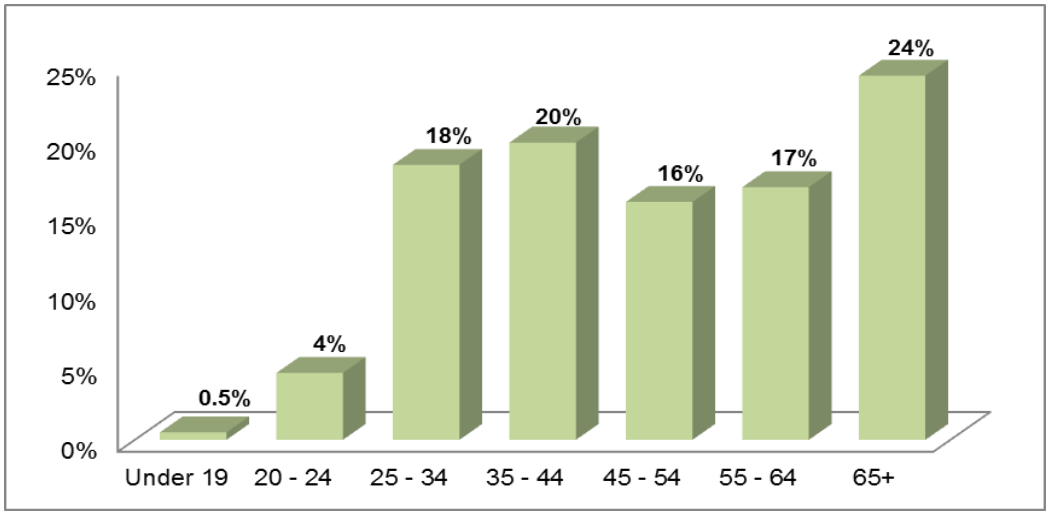

Figure 5.2 Age group responses

Question 2: What is your gender?

☐ Female ☐ Male

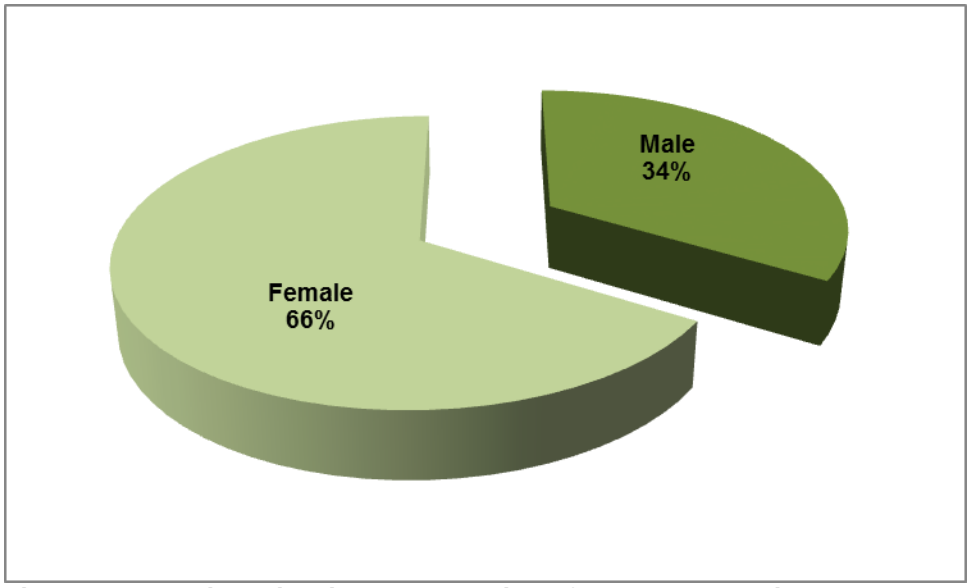

Figure 5.3 Female and Male representation of survey respondents

Question 3: What type of dwelling do you live in?

- ☐ Single Family Household
- ☐ Duplex
- ☐ Townhouse
- ☐ Condominium
- ☐ Apartment

The purpose of Question 3 is to determine differences in opinion between occupants of various housing types.

Figure 5.4 shows that ninety five percent (95%) of the survey respondents live in single family houses, two percent (2%) live in duplexes, one percent (4%) live in townhouses, and two percent (2%) of the survey respondents live in multi-family houses (condominium and apartment).

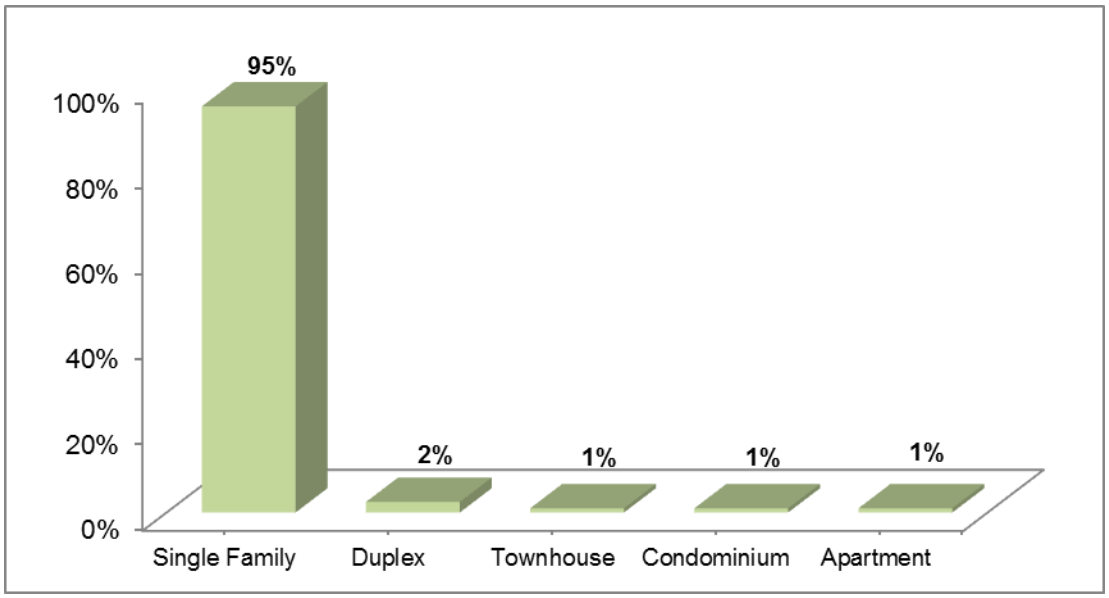

Figure 5.4 Type of dwelling

The purpose of Question 4 is to see how many people and what age group are represented by one household.

Question 4: Including yourself, how many people in each age group typically live in your household?

Age Group	Number of People
☐ Under 13	_____
☐ 13 – 17	_____
☐ 18 – 24	_____
☐ 25 – 34	_____
☐ 35 – 49	_____
☐ 50 – 64	_____
☐ 65 and Over	_____

According to Figure 5.5, twenty percent (20%) of households that participated in the survey are comprised of children under the age 13, fifteen percent (15%) are comprised of persons between the age of 13 and 24, fifty percent (50%) are of persons comprised between the age of 25 and 64 and fifteen percent (15%) are comprised of persons 65 years and above. Based on 2011 Census, fifty (50%) of the Town's population are within the age group of 25-64 and eighteen percent (18%) are 65 and above. **This shows that the response rates are overall representative of the population**.

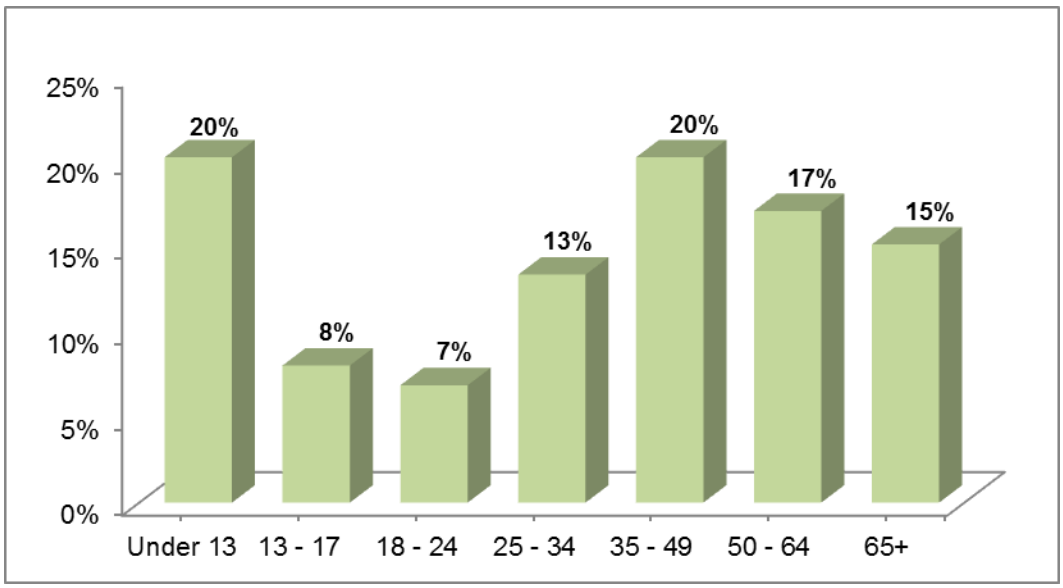

Figure 5.5 Age group responses

As shown in Figure 5.6, twenty one percent (21%) of the households that participated in the survey are comprised of 1 person, forty one percent (41%) are comprised of 2 people, and twenty nine percent (29%) are comprised of 3 or 4 persons. Only 8% of the respondents have more than 4 people in a household.

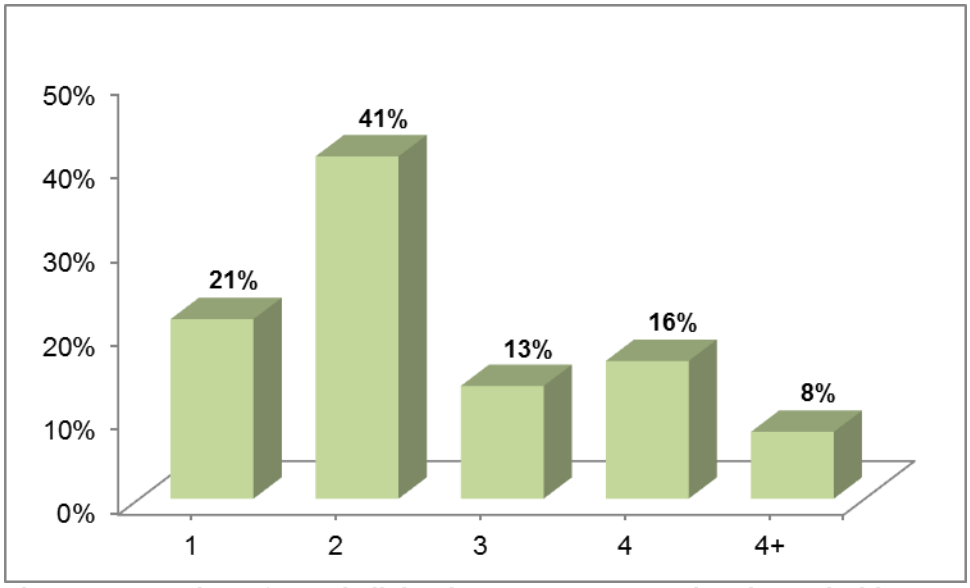

Figure 5.6 Number of people living in a survey respondent household

Question 5: How important is waste diversion and waste reduction to you?

☐ Very important ☐ Somewhat important

☐ Not very important ☐ Not important at all

☐ Unsure

The purpose of Question 5 is to measure the importance of waste diversion and waste reduction to the residents.

As shown in Figure 5.7, ninety eight percent (98%) of the respondents indicated that waste diversion and reduction is important to them, while 2% of the respondents do not think it is important.

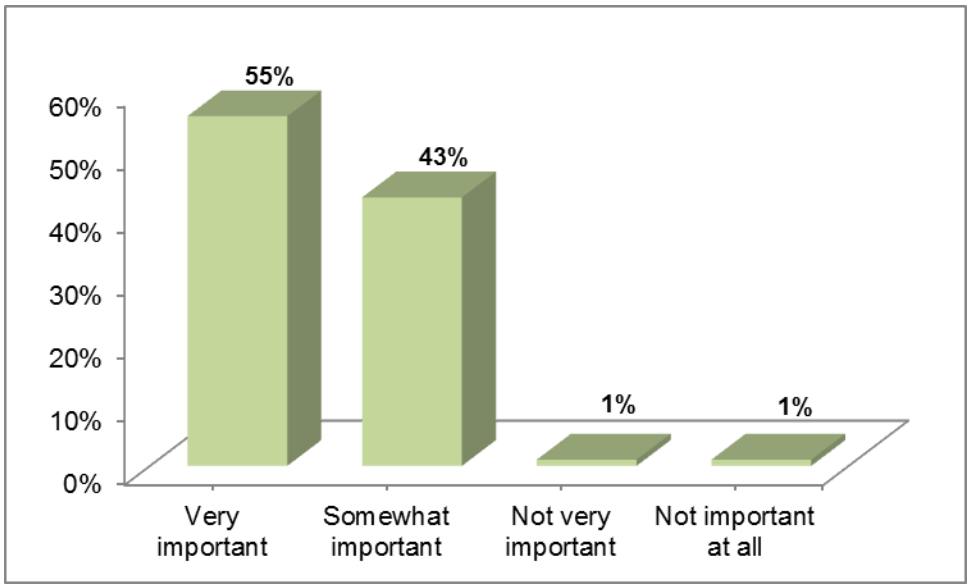

Figure 5.7 Measure of importance of waste diversion and reduction

Question 6: How much waste should Vermilion divert from landfill in the next five years?

☐ None ☐ 20% ☐ 40% ☐ 50% ☐ 80%

The purpose of Question 6 is to determine the level of support of the residents to divert more and to assist the Town to set an achievable goal. Goals provide a means to measure improvement and are therefore an integral part of any long term plan to reduce waste sent to landfill.

Figure 5.8 illustrates that about seventy four percent (74%) of the respondents think that the Town should divert 40% or more of waste from landfill in the next five years and out of the 74%, forty seven percent (47%) think that the Town should divert more than 50% of waste from landfill. Only two percent (2%) indicated that the Town should not divert waste and four percent (4%) did not give a response to this question. **This clearly indicates that the Town could successfully set a target of 50% diversion rate in the next five years.**

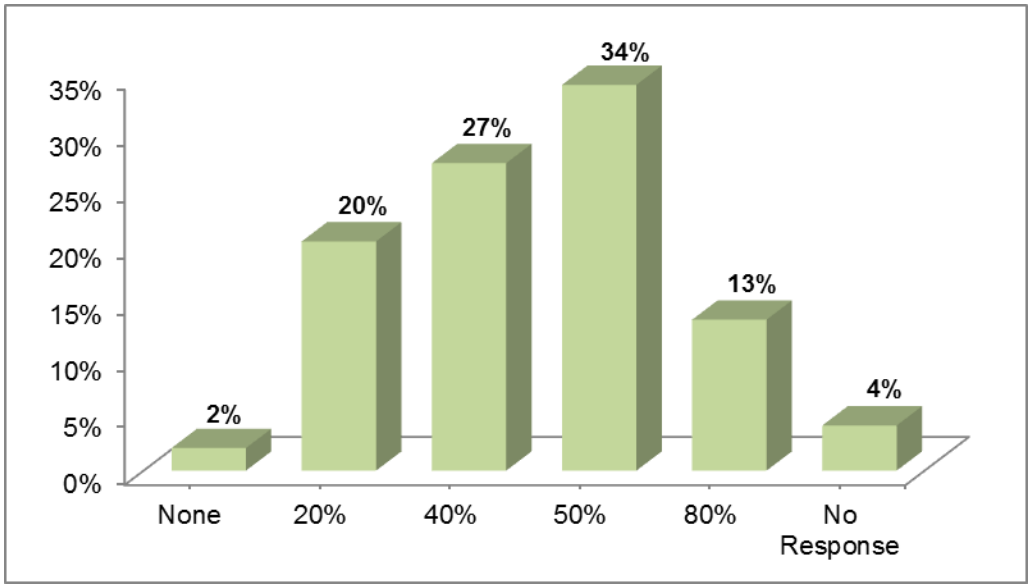

Figure 5.8 Diversion rate target goal

Question 7: Which do you use to dispose of waste?

☐ Roll-Out Bin ☐ Dumpster Bin ☐ Both

The purpose of Question 7 is to see what residents are using to store their waste.

As illustrated in Figure 5.9, thirty seven percent (37%) of the respondents use roll-out bin (cart), fifty two percent (52%) use 3 yd^3 dumpster bin and eleven percent (11%) use both roll-out bin (cart) and 3 yd^3 dumpster bin.

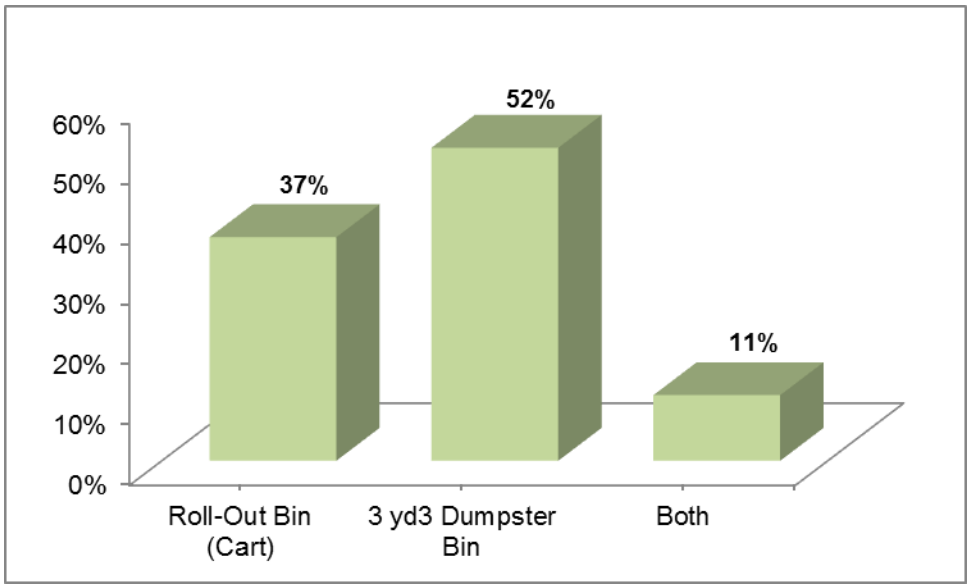

Figure 5.9 Waste storage

Question 8: How much waste do you generate per week? *(1 bag = 75L standard black garbage bag)*

	Garbage	Recycle
None	☐	☐
Less than 1 bag	☐	☐
1 to 2 bags	☐	☐
3 to 4 bags	☐	☐
5 bags or more	☐	☐

The purpose of Question 8 is to assist the Town in sizing roll-out bins (carts) and collection frequency should the roll-out bin (cart) program go Town wide.

As shown in Figure 5.10, the majority of the respondents, eighty percent (80%) and sixty eight percent (68%) indicated that they generate 1-2 bags of garbage and recyclables per week respectively.

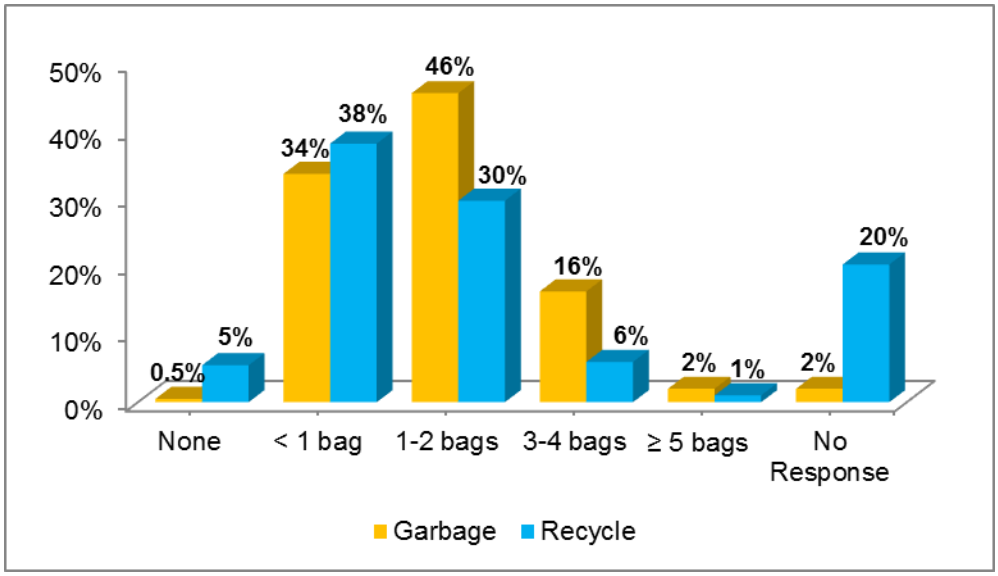

Figure 5.10 Amount of garbage and recyclables generated per week

Since less than 2% of the respondents generate 5 or more bags garbage and recyclables per week, bi-weekly (every two weeks) garbage collection with a 240L roll-out bin (contains up to 5 bags of garbage) or a limit of 4 bags every two weeks can be implemented.

Question 9: How do you typically manage Yard Waste? *(Feel free to have multiple answers)*

- Compost at Home
- Use the Green Bin
- Dispose with garbage
- Haul to the Transfer Station

The purpose of Question 9 is to find out how residents manage their yard waste.

As illustrated in Figure 5.11, thirty five percent (35%) of the total survey respondents at least compost their yard waste at home, sixty six percent (66%) of the total survey respondents at least use the green bin, forty percent (40%) of the total survey respondents at least dispose of their yard waste with garbage and thirty five percent (35%) of the total survey respondents at least haul their yard waste to the Transfer

Station. **This shows that majority of the respondents divert their yard waste from the landfill.**

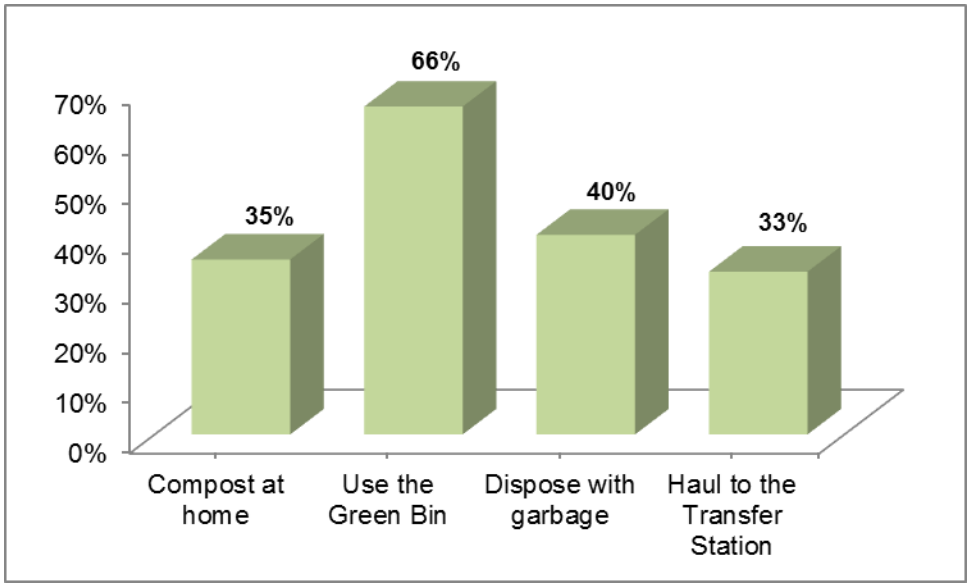

Figure 5.11 Yard waste management

Based on waste sort carried out by Advanced Enviro in September 2015, capture rate for yard waste is only 26% and in 2014 approximately 269 tonnes of yard waste gerenated by residents were disposed of at the landfill.

Question 10: How do you typically manage Food Waste? *(Check all that apply)*

- ☐ Compost at Home
- ☐ Dispose with Garbage

The purpose of Question 10 is to see how residents manage their food waste.

The following figure (Figure 5.12) shows that sixteen percent (16%) of the survey respondents compost their food waste at home, sixty nine percent (69%) dispose of their food waste with garbage while fourteen percent (14%) compost at home as well as dispose of their food waste with garbage. One percent (1%) of the survey respondents did not provide response to this question.

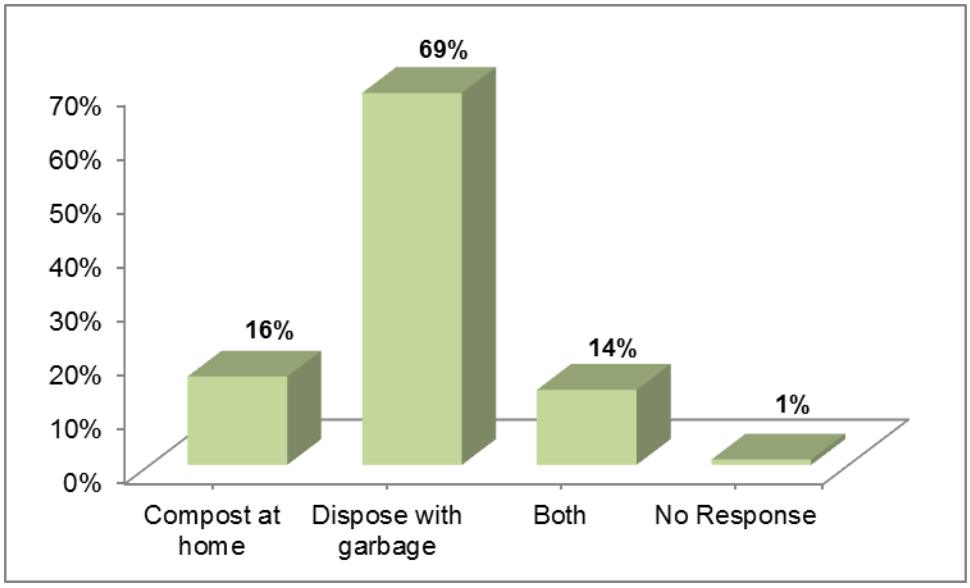

Figure 5.12 Food waste management

Question 11: Would you use a service to collect food waste separate from garbage?

☐ Yes ☐ No ☐ Unsure

The purpose of Question 11 is to see how many people would like a curbside food waste collection service.

Forty three percent (43%) of the survey respondents would use food waste collection service and twenty eight percent (28%) don't want this service while twenty nine percent (29%) are either unsure whether they would use the service or not (Figure 5.13).

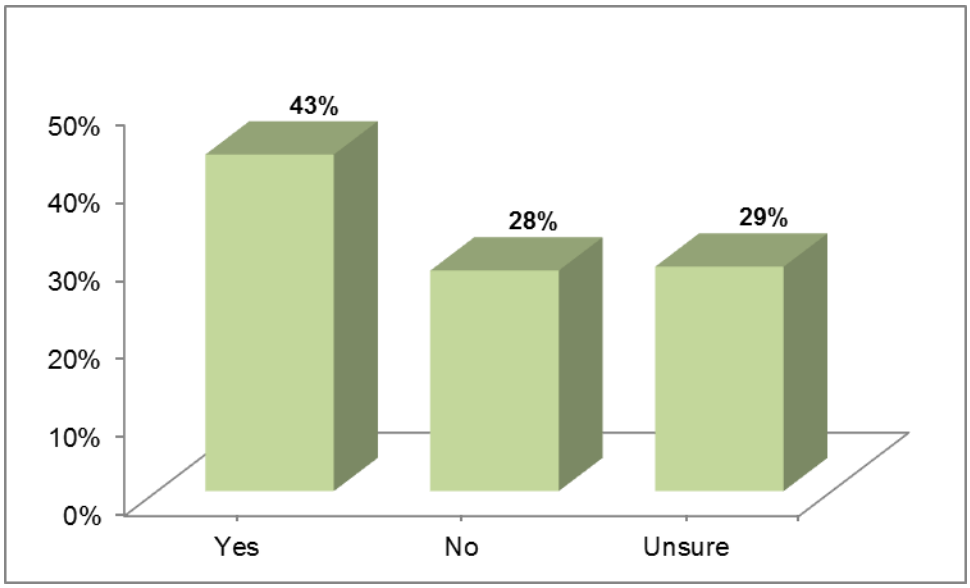

Figure 5.13 Curbside food waste collection service

Question 12: Would you agree in using roll-out bins for curbside collection?

	Yes	No	Unsure
Garbage	☐	☐	☐
Recycling	☐	☐	☐
Organics (food + yard)	☐	☐	☐

The purpose of Question 12 is to see if residents would like to use roll-out bins (carts) for curbside waste (garbage, recycling and organics) collection.

Based on the following figure (Fig. 5.14), seventy one percent (71%) of the survey respondents are willing to use roll-out bins (carts) for their garbage, eighty percent (80%) for their recycling and fifty four percent (54%) for organic (food and yard) waste. **There is great support for roll-out bin (cart) usage from the survey respondents.**

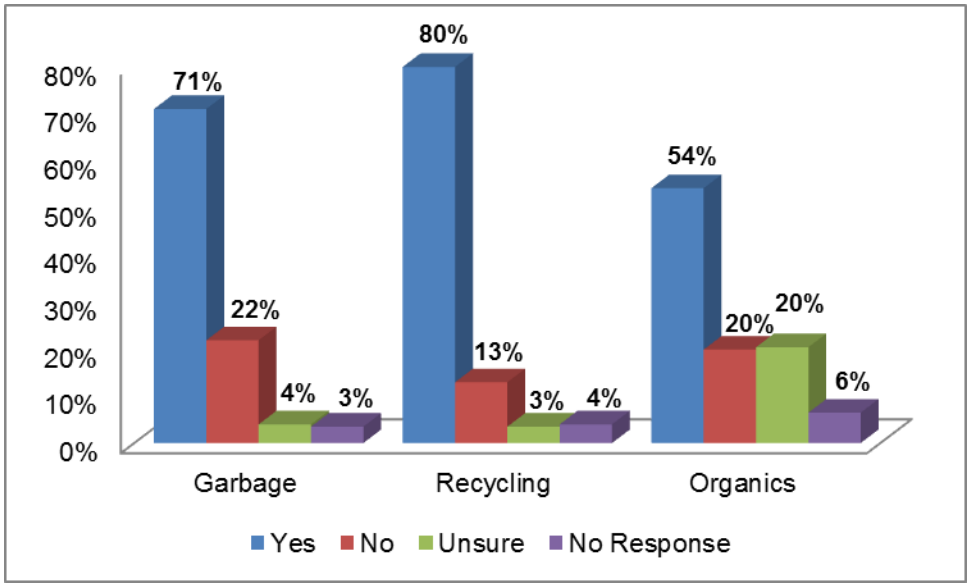

Figure 5.14 Support for roll-out bins (carts)

Question 13: Would you support…..

	Yes	No
Garbage limits	☐	☐
Fees based on amount of garbage	☐	☐

The purpose of Question 13 is to measure the public support to reduce waste sent to landfill using different methods.

According to Figure 5.15, thirty seven percent (37%) of the survey respondents support garbage limit while fifty six percent (56%) don't. Forty three percent (43%) of the respondents support fees based on amount of garbage while fifty four percent (54%) don't.

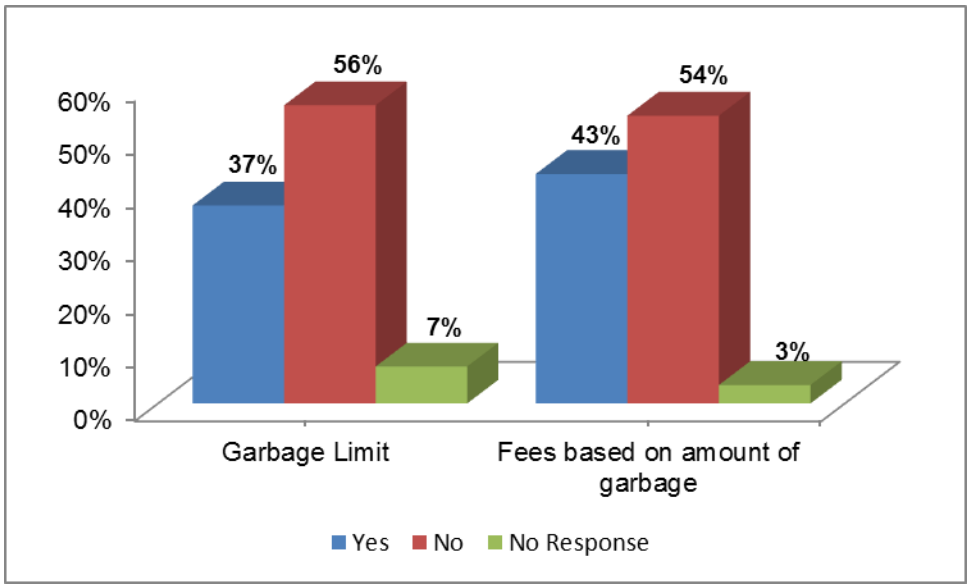

Figure 5.15 Support towards garbage reduction

Question 14: What drop-off services do you use at the Vermilion Recycle Centre at 4018 – 52 Avenue? *(Feel free to have multiple answers.)*

- ☐ Plastics
- ☐ Tin Products
- ☐ Paper Products
- ☐ Mobile Phone and Accessories
- ☐ Ink Cartridge
- ☐ Household Batteries

Other items _____

The purpose of Question 14 is to inform the public of the current services provided at the Vermilion Recycle Centre and to identify services that are highly used and/or underutilized.

Based on Figure 5.16, sixty nine percent (69%) of the survey respondents use the Vermilion Recycle Centre for plastics drop-off, fifty three percent (53%) use it for tin products drop-off, eighty six percent (86%) use it for paper products drop-off and eleven percent (11%) to sixteen percent (16%) use it to drop-off mobile phone and accessories, ink cartridges and household batteries. Eleven percent (11%) indicated that they also

bring either cardboard or small wood or oil, metal, concrete and a few expressed their wish for the Recycle Centre to start taking glass. **This shows that residents use the different services offered at the Vermilion Recycle Centre.**

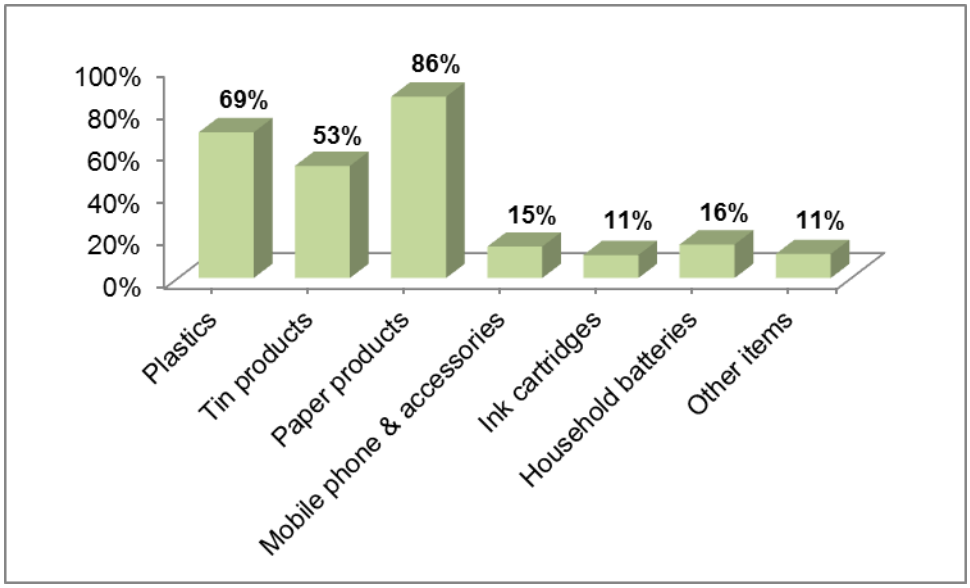

Figure 5.16 Percentage of respondents using the services at the Vermilion Recycle Centre

Question 15: How often do you use the Vermilion Recycle Centre?

☐ Never ☐ Twice a month

☐ Weekly ☐ Once a month

The purpose of Question 15 is to assess the frequency of the Vermilion Recycle Centre usage.

As illustrated in Figure 5.17, sixteen percent (16%) of the survey respondents have never used the Vermilion Recycle Centre whereas seven percent (7%) use the Recycle Centre weekly, twenty seven percent (27%) use it twice a month and fifty percent (50%) use it once a month or less frequently.

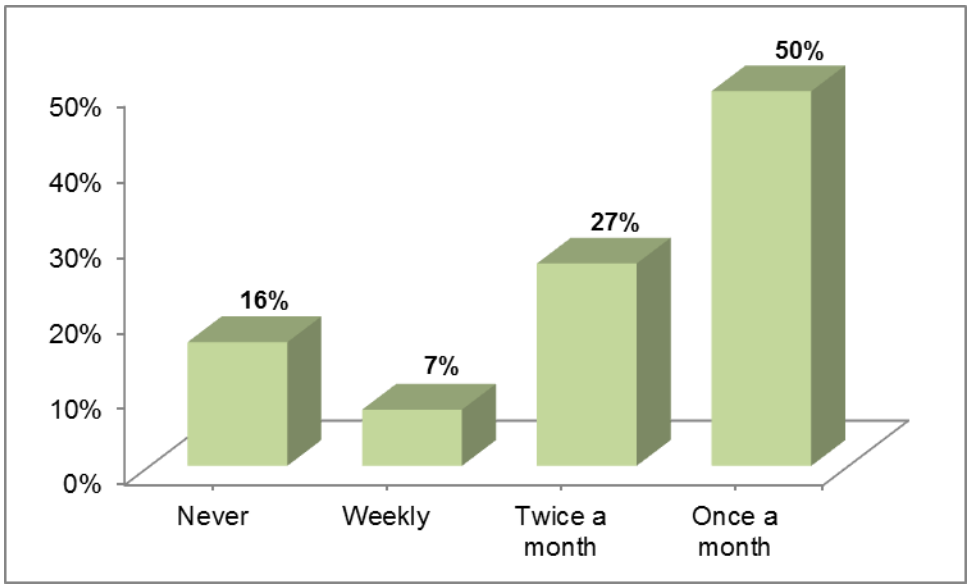

Figure 5.17 Frequency of Vermilion Recycle Centre usage

Question 16: When would you prefer Vermilion Recycle Centre be open?

Hours

☐ 9am – 5pm ☐ 7am – 3pm

☐ 7am – 8pm ☐ 12pm – 8pm

Days

☐ Tuesday thru Saturday (current)

☐ Monday thru Sunday

☐ Monday, Tuesday, Friday, Saturday, Sunday

The purpose of Question 16 is to assess the most convenient Recycle Centre hours and days of operation.

Figure 5.18 shows that twenty nine percent (29%) of the respondents prefer the Recycle Centre to open from 9am-5pm; seventeen percent (17%) prefer 7am-8pm while thirty one percent (31%) prefer 12pm-8pm. Twenty two percent (22%) of the survey

respondents did not answer this question. This shows that **the most preferred hours are 12pm-8pm and 9am-5pm.**

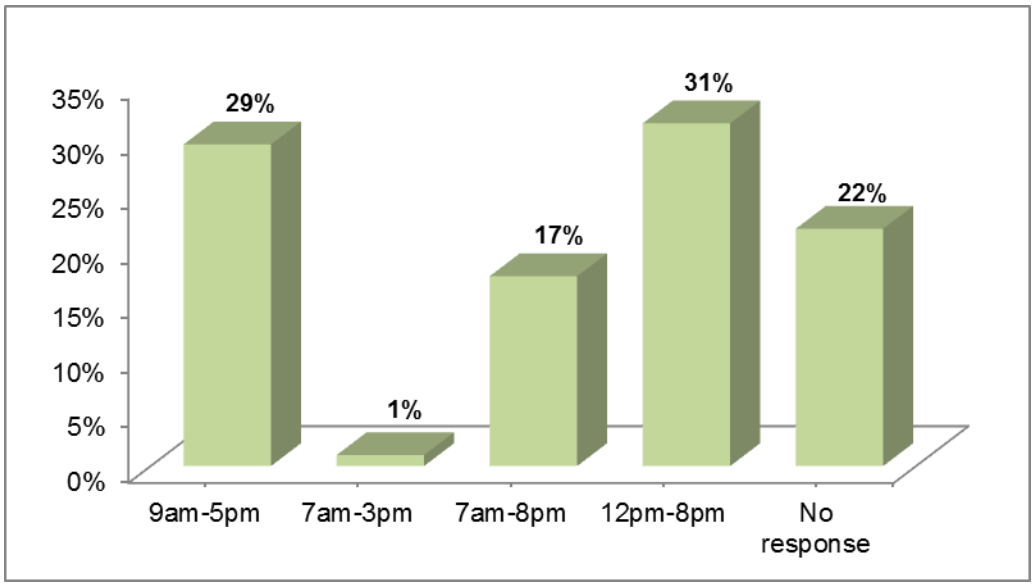

Figure 5.18 Preferred Recycle Centre operation hours

As shown in Figure 5.19, majority of the survey respondents (54%) prefer the current days of operation i.e. Tuesday thru Saturday.

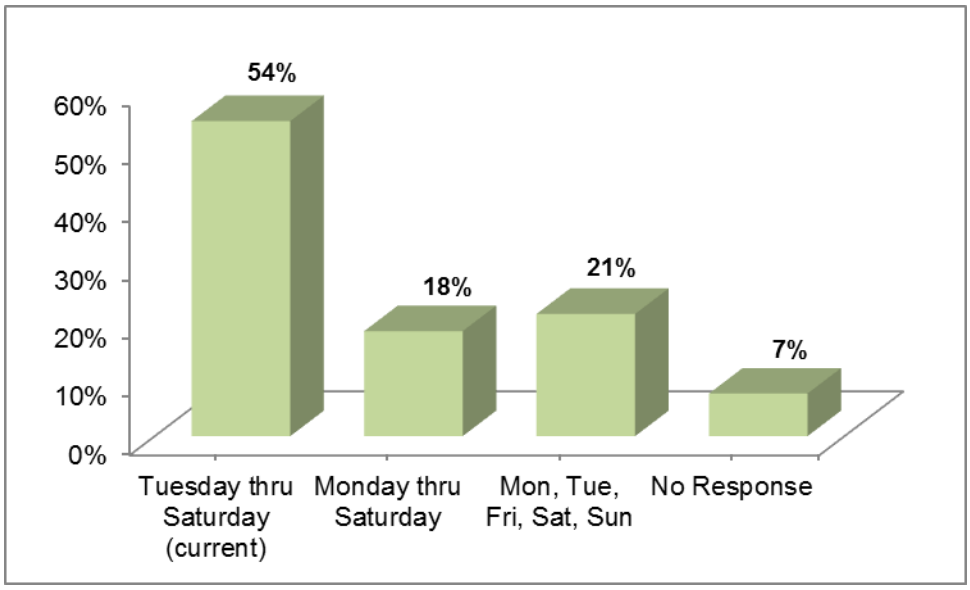

Figure 5.19 Preferred Recycle Centre operation days

Question 17: How often do you use the Vermilion Transfer Station (1.5 km North of Vermilion on Pare Drive)?

	Frequently	Occasionally	Never
Garbage	☐	☐	☐
Wood	☐	☐	☐
Plastic Jugs	☐	☐	☐
Oil/Filter/Paint	☐	☐	☐
Hazardous Waste	☐	☐	☐
Batteries	☐	☐	☐
Propane Bottles	☐	☐	☐
Freon Appliances	☐	☐	☐
TVs & Computers	☐	☐	☐
Metal/Rolled Wire	☐	☐	☐
Mattresses and Furniture	☐	☐	☐
Concrete	☐	☐	☐
Tires	☐	☐	☐

Other items _____

The purpose of Question 17 is to assess the frequency of the Transfer Station usage as well as to inform the public of the current services provided at the Transfer Station and to identify services that are highly used and/or underutilized.

As shown in Figure 5.20, on average two percent (2%) of the survey respondents use the Transfer Station frequently, thirty three percent (33%) use it occasionally, fifty percent (50%) have never used the Transfer Station and fifteen percent (15%) have not provided answer to this question. This shows that **the services at the Transfer Station are underutilized.**

Other items survey respondents indicated that they take to the Transfer Station are home renovation scrap, small appliances such as toasters, radio, gas stoves, etc., yard waste (fall, pruning, and trees), construction items and rocks.

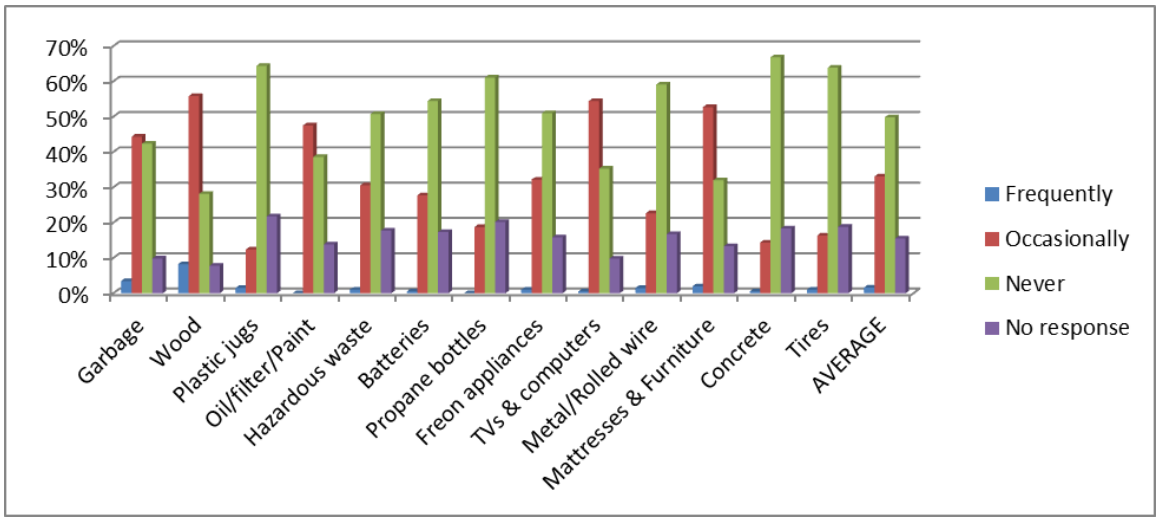

Figure 5.20 Vermilion Transfer Station usages

Question 18: Current operation hours of the Transfer Station are set by the Vermilion River Waste Commission. In the future, if hours need to change, when would you like it be open?

Hours

☐ 9am – 4:45pm (current)

☐ 7am – 3pm

☐ 7am – 8pm

☐ 12pm – 8pm

Days

☐ Monday thru Saturday (current)

☐ Tuesday thru Sunday

The purpose of Question 18 is to assess the most convenient Transfer Station hours and days of operation.

As illustrated in Figure 5.21, forty nine percent (49%) of the respondents prefer the Transfer Station to open from 9am-4:45pm (current operation hours) and sixteen percent (16%) to nineteen percent (19%) prefer either 7am-8pm or 12pm-8pm. Sixteen percent (16%) of the survey respondents did not provide answers to this question.

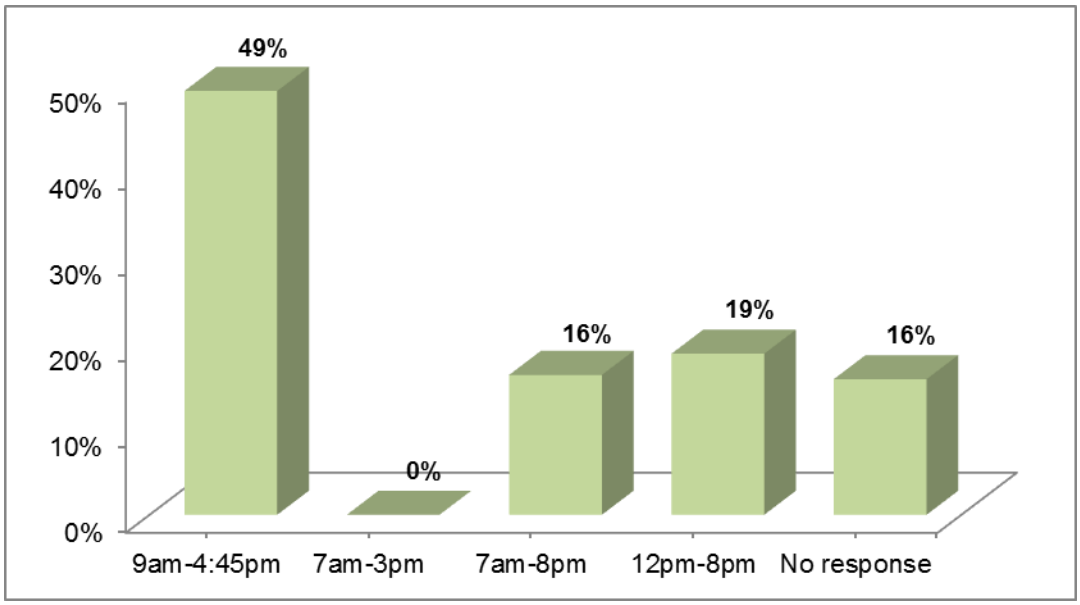

Figure 5.21 Preferred Transfer Station operation hours

Figure 5.22 shows that the most preferred operation days at the Transfer Station are Monday thru Saturday (current). This shows that **the current Transfer Station operation hours and days are convenient to the residents.**

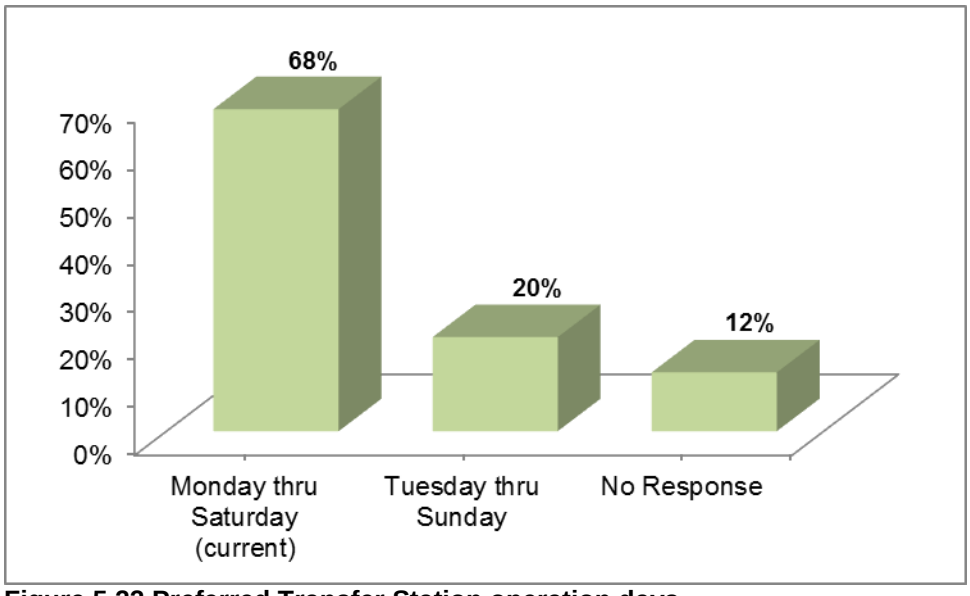

Figure 5.22 Preferred Transfer Station operation days

Question 19: Which factors are more important to you? (Rank)

___ Waste Reduction

___ Convenience

___ Cost

The purpose of Question 19 is to see what is more important to residents regarding waste management.

As illustrated in Figure 5.23, forty percent (40%) of the survey respondents ranked waste reduction as the most important factor, thirty seven percent (37%) ranked convenience as the second important factor and thirty one percent (31%) ranked cost as the third important factor regarding waste management. This shows that residents are committed to waste reduction and are requesting convenient waste collection services.

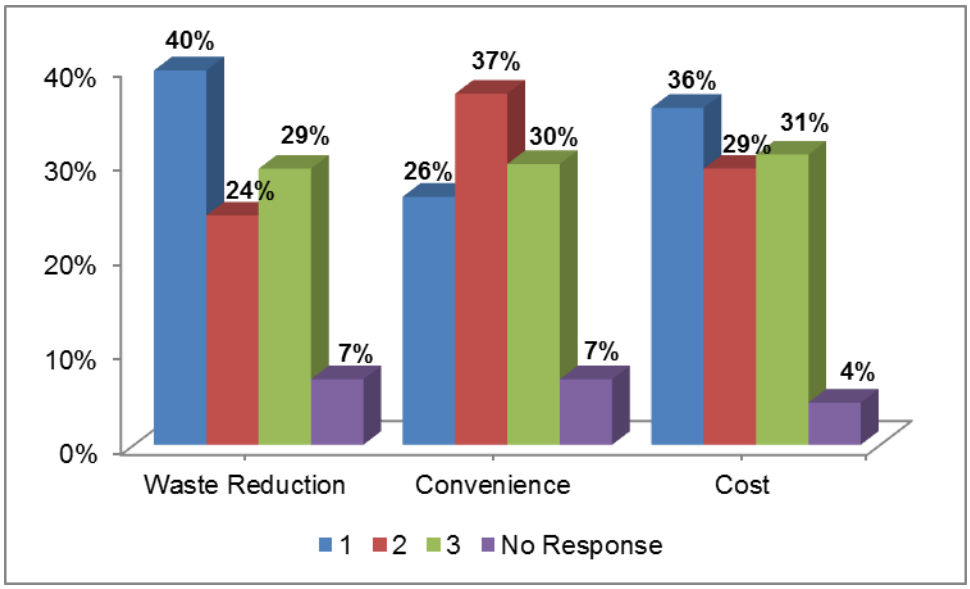

Figure 5.23 Waste reduction, convenience and cost importance ranking

Question 20: Does the Bi-Annual Cleanup Program for small household waste, tree branches, garden waste, electronics, broken toys, books, and magazines meet your needs (e.g. time of year, frequency)?

☐ Yes ☐ No

Why: _____

The purpose of Question 20 is to assist the Town decide when and how often to hold the Bi-Annual Cleanup Program.

Figure 5.24 shows that seventy six percent (76%) of the survey respondents are satisfied with the Bi-Annual Cleanup Program whereas twenty two percent (22%) are not. Two percent (2%) of the respondents did not answer this question.

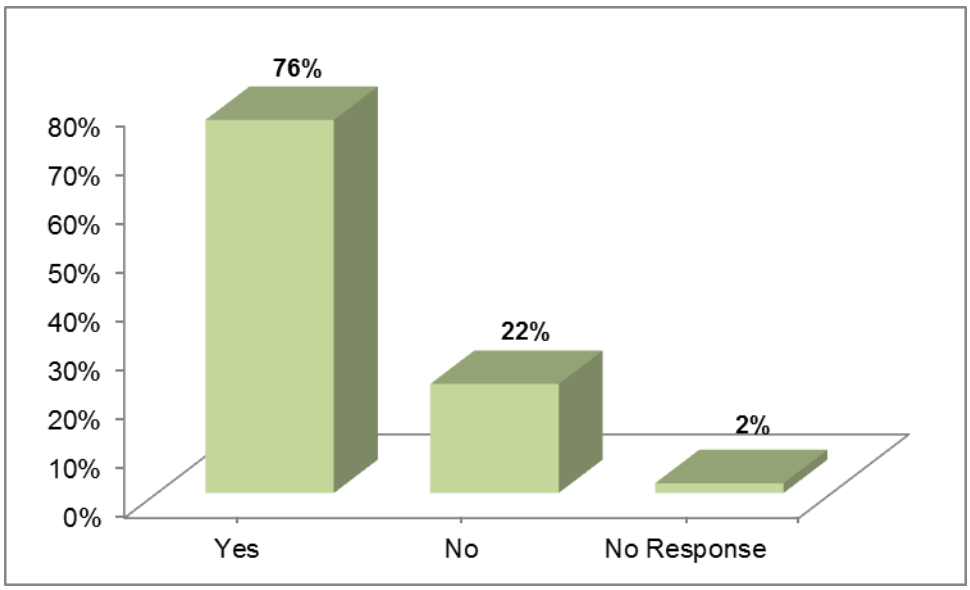

Figure 5.24 Usefulness of the Bi-Annual Cleanup Program

Reasons why or why not the Bi-Annual Cleanup program meets residents need are summarized below:

- Should be in spring and fall.
- Should be more frequent and for longer duration.
- It would be nice if bigger items were allowed.
- Advertise well the dates and provide instructions.

- Concurs with seasonal activities, good for yard waste and spring cleanup, convenient for people who don't have a way to get things to the Transfer Station.
- Program is very much appreciated.
- Some residents were not aware of the program.

Question 21: Please rank the <u>top three</u> waste program options you think the Town should consider implementing (1 being the most important):

___ Reduce garbage collection frequency to encourage more composting and Recycling
___ Get rid of the dumpster bins and have roll-out bins for all residents
___ More educational programs on how to reduce waste
___ Implement curbside organics collection (roll-out bins)
___ Implement curbside recyclables collection (roll-out bins)
___ Encourage backyard composting program/grasscycling (leaving mulch on lawn)
___ Keep current program as is

The purpose of Question 21 is to determine what residents see as the top three priorities for program enhancements based on limited knowledge. Respondents may not know the associated diversion rates, costs, etc. and typically choose the options they are familiar with.

Based the following figure, Figure 5.25, preferences were as follows:

Preference 1: Implement curbside recyclables collection (roll-out bins (carts)) (42%)
Preference 2: Implement curbside organics collection (roll-out bins (carts)) (20%)
Preference 3: More educational programs on how to reduce waste (20%)

This shows that **majority of the survey respondents would like to have curbside recyclables and organics collection as well as more education.**

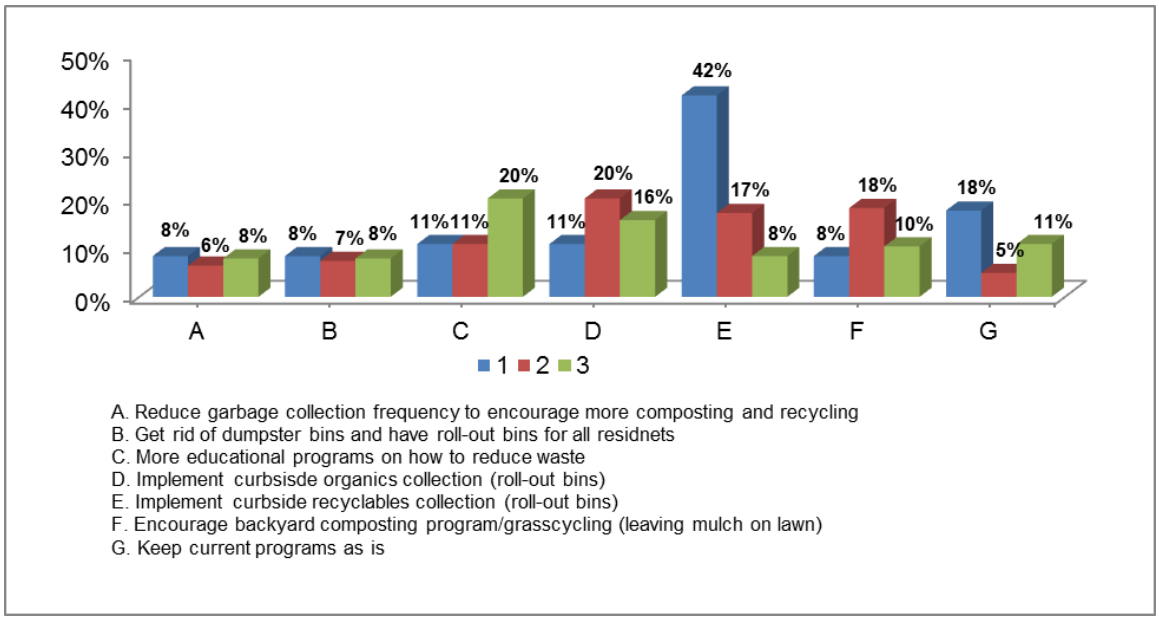

Figure 5.25 Top three waste program options for Town to implement

Question 22: Residents in the Region pay approximately $20 - $35 per month for various levels of service for waste collection. Town of Vermilion residents pay $26. How much are you willing to pay per month for garbage, recycling and organics collection?

☐ $20 - $23	☐ $24 - $26
☐ $27 - $30	☐ $31 and more

The purpose of Question 22 is to measure the willingness of the respondents to pay for curbside waste (garbage, recycling and organics) collection services and to inform them how much they are currently paying for the system.

As illustrated in Figure 5.26, forty two percent (42%) of the survey respondents are willing to pay $27 - $30 per month, twelve percent (12%) are willing to pay $31 or more per month whereas forty three percent (43%) of the survey respondents want to pay the current amount or less ($20 - $26). Three percent (3%) did not provide their feedback for this question. Based on this information, **residents may be willing to pay more than what they are currently paying for curbside three waste stream collection services as approximately fifty four percent (54%) indicated their willingness.**

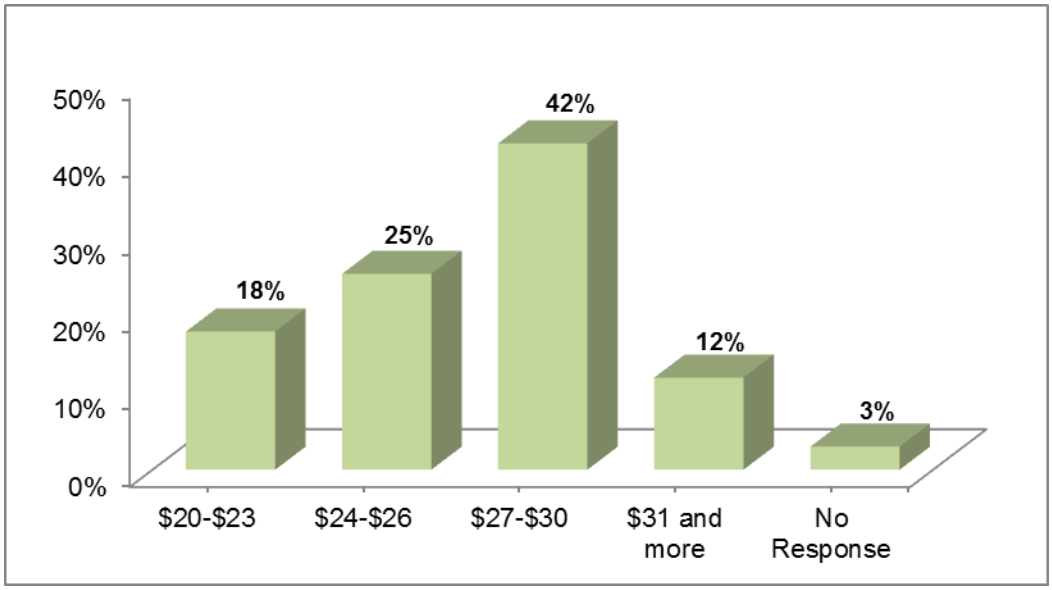

Figure 5.26 Amount residents willing to pay for curbside waste collection service per month

Question 23: When communicating with residents about educational initiatives, how often should we communicate with you about waste issues?

□ About the same ☐ More often ☐ Less often

The purpose of Question 23 is to assist the Town to evaluate the frequency of communication with the residents.

As shown in Figure 5.27, sixty three percent (63%) of the survey respondents are satisfied with the current communication frequency while thirty two percent (32%) would like the Town to communicate with them more often. **Majority (63%) of the respondents indicated that they are satisfied with the current communication frequency hence the Town could add, for exampale, on the monthly newsletter that is mailed out, a regular section on waste reduction to keep residents upto date.**

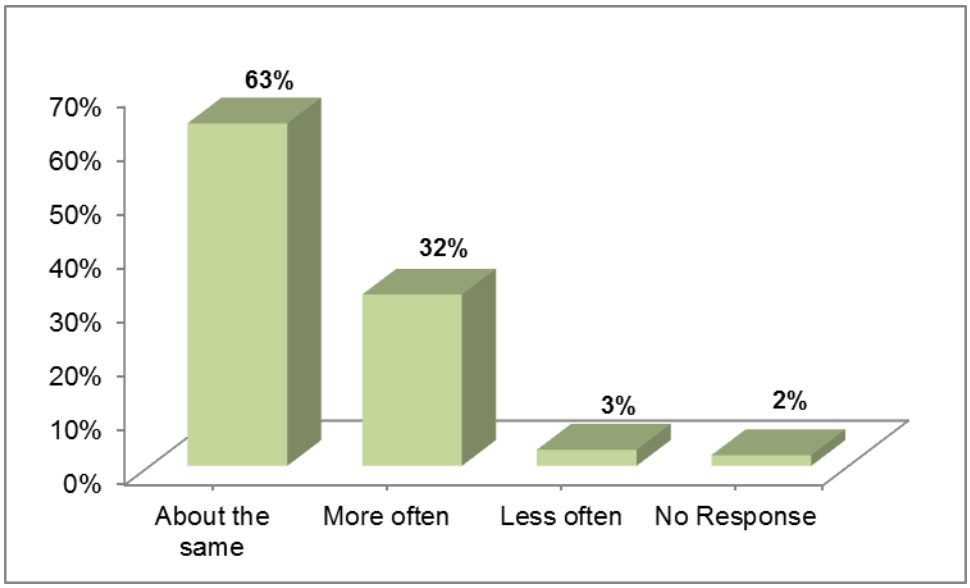

Figure 5.27 Communication frequency

Question 24: How should we communicate about waste programs? (Rank your Top 3)

- ☐ In-Person
- ☐ Direct mail
- ☐ Education in schools
- ☐ Brochures with utility bills
- ☐ Newspaper (Specify) _____
- ☐ Radio (Specify channel) _____
- ☐ Phone
- ☐ Community bulletin boards
- ☐ Town Website
- ☐ E-mail or Mobile Application
- ☐ Social Media (Specify) _____

The purpose of Question 24 is to ask residents to indicate the best communication methods since public communications and education is integral to the success of any implemented waste management strategy.

As illustrated in Figure 5.28, preferences were ranked as follows:

Communication methods ranked #1:

- Brochures with Utility Bills (44%)
- Direct Mail (13%)
- Education in Schools (11%)

Communication methods ranked #2:

- Newspaper (20%)
- Brochures with Utility Bills (18%)
- Town Website (18%)

Communication methods ranked #3:

- Newspaper (16%)
- Town Website (16%)
- Direct Mail (15%)
- Social Media (14%)

Newspapers that respondents indicated they prefer were Vermilion Standard, and Vermilion and Area Voice and Facebook for social media.

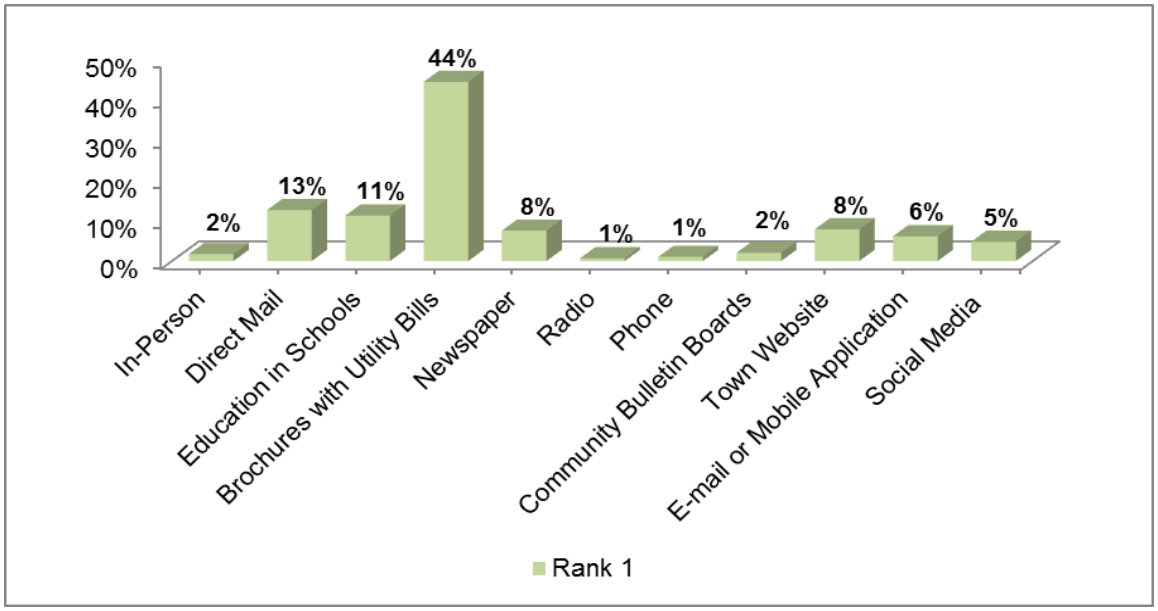

Figure 5.28a Best communication methods ranked #1

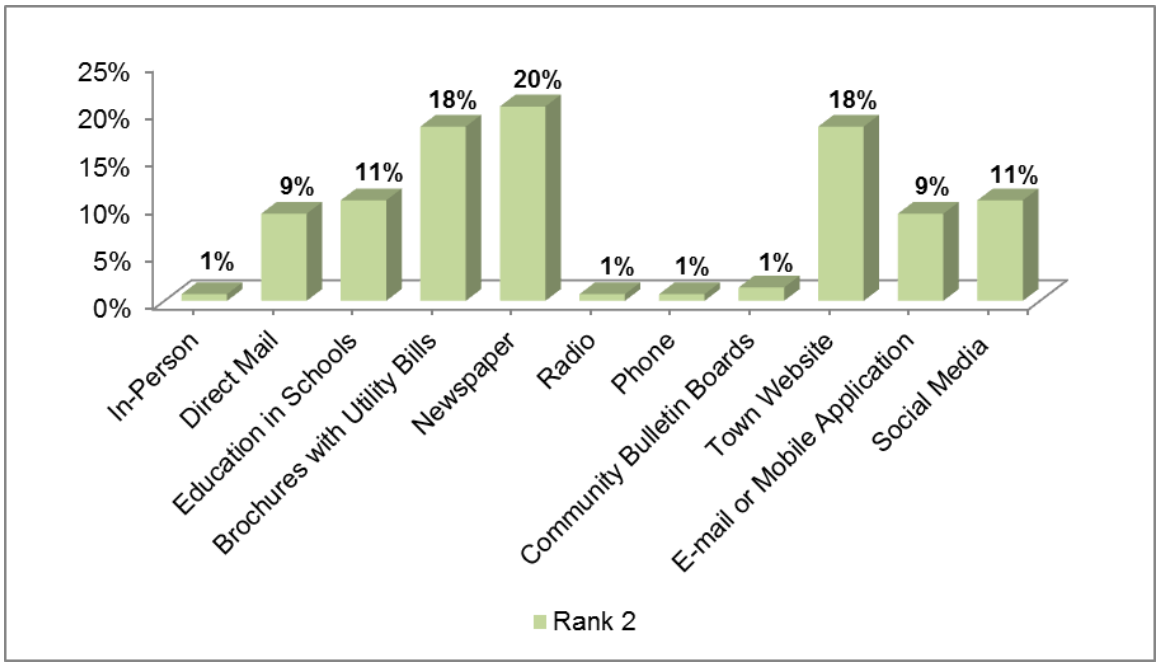

Figure 5.28b Best communication methods ranked #2

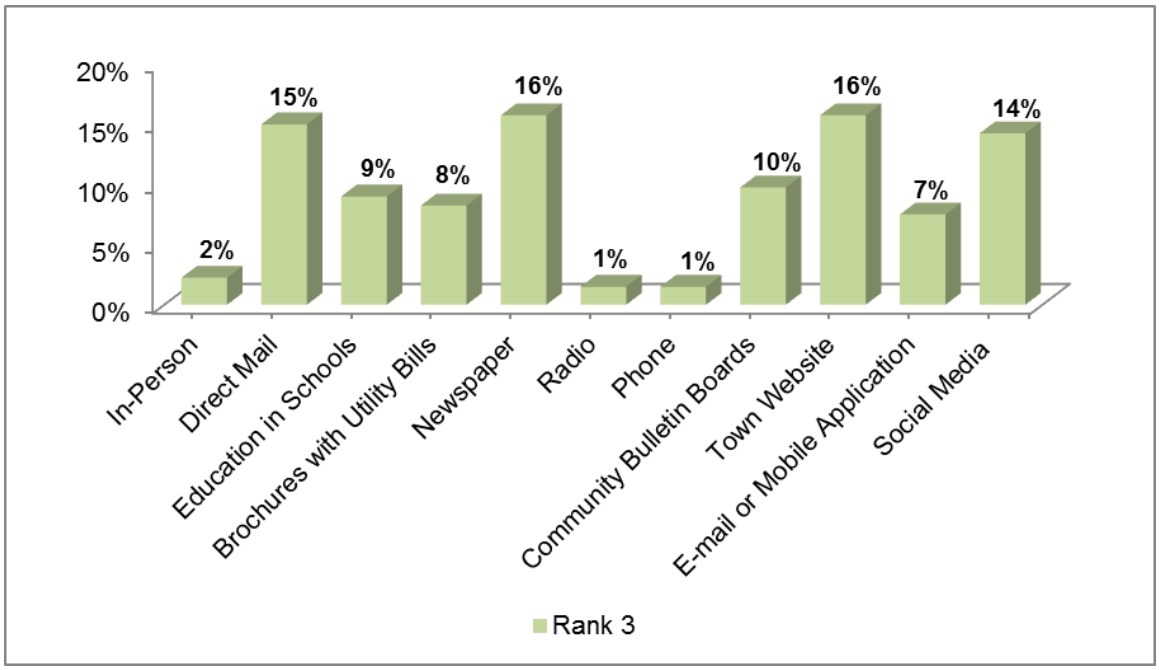

Figure 5.28c Best communication methods ranked #3

So it seems in order of preference brochures with utility bills, then newspaper, followed by Town website are best ways to communicate.

Question 23: Other Comments or Suggestions

Comments are listed below.

Appreciation

- Thank you for being concerned about waste management.
- Good Rec Board.

Curbside collection

- Curbside collection would help reduce the recycled stuff going into garbage.
- Roll-out bin is convenient.
- Curbside recycle bins.
- Would like curbside collection if picked up regularly throughout the year.
- Could do bi-monthly garbage pickup during the colder months.
- Change to a cost per bag of garbage but offer free recycling with purchase of a bin to encourage waste reduction and increase recycling.
- Would like recycling to be more convenient.
- Get blue boxes for paper recycling.
- Implement a cap on the amount of garbage a house can generate and provide curbside recycling and organics pickup.
- Prefer blue bag for recyclables over roll-out bins with weekly collection.
- Consider Vergreville's dumpster recycle bins in all alleys.

Dumpster bins

- Keep the dumpster bins. These are good for back alleys.
- Out of town people use our dumpster bins which accounts for much of the materials in the dumpster.
- Even though they are convenient, items that should go to either the Recycle Centre or the Transfer Station are usually put in the dumpster bins and hence to put an end to the abuse, dumpster bins should be removed.

Green bins

- Request green bin for 48th Street and 48th Avenue alley; for the seniors centre.

- More green bins around the town.
- Green bins should not be placed in front to residences.

Glass recycling

- Need glass recycling back.

Recycle Centre

- Open the Recycle Centre and Transfer Station same day and hours.
- Bins are not labeled except for paper.
- Remove locked gate.
- Replace the current recycling bins with a bin with a sliding door on the side which are more convenient than the one that needs the lids to be lifted with one hand and put recycling items with the other hand.

Transfer Station

- Different hours for summer and winter.

Cost

- Increase convenience and increase the cost.
- Cost is a factor as utility bills have doubled in the last 5 years.
- Will use roll-out bins depending on cost as we already pay enough.
- A single person should not have to pay family rates.
- Decrease monthly fees.

Education

- Educate people on other recycling options in the community, e.g. ATCO recycling batteries.
- Educate people on what is getting thrown out and where it can go to get recycled.

Complaint

- Backyard composting is too stinky, always put by neighbor property.
- The young people are the ones who do not recycle.
- People put large branches, etc. in the green bins which are for grass clippings and garden refuse and also grass clippings in plastic bags. There should be a fine for doing so.

Other

- Learned to really appreciate how much less garbage is sent to dump when we recycle.
- Can Vermilion have a site like Vegreville that is clean, well-kept and open 24/7?
- We are paying $35.93 now, please pave the back allies.
- There should be an incentive program to encourage everyone to recycle, not penalize the ones that already do by charging them the same.
- Love the 'leave your stuff on the lawn day'.
- Businesses like Coop should recycle instead of filling their garbage bin every day.

6.0 DIVERSION OPTION ANALYSIS

The Diversion Options Analysis section of the Vermilion Integrated Waste Study covers the following:

1. Description and outline of advantages and disadvantages for a range of waste management options including:
    a. Waste Collection
    b. Garbage
    c. Recycling
    d. Composting
    e. Cart Ownership Model

2. Cost and Feasible Options analysis based on the current system review

Advance Enviro also conducted an initial review of the equipment currently used by the Town of Vermilion for the automated collections. Advantages and disadvantages of different collection options are provided.

6.1 Waste Collection Options

Program options for waste collection include:

1. Fully-automated Collection
2. Truck Technology
3. Semi-automated Collection

4. Radio Frequency Identification Device (RFID) Tracking System

A description of each option as well as the associated advantages and disadvantages of each are provided below.

6.1.1 Fully-automated Collection

Automated collection is based on a cart system. Wheeled carts with lids are provided to residents. Residents place carts at curbside for collection according to set specification (usually 1 m distance from other carts or other objects, etc.) on their collection day. In a fully automated system, the collection truck driver operates a mechanical arm from inside the cab of the truck, which reaches out and grasps the cart, empties the cart into the truck, then mechanically places the cart back at the curb without the operator having to exit the truck.

Over 30% of municipalities across Canada have implemented a cart system with this number steadily increasing. The automated cart system appears to be the future model for waste collection.

Advantages

Advantages of Automated Collection:

- Operational cost efficiencies:
  - One man operation lowers labour costs.
  - Elimination of lifting reduces injuries and Workers Compensation claims.
  - Reduced collection time per household reduces labour and fuel costs, and may require fewer trucks (collection time estimated at ~ 10-15 seconds/household).
- Although, operational cost efficiencies of an automated system accrue to the service provider when collection is contracted out, these efficiencies allow the Town to attract competitive pricing from private service providers. Depending on the amount of garbage collected (generally more than 200 kg/person/year) hand-bombing or manual collection prices are higher than automated collection.
- Expandable to waste/organics/recyclables.
- Fewer trucks and reduced collection time reduces greenhouse gas emissions.
- Reduced labour requirements help to address missed pick up due to labour shortages.

Advantages of Cart System:

- Cart design (ventilation, lids, and holding capacity) allows year round collection of organics (food and yard waste) and varied collection frequencies.
- Cart design allows garbage collection every two weeks (if coupled with other diversion programs such as organics collection) in a clean efficient way.
- Acceptable volumes of waste are easier to establish with a cart than with bags if a volume limit is imposed i.e. 1 cart/household (volume limits are required to achieve higher diversion rate).
- Radio Frequency Identification Device (RFID) technology is available in some carts.
- Funding may be available for municipalities to purchase carts.
- Carts generally have a 10-year warranty with a unit cost of approximately $60-80 (landed). Carts can be financed. Over 10 years, cost of carts is at least 50% cheaper than bags purchased over the same time frame.
- Less plastic waste compared to manual collection.
- Reduces problems with animals and rodents.
- Visually attractive – neater than bags and uniform system.
- No breakage from overfilling or from animals if waste is put out overnight.
- Comes in various container sizes.
- Easy to maneuver (on wheels).
- It has been accepted by over 30% of Canadian households and continues to be implemented.

Disadvantages

- Capital investment required at outset if municipality is purchasing. A container must be purchased for each household and homeowners may object to paying for any increase in cost (carts can be financed).
- The costs of implementing and maintaining a containerized system compared to bags could be prohibitive unless the cost can be spread out over time.
- If carts are owned by the Town, additional administration is required to manage carts (if residents move, carts are lost, etc.). Cart maintenance can be contracted out.
- Difficult to monitor contamination (oil containers in garbage, etc.) as operator does not leave truck.
- Might be inconvenient for some residents because of the room needed to store the carts and to put them out properly on the curb on collection day.
- Trucks may have difficulties to collect the carts in specific areas such as cul-de-sacs.
- In order to allow back lane collection with overhead lines, additional retrofit to collection truck may be required.
- Cost to retrofit collection trucks for fully automated system is estimated to be $40,000 to $50,000.

- Can become costly if collection time per cart is too long. Requires periodic monitoring

6.1.2 Truck Technology

Recently there has been a great deal of research and development in the design of carts and trucks.

In general the lowest costs are achieved by reducing stop times and increasing waste density on the truck.

The Town of Vermilion currently uses a Pak-Mor side loader automated arm (Town owned) for the automated collection of recyclables, organics and garbage (figure 6.1).

Figure 6.1 Vermilion's Pak-Mor side loader truck

The advantage of this model is the possibility to use the same truck to pick up waste both from roll out bins (carts) and 3 yard bins. This represents an important benefit as currently the towns is providing pick up services for both bins.

Disadvantage of this model is the speed of the lift cycle that is calculated at over 20 seconds while specific side loader trucks for roll out bins have a lift cycle of 8-10 seconds.

The lift cycle for the truck currently used by the Town is more than double that of

other truck models available on the market and this represents low efficiency in the Vermilion waste management system as stop time (for waste pick up) could be reduced by half.

See video for Pak-Mor activity in Vermilion in the attached CD.

In Appendix D is a preliminary evaluation of different side loader trucks currently available on the market that might improve the performance of the current and future automated collection programs in Vermilion.

The most important benefits are related to fuel consumption, safety and route efficiency.

The evaluation is focused on the following side loader trucks:

- Heil Payton
- Heil Odyssey Automated Front Loader (AFL) with integrated CUROTTO-CAN
- Heil's STAAR System
- Rotopac by Ginove
- Labrie - Expert Dual Helping-Hand
- McNeilus

6.1.3 Semi-Automated Collection

Semi-automated collection is also based on a cart system. Carts are manually rolled to the collection truck by an operator, attached to a "tipper" or mechanical arm which is then automatically lifted and emptied into the truck. In Alberta, most semi-automated trucks are either side load or rear load.

Advantages

- Semi-automated trucks are able to get into more restricted spaces which could allow back lane pickup to continue if required (1 m distance restriction is eliminated).
- Operational cost efficiencies is the same as in fully-automated collection, however semi-automated collection time is longer (estimated at ~ 30 seconds/household rather than 15 seconds for fully automated trucks).
- Retrofits for semi-automated collection are simple and relatively inexpensive (~ $7,000 or less per truck), although most collection service providers in Alberta have automated collection capabilities.
- Provides opportunity for public education through operator inspections (i.e. if organics collection program is in place, operator can check load before or after it is

emptied for contamination and apply sticker, etc. according to the program) without any significant impact to collection time.
- Semi-automated system can be implemented and easily scaled up to fully-automated system.

Disadvantages

- In long term, collection is expected to go to full-automation. If semi-automated collection is selected to maintain back lane collection, this essentially postpones the change to front lane collection.
- Collection trucks can damage back lane roadways that are not designed for heavy vehicle traffic, thus significantly increasing costs.

Advantages and disadvantages of carts are the same for both fully- automated and semi-automated systems.

6.1.4 RFID Tracking Systems

Radio Frequency Identification Device (RFID is a small electronic device that consists of a small chip and an antenna. Carts with RFID emit radio signals that enable an electronic reader to collect key data on the cart's use. The RFID serves the same purpose as a bar code; it provides a unique identifier for that object but unlike traditional barcode, the RFID tags can be read from a distance. RFID technology is now available with carts (Strathcona County, Devon, St. Albert and Medicine Hat's carts have RFID chips). Coupled with proper software and hardware, RFID cart systems allow for improved scheduling, billing, routing efficiencies, maintenance and inventory tracking. Municipalities can subscribe to a web-based program (at a certain fee/cart), which collects the data from the RFID. Municipalities can log on to the website and obtain real-time data. This is currently being used in the Town of Medicine Hat. As the supplier collects data from municipalities across North America, knowledge and information on system efficiencies and data use is pooled and shared.

Advantages

- Provides real-time service verification
    - RFID software can record when and from which container garbage is picked-up and disposal took place and can record what actually is being collected and transported.
- Increases accountability of haulers.

- Residents can receive faster customer service data.
- Provides option to implement incentive program if RFID technology on organics and/or recycling carts (e.g. coupons).
- Allows more effective cart maintenance – cart history is tracked and can provide prompts for maintenance or replacement.
- Provides a range of tracking options, for example:
    - To track routes, data can be linked to a GPS system, which shows where collection has occurred and the ones remaining.

Disadvantages

- The technology is relatively new to the waste sector.
- Currently only one proven system in Canada (have supplied RFID carts to Strathcona County, Devon and Medicine Hat). Supplier is looking for pilot communities in Alberta.
- Requires technical know-how to make the most use of data provided. Subscription to web-based program assists with this.
- Durability of chip.
- Software to track RFID data costs $10,000 to $20,000.

6.2 Garbage Options

Residential Garbage

Currently the Town of Vermilion provides the residents with a weekly automated curbside residential garbage collection program with 360L carts for approximately 600 households and a weekly automated garbage collection for approximately 285 bins located on residential back alleys (3yd^3 dumpsters).

Residents can also drop off garbage at the Transfer Station (Located 1.5 km north of Vermilion on Pare Drive) at no cost.

Based on interviews and survey, garbage dumpsters fill quickly because out of Town residents are using the bins to dispose large items.

The Town owns and uses one (1) side loader fully automated truck (Pak-Mor side loader) for garbage collection.

These programs collected approximately 1493 tonnes (estimate data) of residential garbage in 2014, seventy six percent (76%) of the residential waste stream.

The cost for residential garbage collection in 2014 in Vermilion (residential/year round) was approximately $135,199 which is equal to $90.53/tonne or $7.69/household/month (see section 6.7 for further details).

In 2014, the cost for receiving waste at the Transfer Station (recyclables and garbage) and then for transportation and disposal of garbage at Ryley Class II Landfill was approximately $141,167 which is equal to $94.55/tonne or $8.02/household/month (see table 6.1a).

Residential Garabage Collection

Description	Cost
Tonnes collected	1493
Driver	$ 56,884
Fuel/Maintenace/Parts	$ 33,452
Misc	$ 19,598
Ammortization	$ 25,265
Total Cost	$ 135,199
Cost/Tonne	$ 90.53
Cost/household/month	$ 7.69

Residential Garabage Disposal

Description	Cost
Tonnes disposed	1493
VERMILION RIVER WASTE MGT AUTHORITY + Engineering Fees	$ 141,168
Total Cost	$ 141,168
Cost/Tonne	$ 94.55
Cost/household/month	$ 8.02

Table 6.1a Residential Garbage Collection and Disposal costs

Commercial Garbage

The Town provides commercial garbage collection for 261 businesses.

The Town owns and uses one (1) side loader fully automated truck (Pak-Mor side loader) for garbage collection (the same truck is used for residential garbage collection).

This program collected approximately 1606 tonnes (estimate data) of commercial garbage in 2014.

The cost for commercial garbage collection in 2014 in Vermilion was approximately $89,369 which is equal to $55.66/tonne or $28.53/business/month (see table 6.1b).

In 2014, the cost for receiving commercial garbage at the Transfer Station and then for transportation and disposal at Ryley Class II Landfill was approximately $151,774 which is equal to $94.53/tonne or $48.46/business/month (see table 6.1b).

Commercial Garabage Collection (261 businesses)	
Description	Cost
Tonnes collected	1606
Driver	$ 37,601
Fuel/Maintenace/Parts	$ 22,112
Misc	$ 12,955
Ammortization	$ 16,701
Total Cost	$ 89,369
Cost/Tonne	$ 55.66
Cost/business/month	$ 28.53

Commercial Garabage Disposal	
Description	Cost
Tonnes disposed	1606
VERMILION RIVER WASTE MGT AUTHORITY + Engineering Fees	$ 151,774
Total Cost	$ 151,774
Cost/Tonne	$ 94.53
Cost/business/month	$ 48.46

Table 6.1b Commercial Garbage Collection and Disposal costs

Total cost for collection and disposal of garbage from commercial businesses is $76.99/business/month.

Program options for garbage include:

1. Every two Weeks Garbage Collection and Recyclables Processing
2. User Pay Systems/Volume Limits
   - Tag-a-Bag
   - Cart Limit
   - Volume Based Subscription

A description of each option as well as the associated advantages and disadvantages are provided below.

6.2.1 Every two Weeks Garbage Collection

Residential garbage collection is reduced to once every two weeks. Every two weeks, garbage collection works best when combined with weekly curbside organics collection as this option addresses residents' concerns regarding odour, especially during summer time.

Advantages

- Cost savings realized from reduced collection can be applied to enhanced diversion programs (cost savings are estimated at 30% to 40% when applied year round).
- Emphasizes diversion at the source – residents may change purchasing habits, etc. to meet needs of collection every two weeks.

- Increases participation in diversion programs (curbside organics and/or recycling collection).

Disadvantages

- Cannot be implemented on its own. In order to implement waste collection every two weeks, alternative diversion options must be provided such as curbside collection of organics and recyclables.
- Requires an effective education program to ensure public acceptance.

6.2.2 User Pay Systems/Volume Limits

The amount of garbage that can be put out for collection is limited to the size of the container (bag or cart). Residents must pay an additional amount for over-limit waste. Some communities have implemented volume limits for the commercial sector as well. Weight by household systems are beginning to be implemented in the United States. In Canada, approval of weight systems for waste is still under review by Measurement Canada.

Advantages

- Establishes incentive to reduce waste and to use recycling and compost systems.
- Focus on waste disposal leads to decreased waste generation on its own as the public think more about their waste generation and habits.
- Financially more attractive in the long run as landfill costs rise.
- Volume limits can help achieve significantly higher levels of waste reduction and cost savings realized from reduced waste which can be applied to enhanced diversion programs.
- Volume limits can be reduced over time to achieve increasingly higher levels of waste reduction.
- Residents are made aware of the volumes of waste they generate.
- Without waste reduction, the overall waste management program becomes increasingly expensive as both waste and recycling costs remain high (decrease in waste costs offset costs for recycling and composting infrastructure).

Disadvantages

- Can be inconvenient for residents who generate large quantities of waste each week.

- Equity of limits is sometimes challenging (should a large family be limited to same amount as a single person and how do we reward someone who reduces all their waste).
- Incidents of illegal dumping can rise if effective awareness and enforcement mechanisms are not established. (Generally, if illegal dumping occurs it is in the first 6 months. Illegal dumping has not been an issue in Alberta communities that have implemented two-bag/1 cart limits).

The following User Pay/Volume Limit options are described below:

1. Tag-a-Bag
2. Cart Limit
3. Volume Based Subscription

1) Tag-a-Bag

The number of bags of garbage that can be set out for collection each week is limited. Bag limit is usually phased in:

- 2016 - 4 bags
- 2017 - 3 bags
- 2018 - 2 bags (equivalent to one 120 litre cart)

Residents are required to purchase tags for over-limit bags at a specified $/tag cost. Diversion programs are enhanced to address increased diversion requirements to meet the waste limit. (No limits are placed on blue bags or organics).

The tag system could also be implemented in an automated cart collection system (for the waste stream) where residents are asked to purchase a tag for over-limit carts.

Advantages

- As listed under User Pay/Volume Limit.
- Easy to count bags.
- Easy to designate additional volumes by adding sticker.
- Town is not responsible for bag purchases – homeowners are (this can be an advantage to the municipality, or disadvantage to the homeowner).
- Can be combined with cart system.

Disadvantages

- Residents must continually purchase bags.
- Residents must pay an estimated $20 to $25 per year for bags not including the over-limit cost. Over 10 years the cost of bags to residents exceeds $200 to $250 (therefore, more costly than containers).
- Doesn't allow for operational cost efficiencies available through the cart system, i.e. potentially higher WCB premiums for waste contractors, a cost that is passed on to client.
- Bags themselves add to the overall volume of waste disposed.
- Bags can be overfilled and break, spreading litter and attracting animals/birds/scavengers.
- If moved to a 2 or 3 stream sort – bags can be unsightly.
- Full curbside organics collection is difficult to implement with bags as food waste is heavy.
- Not as convenient for residents as they must be lifted out to curbside.
- Not a standardized unit – size of bags vary.

2) Cart Limit

An Automated system is implemented and weekly collection is limited to one cart (cart size can be determined by the municipality i.e. 120 litre, 240 litre or 360 litre). Some municipalities provide 2 or 3 options for cart sizes and/or provide residents with the option to purchase bags (or tags) for additional waste set out.

Advantages

- Waste limit is simple and easy to implement (1 cart).
- Makes enhancements to 2 or 3 stream cart collection systems easier.
- As listed under cart advantages.
- Increased efficiencies of other diversion infrastructure (i.e. composting costs less per tonne for debagged material).

Disadvantages

- As listed under cart disadvantages

3) Volume Based Subscription

Residents subscribe to a certain volume of waste and pay accordingly. For example, if implementing the bag system residents may pay $8.75/month for 2 bags, $14.25/month for 4 bags, etc.

For the cart system residents pay a graduated price for small, medium or large carts.

Advantages

- As listed under User Pay System/Volume Limits
- Can be implemented with either the bag or the cart system

Disadvantages

- Increased administrative requirements – various subscription levels must be managed and different sized containers or numbers of bags at various households must be tracked (RFID technology on carts can reduce administrative requirements for carts).
- Increased administrative requirements, increases operational costs.

6.2.3 Recommendations

- **It is recommended that the Town set a goal for its diversion rate and based on interviews and the residential survey it could be set at 50% by 2020.**

- Currently only 600 households in Vermilion are using a roll out bin for garbage. Dwellings with back allies have shared 3 yd^3 dumpsters. Garbage dumpsters fill quickly because out of Town residents are using them and some use them to dispose of large items. **It is recommend to expand the roll out bin (cart) system throughout the Town. 3 yd^3 dumpsters would be then used for commercial businesses or sold.**

- Currently the Town of Vermilion's waste stream composition (based on the waste sort conducted in September 2015), shows a high percentage of organics (60%) and recyclables (13%) in the sorted garbage. The Town should evaluate the system to significantly increase organics and recyclables diversion rate (with a goal to capture 75-90% of the organics and recyclables currently ending up in the garbage stream) in the next 5 years. This will be achieved through the

implementation of a curbside organics and recyclables collection. **It is recommend to implement curbside Organics and Recyclables collection in the next two years**.

- Based on interviews a garbage limit would be supported in Vermilion. In addition, setting a garbage limit has been shown to lead to a 20% reduction in garbage. **It is recommended to expand the rollout bin (cart) system throughout the Town and reduce garbage collection frequency from weekly to biweekly (every two weeks). Introducing a cart limit is an efficient system to reduce garbage generation, augment the Town diversion rate and reduce costs. In addition, automated collection allows:**

    - **One man automated collection resulting in lower labor costs.**
    - **Elimination of manual lifting reduces injuries and Workers Compensation claims.**
    - **Reduced collection time per household reduces labor, fuel costs and greenhouse gas emissions.**

- **It is recommended to use a 240L roll-out bin (cart) for garbage collection as smaller carts would limit the quantity of garbage generated and increase diversion of recyclables and organics. Furthermore, based on public survey eighty percent (80%) of respondents indicated that they generate less than 1 to 2 bags of garbage per week and 240L carts contain approximately 5 bags (2 weeks of garbage generation) therefore the Town could reduce its garbage collection frequency (using 240L carts).**

- **The lift cycle of the garbage collection truck currently used is long which makes the pick-up system less efficient. The Town should evaluate the use of different side loader trucks to increase efficiency at the same time reduce cost when implementing curbside garbage, recyclables and organics collection service.**

6.3 Recycling Options

Recyclables diversion options currently provided by the Town to residents are limited to drop-off service at the **Vermilion Recycle Centre** (VRC) at 4018-52 Avenue. A weekly automated collection system (3 yd^3 bins) is available for commercial businesses limited to cardboard. Collection is provided by the Town using an automated Pak-Mor side

loader truck and cardboard is taken to the VRC for processing. Recyclables dropped off are not weighed at the VRC.

Based on quantities send to recycling from the VRC, these programs diverted 500 tonnes of recyclable material in 2014 (263 tonnes from commercial businesses and 237 tonnes from residents).

In 2014, the cost for recyclables (cardboard) collection in Vermilion (261 commercial business customers) was approximately $43,642 which is equal to $166.02/tonne or **$13.93/business/month** (see table 6.2).

Table 6.2 Commercial Recyclables Collection costs

Recycling Commercial Collection (261 businesses)		
Description	Cost	
Tonnes collected	263	
Driver	$	15,838
Fuel/Maintenace/Parts	$	3,633
Misc	$	24,172
Total Cost	$	43,642
Cost/Tonne	$	166.02
Cost/business/month	$	13.93

Program options for recycling in Vermilion include:

- Enhanced Residential and Commercial Curbside Recyclables Collection – Blue Cart/Blue Bags
- Recyclables Processing

A description of each option as well as the associated advantages and disadvantages are provided below.

6.3.1 Curbside Recyclables Collection

The following factors affect the collection efficiency and costs of a curbside recyclables collection program:

1. Set out requirements (i.e. how material is sorted, commingled or mixed versus separate containers for each material, etc.).

2. Collection frequency.
3. Increased community participation.

In general, the cost of recyclables collection per household:

- **Increases** with the number of separately segregated commodities (single stream, or commingled is the least costly to collect).
- **Increases** with the frequency of collection. Collecting half as frequently (e.g. every other week instead of weekly) can reduce collection costs by 25% to 40%.
- **Decreases** with an increase in diversion rate. Lowest per household cost occurs when recyclables are collected every other week and the diversion rate is high.

1) Set out Requirements

Currently no curbside collection for recyclables is available for residents.

Collection container options for residential collection (blue box, blue bag, blue cart, reusable bags + blue box) determine general set out requirements.

Blue Box

Advantages:

- Does not require regular purchase

Disadvantages:

- Susceptible to wind and rain
- Low capacity especially if materials are separated in bags and then placed into box
- Lower capacity decreases ease of use and capture rate
- Lower capacity does not allow for reduced collection frequency

Blue Bags

Advantages:

- Materials are enclosed and therefore not susceptible to wind and rain
- Bags have greater capacity than blue boxes
- Residents can put out several bags of recycling whereas most households only have one blue box
- Blue bags allow multiple stream collection (in combination with blue box for paper only and/or cardboard bundles)
- Increased convenience increases capture rate

- Collection frequency can be reduced (residents put out more bags)

Disadvantages:

- Commingled material requires separation at facility
- Separation at facility increases labour costs
- Bags can rip or tear (reusables stronger)
- Bags must be collected manually
- Homeowners must purchase bags
- Single use bags can be unsightly

Blue Cart

Advantages:

- Large capacity (available in a range of sizes)
- Visual cue of larger cart encourages more diversion
- Materials are enclosed and protected from rain and wind
- Commingling of materials provides greater convenience to residents, which increases the capture rate. In a 3 year study conducted by North Carolina's Division of Pollution Prevention and Environmental Assistance, a transition from bins to carts saw a 35% to 50% increase in capture rates in municipal curbside collection programs.
- For a two or three stream diversion system, carts appear neater (black – waste, green – organics, blue – recyclables)
- Allows for a lower collection frequency
- Blue carts require an automated collection system as weight is too great for manual collection

Disadvantages:

- Requires initial capital investment to purchase carts
- Commingling requires separation at the facility, which increases labour costs
- Requires automated collection (can also be an advantage)

Reusable Bags + Blue Box

This set out requirement is lately getting popular in some areas in Canada (e.g. City of Vancouver, see Figure 6.2).

Figure 6.2. Reusable Bags + Blue Box in Vancouver

Advantages:

- Materials are enclosed (bags) and therefore not susceptible to wind and rain
- Does not require regular purchase
- Bags and Boxes allow single stream collection
- Collection frequency can be reduced (residents put out more bags)
- Bags are easier to store in the residence
- Reusable Bags don't rip or tear
- Cleaner waste streams
- Less commingled material requiring separation at MRF

Disadvantages:

- Less convenient than blue bags, decreases capture rate
- Bags must be collected manually
- Susceptible to wind and rain (Box)
- Low capacity (Box) especially if materials are separated, bags increase capacity

2) Collection Frequency

The frequency for all collection services can be adjusted to reduce collection costs. This should be considered once other diversion options are decided on and based on desired capture rate. Vermilion currently has no recyclables collection.

3) Increased Community Participation

The per tonne cost of collection is reduced by increasing the participation and the diversion rates. That is, the time required to empty a container or collect a bag with fewer materials is the same as that required to empty a full container or bag.

The cost efficiencies generally accrue to the hauler, however, good curbside program performance ensures that the program achieves the results expected when investing in the program.

6.3.2 Recyclables Processing

A material recovery facility (MRF) allows the separation, bailing and marketing of different materials collected through curbside collection and resident drop off. The average cost paid by municipalities in Alberta for recyclables processing by private contractors is between $40-80/tonne.

The Vermilion Recycling Centre (VRC) is owned by the Town and currently managed by C&S Enterprising on an annual fee base.
The current cost paid by the Town of Vermilion to process the recyclables (dropped off by residents and collected by town trucks) at the VRC is provided in the following (table 6.3):

- **$137,361 total cost for processing 500 tonnes of recyclable waste (residential and commercial) in 2014**
- **$274.55/tonne cost for processing of recyclables.**
- $65,188 cost for processing residential recyclables (dropped off by residents at the VRC or $3.71/hh/month
- $72,173 cost for processing commercial recyclables collected by the Town's truck or $23.05/ business/month.

Table 6.3 Recyclables processing costs

Recycling Processing (residential+commercial)		
Description	Cost	
Tonnes collected	500.32	
Contract	$	103,785
Utilities	$	8,028
Ammortization	$	17,449
Misc	$	8,099
Total Cost	$	137,362
Cost/Tonne	$	274.55

The current high cost paid for processing recyclables in Vermilion at the VRC ($274/tonne) suggests that **alternative and suitable options need to be evaluated by the Town in order to mitigate the current cost and have a feasible long term plan.**

It is recommended to evaluate a collaboration with the Vegreville Material Recovery Facility as it would represent a potential alternative for processing Vermilion's recyclables.

Total cost for collection and processing recyclables from commercial businesses is $36.99/business/month but the single businesses are currently charged only $7.87/month.

The cost for commercial recyclables management is not fully paid by businesses.

Review Recyclables Process and Processing Contract

Efficiency and savings can be increased by reviewing the current process and contract conditions with the Vermilion Recycling Centre and a profit sharing agreement could be introduced. The contractor may have some good solutions.

Other elements to consider when updating the recycling contract include:

- Education component – identify the level of responsibility the service provider has for education, i.e. distribution of material, at least one trained staff member at depot to help with public relations, display of unified signage, etc.
- Incentive programs to boost participation (revenue sharing)
- System to receive complaints and provide feedback – does the contractor respond well to feedback

- Requirement to measure and report back the amounts recycled

If the Town decides to review the current recyclables process and contract it is suggested that the following Material Recycling Facilities be toured:

- Athabasca Transfer Station
- Cochrane Recycling Depot
- Okotoks Recycling Depot
- Canmore Recycling Depot
- Vegreville Material Recovery Facility

Market Evaluation

To get the best prices possible for recyclables, it is important for the service provider to keep current with the market and with operational efficiencies, which might develop over time. Examples of how to do this include:

- Regular check of market prices on the Market Updates page of the Recycling Council of Alberta (RCA) https://www.recycle.ab.ca/markets
- Contact MRF's and other recyclers for information on how to make the most from collection
- Contact processors directly and ask for suggestions on how to make the most from collection. RCA has a list of processors by material on the Directory Listings tab on its website.

6.3.3 Recommendations

- Residents drop off recyclables at the VRC. The service is not convenient for residents and allows capture of recyclables by residents already committed to waste reduction but doesn't intercept the waste generated by other residents. Based on the waste sort, 196 tonnes of recyclables generated by Vermilion residents were sent to landfill in 2014 and only 35% of the recyclables generated by residents is actually diverted. **It is recommended to implement a curbside recyclables collection program in Vermilion.**

- **Currently, the only option Town residents have to recycle is to use the VRC. The geographic location does not allow for a choice between other sorting facilities, but currently VRC represents the only option for recyclables processing in Vermilion. The current high cost paid for**

processing recyclables in Vermilion ($274/tonne) indicates the need for the Town to evaluate the feasibility of other options to process recyclables. In order to reduce costs and improve efficiency, collaboration with the Town of Vegreville is recommended. Conversely just requiring an expression of interest (EOI) from contractors on a per tonne (or per household) basis, may result in better pricing for the management of the stream.

- **Collaboration with Vegreville for processing Vermilion's recyclables at their Material Recovery Facility is an added future possibility to evaluate for cost savings.**

- Currently residents cannot drop off recyclables at the Transfer Station which results in recyclables going into the Class II Landfill (Ryley) for disposal. **It is recommended to set up bins for recyclables at the Transfer Station to increase the capture rate for recyclables and reduce the amount of recyclables currently ending up in the landfill. A material ban at the landfill for these materials can be phased in over time.**

- The cost for commercial recyclables management is not fully paid by businesses**. It is recommend to evaluate fees adjustment for commercial recyclables collection to fully recover the cost for the service.**

6.4 Organics Options

Organics recycling options currently provided by the Town include summer weekly collection of yard waste through the 23 3yd^3 Green bins located throughout Town.

This program diverted approximately 94 tonnes of yard waste in 2014 (5% of the total stream).

Based on the waste sort conducted by Advanced Enviro, organic waste (yard waste and food waste) represent over 50% of the total waste generate by residents in Vermilion. A different program to increase participation rate is needed.

The cost in 2014 for organics collection in Vermilion was approximately $4,583 which is equal to $48.76/tonne or $0.26/household/month (Table 6.4).

Table 6.4 Organics (yard waste) collection costs

Organics Collection	
Description	Cost
Tonnes collected	94.00
Driver	$ 1,928
Fuel/Maintenace/Parts	$ 1,134
Misc	$ 664
Ammortization	$ 856
Total Cost	$ 4,583
Cost/Tonne	$ 48.76
Cost/household/month	$ 0.26

Options for addressing the organic waste stream, which is the largest component of residential waste (about 50%) include:

1. Curbside Yard Waste Collection – Spring through Fall
2. Curbside Organics Collection (Food and Yard Waste)
3. Grass Cycling and Backyard Composting

6.4.1 Curbside Yard Waste Collection – spring through fall (Cart)

Yard waste (grass, leaves, tree pruning and brush) is collected at the curbside along with normal garbage collection from mid-April through to mid-October each year. Curbside collection of yard waste can be provided either through bags or carts. Options for bags include biodegradable clear bags or the Kraft brown paper bags or reusable bags. Automated carts are recommended for organics collection especially when capturing both food and yard waste due to the weight of the material. They also have a higher participation and capture rate.

Advantages

- Addresses largest single waste stream (31%).
- Relatively easy to implement.
- Generates a valuable soil amendment product to enhance Town and residential properties.

Disadvantages

- Requires effective public communication (social marketing) as do all diversion programs that bring change.

6.4.2 Curbside Collection of Organics (Food and Yard Waste)

Food and yard waste are collected at the curbside. Due to the weight of the material an automated cart system is the best option for the collection of food and yard waste. The program can be implemented in spring through fall to reduce collection costs or year round. Year round collection increases the capture rate of food waste as spring through fall collection tends to reinforce yard waste collection only, in homeowner's minds.

Advantages

- Provides the biggest "bang for your buck" and the highest diversion potential of any solid waste management program as it addresses 60% of the waste stream, depending on what is included.
- Availability of a valuable soil amendment product to enhance Town and residential properties.
- Increases the capture rate, once the program is implemented, and can significantly increase diversion rates (i.e. 75% capture rate of organics can increase Vermilion's residential diversion rate to 60% through one program).
- Advantages as listed under cart system.

Disadvantages

- Increases capital and operating costs for compost processing and cart supply, yet are less costly per tonne then building a new landfill.
- Processing of food waste requires higher processing sophistication. Vermilion currently does not process food waste but intends to.
- Implementation of a food and yard waste collection program requires effective social marketing to ease adoption.

6.4.3 Grass Cycling and Backyard Composting

Residents are required by bylaw to leave grass clippings on the lawn and/or use a backyard composter; no pickup provided for yard and/or lawn clippings. This option was

implemented by the Town of Toronto and they achieved an immediate waste diversion of 20%.

Advantages

- 10% to 20% diversion rate with minimal associated costs (public education costs).

Disadvantages

- Some residents may not easily accept enforcement of how they manage their lawns.

6.4.4 Organic composting

The Town currently doesn't operate any Composting Compound. Yard waste collected from Green bins is dropped off at the town shop yard (3905-52 Avenue), piled up without any further management. The material is then eventually mixed with gravel/sand/aggregate and used in public work projects.

The organics waste management in Vermilion doesn't meet the minimum Provincial requirement outlined in the *Code of Practice for Compost Facilities*.

6.4.5 Recommendations

In summer months the Town collects residential organics every week through the 23 Green bins, using a side-loader truck (Pak-Mor). Organic waste represents 50% of the waste generated in Vermilion but currently only 5% is diverted from landfill.

- **It is recommended that the Town implements organics collection for food and yard waste every two weeks in the winter and every week in the summer.** This allows capturing of kitchen waste and increasing organics diversion. Year round collection increases the capture rate of food waste, as spring through fall collection tends to reinforce yard waste collection only. This will allow the Town to save money as lesser tonnes of garbage will be transported and landfilled (currently $112/tonne as 800 tonnes of organics are currently landfilled).

- **Implement a roll-out bin (cart) system (240L green cart for organics) throughout the Town.** Based on the waste sort results, organics comprise

approximately 60% of the total garbage sorted. An organics program helps achieve a higher diversion rate. Based on the residential survey, shifting to carts is acceptable as approximately fifty four percent (54%) of the survey respondents are willing to use carts for organics curbside collection. In addition automated collection would allow:

- Lowered labor costs as a result of a single operator.
- Elimination of lifting reduces injuries and Workers Compensation claims.
- Reduced collection time per household reduces labor, fuel costs and greenhouse gas emissions.

- **It is recommended to build and operate a compost pad to process organic waste generated by residents in Vermilion. A compost pad with a capacity to process up to 600 tonnes/year of organics has a cost of approximately $1 – $1.5/hh/month (considering to develop the compost pad on the former Class II landfill by the Transfer Station) and in the long term it would represent an overall benefit for the community as a whole.**

  A registered compost pad would allow the Town to be in compliance with Alberta Environment and Parks and with the *Code of Practice for Compost Facilities* to manage the organic stream.

- **Collaboration with Vegreville or contracting Vegreville organics for processing is an added future possibility.**

- **Considering that 95% of Vermilion residents live in single houses, a backyard composting program and/or grass cycling program is recommended** through communication and education projects. Residents who participate will lower the overall collection costs, as their houses will not require organics pickup.

6.5 Cart Ownership Model

The following ownership options are available for carts.

1. Contractor owned
2. Town owned

A description of each ownership model and the associated advantages and disadvantages of each model are provided below.

6.5.1 Contractor Owned

Under this cart ownership model, the waste hauler (in the case of a waste cart) or cart manufacturer owns the carts. Residents pay a monthly or annual fee directly to the waste hauler or the rental fee can be included in the total cost/tonne or cost per household paid by the municipality to the contractor.

Advantages

- Administration required to manage carts is provided by private sector.
- Private sector is responsible for cart maintenance.
- The cart is never paid off unless this is negotiated in the deal. Then the hauler or manufacturer provides the cart financing.

Disadvantages

- Cost to residents is usually higher than if the municipality purchases the carts. Carts can be purchased outright for between $50 and $80 per unit with bulk pricing or if the Town finances the purchase, the carts can be provided to households at a cost of ~ $13/yr. (At $60/cart landed, amortized over five years at 6%, the cost per household per year is ~$13). The carts would be owned by the Town after five years.
- Service provider may not have the ability or expertise to manage a large number of carts.
- Town may feel committed to stay with service provider simply because the service provider owns the carts and any changes will lead to disruptions to residents and the Town.
- Town does not own asset. Once a cart system is implemented it is not likely that the Town will go back to a manual system. This may result in the Town purchasing the carts at the end of contract, in which case – they have paid both a rental fee and the purchase price.

6.5.2 Town Owned

The Town purchases carts for all households and manages carts (i.e. additional carts for new developments, transferring of carts from old owner to new owner, etc.). The Town can either service any repairs in-house or can contract maintenance out to a private service provider.

Advantages

- Town may be able to receive funding for carts reducing the overall cart/household cost.
- Town can finance carts over a 5 or 10 year amortization period.
- As Town owns carts, it can select the most competitive service provider and not feel obligated to stay with the company that owns the carts.
- If desired, the Town can bill homeowners over a period of time.

Disadvantages

- Requires significant capital outlay.
- Increases administrative and management requirements of the Town (can be reduced through maintenance service provided by the cart manufacturer).

6.5.3 Recommendations

The Town of Vermilion is currently providing an in house collection service and owns the 360L roll out bins (carts) used for 600 households (garbage collection).

- Based on residential survey conducted by Advanced Enviro in Oct/Nov 2015, seventy one percent (71%) of the survey respondents are willing to use roll-out bins (carts) for their garbage, eighty percent (80%) for their recycling and fifty four percent (54%) for organic (food and yard) waste. It is only 1/5th of the respondents that are not willing to use roll-out bins for either garbage or organics. **It is recommend extending automated garbage collection throughout the Town and implementing automated organics collection. This can be phased in over the next 2-3 years.**

- **It is recommended to use a 240L roll-out bin (cart) for garbage collection as smaller carts would limit the quantity of garbage generated and increase diversion of recyclables and organics. The 360L carts currently used can be sold as they have good value on the market.**

- In the case that the Town extends the automated collection for garbage Town wide and/or implements automated collection for organics, **it is recommended that the Town own its own carts**. The Town can either service any repairs in-house or can contract maintenance out to a private service provider. Owning the carts will be less costly over time as quality carts tend to last 10 years or more.

- The Town is recommended to buy high quality carts to avoid possible complaints from the residents, recovering the higher cost through a lower cost for maintenance. The Town can select the most competitive and technologically advanced carts and not feel obligated to stay with the company that owns the carts.

- The Town may be able to receive funding for carts reducing the overall cart/household cost. (The Town can finance carts over a 5 or 10 year amortization period).

- **It is recommended to further evaluate the most suitable carts for Vermilion** as many options are available on the market. For example:

  - **The new round bottom cart** provides some unique features that negate the need for a grate and allows moisture to collect at the low point or sink which allows the rest of the material to stay aerobic. Grates trap organic materials at the bottom of the cart, which is smelly and hard to clean. Waste does not freeze in carts in winter.

  - **Thinner width carts** take up less space in storage areas.

  The use of carts gives the following benefits:
  - Cart design (ventilation, lids, and holding capacity) allows for year round collection of organics (food and yard waste) and varied collection frequencies.
  - Carts allow for a cost reduction of 50% whenever changing to biweekly garbage collection (if coupled with other diversion programs such as organics collection).
  - Less plastic waste compared to bag collection.
  - Reduces problems with animals and rodents.
  - Visually attractive (neater than bags or variety of customized bins) and uniform system.
  - No breakage from overfilling. Animal less likely to get into waste.
  - Comes in various container sizes and colors.
  - Easy to maneuver (on wheels).

Manufacture

- Carts should be manufactured using an injection molding process.

- Carts to be made with virgin HDPE and resin content should be considered (Some carts use half the resin and hence will last approximately half as long, not 10 years and more).
- Cart to be stable in winter and summer conditions.
- Wheels should be 6 inches in diameter and feature snap on assembly for easy removal. Preference to be given to wheels designed for heavy loads and uneven grounds.

The Town of Vermilion has very challenging cold weather conditions.
It has been determined that these conditions affect speed of collection and the complete emptying on materials. Materials freeze and stick to the inside of collection containers. These cold weather conditions also create additional wear and tear on equipment. Costs for repairing carts on the street are very high, the replacement of wheels are the most prone to damage, cracks in body due to cold weather issues are the next problem. The Town should therefore look at the total lifecycle costs of the designs offered by the manufacturer and at residents' satisfaction. Specifically the Town should consider:

- How the cart design reduces sticking and freezing of materials to the insides of the cart.
- How the design eliminates inside structures that encourage sticking and freezing such as corners, catch points, flat surfaces.
- Preference should be given to carts that spill contents on first cycle with no residual weight being transferred to cart lifting structures.
- Carts must be designed to be used in cold climate conditions.
- How the design promotes easy cleaning of the inside of the cart.
- Warranty (most carts have a 10 year warranty)

6.6 Public Education and Social Marketing

Successful collection and diversion programs require an extensive educational component. An effective public education program that includes social marketing can increase capture and diversion rates for all programs provided by the Town.
Options for a public education program include the following:

- Advertising budget specifically for solid waste collection and diversion programs
- Staff position responsible for an education program and/or contract development of an education program to the private sector
- Develop overall theme that is integrated with all collection and diversion programs
- Focus activities and marketing on achieving specific behavioral goals (working closely with schools is very effective in this area)

- Provide training in social marketing techniques to key staff involved in the education program
- Incorporate a Zero Waste statement into Town's Waste Management Strategy (Count GHG reductions to support program
- Include GHG reductions in material that shares diversion successes

The following photographs are an example of the use of an overall program to link all diversion programs under one integrated waste management system. Whistler's theme is "Moving Towards a Sustainable Future".

Figure 6.3. Whistler Signage – Recycling Depot.

Figure 6.4. Whistler Signage – Organics.

Figure 6.5. Whistler Signage – Compost.

6.7 Costs Analysis

Table 6.5 and 6.6 provide the current costs for the different waste management components for the Town of Vermilion:

Table 6.5 – Residential Waste

- Garbage collection (600 carts and 285 3yd^3 dumpster bins) and disposal
- Yard waste collection (Green bins April-November)
- Recyclables processing at the VRC (Recyclables dropped off by residents)

Table 6.6 – Commercial Waste

- Garbage collection and disposal
- Recyclables collection and processing at the VRC

Calculations for this table were based on the following assumptions:

Residential Waste

- Status quo is 24% diversion rate
- Total number of households: 1,466
- Total number of households charged for waste management services (garbage + recyclables): 1,466
- Residential garbage generated in 2014: 1,493 tonnes
- Recyclables dropped off at VRC in 2014: 237 tonnes
- Yard Waste (Green bins) collected in 2014: 94 tonnes
- Waste Recycled at the Transfer Station in 2014:139 tonnes
- Cost/hh/month charged to residents (single dwelling) in 2014 was **$25.91.**
  Garbage: $18.04/hh/month for garbage collection and disposal
  Recyclables: $7.87/hh/month for recyclables processing ($21.74/month/unit for multi dwellings and condos)
  The cost of $25.91/hh/month also covers other components of the waste management system in Vermilion (organics collection and processing, Transfer Station, etc.)
- Costs and revenues are based on the Town's 2014 budget and other data provided by the Town of Vermilion.
- Current disposal and processing fees are from 2014

Commercial Waste

- Total number of commercial businesses serviced and charged for garbage pickup: 261
- Commercial garbage generated in 2014: 1,606 tonnes
- Recyclables collected in 2014 (commercial): 263 tonnes
- Costs and revenues are based on the Town's 2014 budget and other data provided by the Town of Vermilion.

Current Residential Waste Management Costs (2014)- Status Quo Diversion Rate 24%								
		Collection			Processing			Total
	Tonnes 2014	Total Collection Costs	Collection Cost/Tonne	Collection Cost/HH/Month	Total Processing Cost	Processing Cost/Tonne	Processing cost/HH/Month	Total Cost/ HH/Month
Garbage Residential	1493	$135,199	$90.53	$7.69	$141,168	$94.53	$8.02	$15.71
Recycling Residential	237			$0.00	$65,189	$274.55	$3.71	$3.71
Organics Dumpsters	94	$4,583	$48.76	$0.26				$0.26
Administative								$1.33
Total	**1824.8**	**$139,782**	**$139.29**	**$7.95**	**$206,356**	**$369.07**	**$11.73**	**$21.00**
Currently Charged to residents								**$25.91**

Table 6.5 Summery for Residential waste management

Total cost for residential waste management in Vermilion is approximately $21.00/hh/month, but residents are currently charged $25.91/hh/month.

The difference of $4.91/hh/month (approximately $86,335/year) currently paid by residents for garbage/recyclables management services are actually used by the Town to cover commercial waste management costs (see below).

Current Commercial Waste Management Costs (2014)- Status Quo								
		Collection			Processing			Total
	Tonnes 2014	Total Collection Costs	Collection Cost/Tonne	Collection Cost/Business/ month	Total Processing Cost	Processing Cost/Tonne	Processing cost/Business/ Month	Total Cost/ Business/ month
Garbage Commercial	1606	$89,368.99	$55.66	$28.53	$151,773.63	$94.53	$48.46	$76.99
Recycling Commercial	263	$43,642.46	$165.94	$13.93	$72,205.94	$274.55	$23.05	$36.99
Total cost	**1868.6**	**$133,011**	**$221.60**	**$42.47**	**$223,980**	**$369.07**	**$71.51**	**$113.98**
Currently Charged to businesses ($285,913)								**$91.3**

Table 6.6 Summery for Commercial waste management

Total cost for collection and processing of commercial waste (garbage + recyclables) is $113.98/business/month but the single businesses are currently charged approximately $91.3/month.

The cost for commercial garbage and recyclables management is not fully paid by businesses but partially covered by residents through utility bill.

6.7.1 Option A. Garbage collected every 2 weeks, recyclables every 2 weeks, organics every week in summer and every 2 weeks winter - 53% Diversion Rate

Option A for Vermilion waste management assumes every two weeks garbage collection year round and extends organics collection to every two weeks in the winter months (November-March) and every week in summer months (April-October).

The goal for this option is to achieve a 53% diversion rate.

A communication budget of $50,000/year allows deeper communication with residents and will in 2-3 years lead to an increased capture rate for recyclables and organics by 55%.

This option will reduce garbage generation by 565 tonnes and reduce the current cost to transport and dispose the garbage to Ryley Class II landfill by approximately $54,000/year.

In order to avoid extra garbage dropped off at the transfer station by residents (currently there is no charge for waste dropped off at the Transfer Station by residents) a charge of $10 per load of garbage dropped off by residents is recommended.

Costs for Residential Waste Management – Option A are based on the following assumptions:

- Number of households charged for collection services: 1,466
- Automated curbside garbage collection (carts 240L) every two weeks year round
- Automated curbside organics (yard and food waste) collection (carts 240L) every week during summer months (April-October) and every two weeks during winter months (November-March).
- Manual curbside recyclables collection every two weeks year round
- Waste generation rate through curbside collection: 1,851 tonnes/year
- Garbage collected per year: 928 tonnes
- Recyclables collected per year: 338 tonnes (50% capture rate)
- Organics collected per year: 585 tonnes including 300 tonnes of food waste (55% capture rate)
- Organics and recyclables collections contracted out.
- Cost for organics and recyclables collections are based on average cost for similar services in northern Alberta (see appendix E)
- Recyclables processing contracted out (not at the VRC)

- Cost for organics processing at the new Town compost pad is approximately $40/tonne assuming to develop the compost pad on the former Class II landfill by the Transfer Station.
- Cost for garbage management plus transportation and disposal to Ryley Class II Landfill is $94.53/tonne.
- Diversion rate at 53% includes recyclables dropped off at the Transfer Station (139 tonnes) by residents.
- Cost/HH/Month charged to residents in 2014 is $25.91 (single dwellings)
- Capital costs and implementation costs are amortized over 10 years (5 years for equipment) at 5.25% fixed interest rate.
- Current disposal, transportation and processing fees (2014).
- Communication cost at $50,000/year.

The cost analysis in Table 6.7 (Option A) shows how implementing services that are targeted to increase the diversion rate, provide the most efficient solution at a manageable cost.

Option A represents an important step in the Vermilion 5 year plan, detailed in section 7of this study “Action Plan/Implementation Report” that provides recommendations and a timeline for the action plan.

Residential Waste Management Costs - Option A 53% diversion rate								
		Collection			Processing			Total
	Tonnes	Total Collection Costs	Collection Cost/Tonne	Collection Cost/HH/Month	Total Processing Cost	Processing Cost/Tonne	Processing cost/HH/Month	Total Cost/ HH/ Month
Garbage Automated Collection	928	$70,368.00	$75.81	$4.00	$87,743.97	$94.53	$4.99	$8.99
Manual Recycling Collection	338	$75,645.60	$223.97	$4.30	$23,642.44	$70.00	$1.34	$5.64
Automated Organics Collection	585	$105,552.00	$180.29	$6.00	$23,418.20	$40.00	$1.33	$7.33
Administative Costs								$1.10
Communication - $50,000								$2.84
Total	**1851.44**	**$251,566**	**$480.07**	**$14.30**	**$134,805**	**$204.53**	**$7.66**	**$24.81**
Currently Charged to residents								**$25.91**

Table 6.7 Cost summary for Option A waste management in Vermilion (Garbage collected every 2 weeks, recyclables every 2 weeks, organics every week in summer and every 2 weeks winter - 53% Diversion Rate)

The cost analysis illustrates that implementing services that are targeted according to the significance of the waste stream, provides the most cost effective solutions.

Integrating all components and maximizing efficiencies also provides for greater diversion opportunities at a manageable cost.

6.7.2 Recommendations

Organics represent 50% of waste generated in Vermilion. Implementing an organics curbside collection year round will increase the organics capture rate especially when combined with the implementation of a garbage limit (collection every two weeks with 240L carts). This would increase the capture rate for recyclables as well and reduce considerably the amount of garbage sent to landfill and the high costs associated ($112/tonne).

The cost per household per month is not expected to drastically increase as the system would efficiently reduce costs for garbage collection and disposal.

Implementation of Option A should start in 2016 with the expiration of the contract with C & S Enterprise for the management of the VRF, but has to be planned in advanced in order to schedule activities and implement an effective communication plan that allows informing, educating and engaging the residents with respect to program changes.

Option A would include the use of different contractor for processing of recyclables. It is recommended to request an EOI to evaluate the contractors and options available on the market. Collaboration with Vegreville and their Material Recovery Facility is an added future possibility.

Option A includes 50,000/year for communication programs. This budget is necessary and allows deeper communication with residents and will lead in 2-3 years to achieve a capture rate for recyclables and organics of 55%.

It is recommended to implement Option A - Garbage collected every 2 weeks, recyclables every 2 weeks, organics every week in summer and every 2 weeks winter- in order to increase diversion from 24% (current) to 53% in the next 2-3 years at no cost increase.

The cost for commercial garbage and recyclables management is not fully paid by businesses**. It is recommend to evaluate fees adjustment for commercial waste collection to fully recover the cost for the service.**

7.0 ACTION PLAN

This section provides a brief summary of the Town of Vermilion's current residential solid waste management system, recommendations and a timeline for action.

7.1 Current System Summary

7.1.1. Waste Collection and Disposal

The Town of Vermilion provides weekly automated curbside residential garbage collection (360L) for 600 households and weekly automated garbage collection (3yd^3. dumpster) for approximately 866 households. The Town owns and uses one (1) side loader fully automated truck (Pak-Mor) for garbage collection. Garbage can also be dropped off at the Transfer Station by residents at no cost.

The 2014 cost for garbage collection and disposal were:

- Residential garbage collection: $90.53/tonne or $7.69/month/hh
- Disposal (includes transportation): $112.95/tonne or $9.59/month/hh
- Resident garbage collection fee: $19.54/month/hh

Approximately 1,493 tonnes of residential garbage was sent to the landfill in 2014 or 380 kg/capita; compared to the provincial average of 272 kg/capita[2].

7.1.2. Recycling

Recyclables diversion options currently provided by the Town to residents are limited to drop-off service at the Vermilion Recycle Centre (VRC) at 4018-52 Avenue.

In 2014 costs for recyclable items processing were:

- Processing cost (VRC): $274.55/tonne ($3.71/hh/month)
- Resident recyclable collection fee: $7.87/month/single dwelling for recyclables processing ($21.74/month/unit for multi dwellings and condos)

[1]Based on 2010 Statistics Canada residential waste disposal data and Statistics Canada 2010 Population data

In 2014, 237 tonnes of recyclables were dropped at the VRC by residents.

The residential diversion rate for recyclables is 12%. The recycling program captures 1/3 of the available recyclables.

7.1.3. Composting

The Town provides the following organics diversion programs:

- Residential weekly automated organics (yard waste) collection in the summer with 3yd^3 dumpster (green bins). Organics is collected using a fully automated side-loader truck (Pak-Mor).
- Organics collected from the green bins are piled up at the shop yard without any further management. The material is then eventually mixed with gravel/sand/aggregate and used in public work projects.

The 2014 organics collection costs were:

- Automated organics collection: $48.76/tonne ($0.26/hh/month
- Currently the Town does not charge for organics collection

In 2014, approximately 94 tonnes of organics were collected.

The residential diversion rate for organics (yard waste) collection is 5%. The program captures 21% of the available yard waste and 9% of the total organics (food and yard waste).

7.1.4. Vermilion Transfer Station

In 2014, 3,702 tonnes of waste was received and processed at the Vermilion Transfer Station (Located 1.5 km north of Vermilion on Pare Drive).

There is no charge to commission members for residential waste.

Materials accepted, at the Transfer Station, and brought to the Ryley landfill for disposal, include:

- Residential garbage
- Commercial waste

Residents do not have the option of dropping off recyclables at Vermilion Transfer Station which could have captured some of the recyclables going to landfill as waste.

The 2014 costs paid to the Vermilion Regional Waste Management Authority for waste management including transportation and disposal of garbage at Ryley landfill and for the Town's former landfill monitoring was $95.55/tonne ($349,945.00).

7.1.5. Commercial Waste and Cardboard Collection

Town provides weekly waste and cardboard collection services to 261 commercial businesses for $14.92/pickup/week for garbage and $7.87/month for cardboard. For additional pickups the Town charges $32.82/pickup.

In 2014 this program collected approximately 1,606 tonnes (estimate data) of commercial garbage and 263 tonnes of commercial cardboard.

The 2014 cost for commercial garbage and cardboard collection and disposal/processing were:

- Commercial garbage collection and disposal: $241,226 or $150.19/tonne or $76.99/business/month.
- Commercial recyclables (cardboard) collection and processing: $115,848 or $440.49/tonne or $36.99/business/month.
- Single businesses are currently charged on average $91.3/month.

7.1.6. Diversion Rates

Vermilion's current residential diversion rate is 24%, compared to an average residential diversion rate of 25% in Alberta. Tonnage data for residential waste (garbage and organics) separately is not available prior to 2014.

High percentages of organics, mostly food wastes are sent to landfill (55% of the garbage stream). If waste was sorted at the source (household), approximately 13% of the waste generated would have been landfilled. If all the available recyclables and

organics were captured through the existing diversion programs, the Town would have achieved an 87% diversion rate.

Based on survey carried out by Advanced Enviro in October/November 2015, seventy four percent (74%) of the respondents think that the Town should divert more than 40% of waste from landfill in the next five years.

7.2 Recommendations

7.2.1 Waste Management Strategy and Goals

It is recommended that the Town sets a goal 50% diversion rate by 2020 and shares the goal with the community.

The Town of Vermilion currently has no specific goal for waste diversion and/or reduction. Based on the residential survey, about seventy four percent (74%) of the respondents think that the Town should divert more than 40% of waste from landfill in the next five years and forty seven percent (47%) think that the Town should divert more than 50% of waste from landfill in the next five years. This clearly indicates that the Town could set a target of 50% diversion in the next five years.

Based on the residential survey, forty two percent (42%) of the survey respondents are willing to pay $27 - $30 per month and twelve percent (12%) are willing to pay $31 or more per month. Ninety eight percent (98%) of the respondents indicated that waste diversion and reduction is important to them. These responses indicate that Town residents are in favor of a Waste Reduction Strategy with an associated goal and the majority are willing to pay up to $30 per month for that strategy to be implemented.

Recommendation 1: Town sets a diversion goal and shares it with the community.

- **Increase the residential diversion rate to 50% by 2020.**
  This represents an approximate 26% reduction in residential waste being sent to landfill.

It is recommended that the Town develops and documents a Solid Waste Management Strategy that focuses on waste reduction and diversion.

The strategy should be based on source reduction first, then resource recovery, and lastly waste disposal and should include waste reduction goals and targets. This

represents resident's desire and is cost effective. The strategy should represent a progression towards higher diversion rates and hence a longer life expectancy for the landfill. Documenting a Solid Waste Management Strategy will ensure continued progress towards increased diversion.

Municipalities across Canada, as they become comfortable with the basic elements of waste diversion, are expanding their strategies to achieve higher diversion rates. An example of this is the increasing trend across North America and Europe to incorporate Zero Waste strategies. Zero waste regards all waste as a potential revenue stream and encourages the redesign of resource life cycles so that products are reused, with an end result of minimal waste being sent to landfill.

The Town may choose to include a Zero Waste statement in the strategy to illustrate the Town's goal to reduce waste as much as possible. As an example of the implications of including a Zero Waste statement, the Town of Stony Plain has a goal to make all Town events Zero Waste. This encourages waste management strategies to be incorporated at the planning stage and considers green procurement, source reduction and reuse for each event.

Recommendation 2: Develop & Document a Solid Waste Management Strategy.

This target should be reviewed after 3 years, and then a 2025 goal can be set. This goal should reflect the achievements made over the 3 years and should move the Town closer to its Zero Waste strategy statement.

The chart on the following page illustrates successful diversion program components, to be considered when developing the Town's solid waste management strategy.

Recommendation 3: Consider Components of Successful Waste Diversion Programs Chart When Developing Solid Waste Management Strategy.

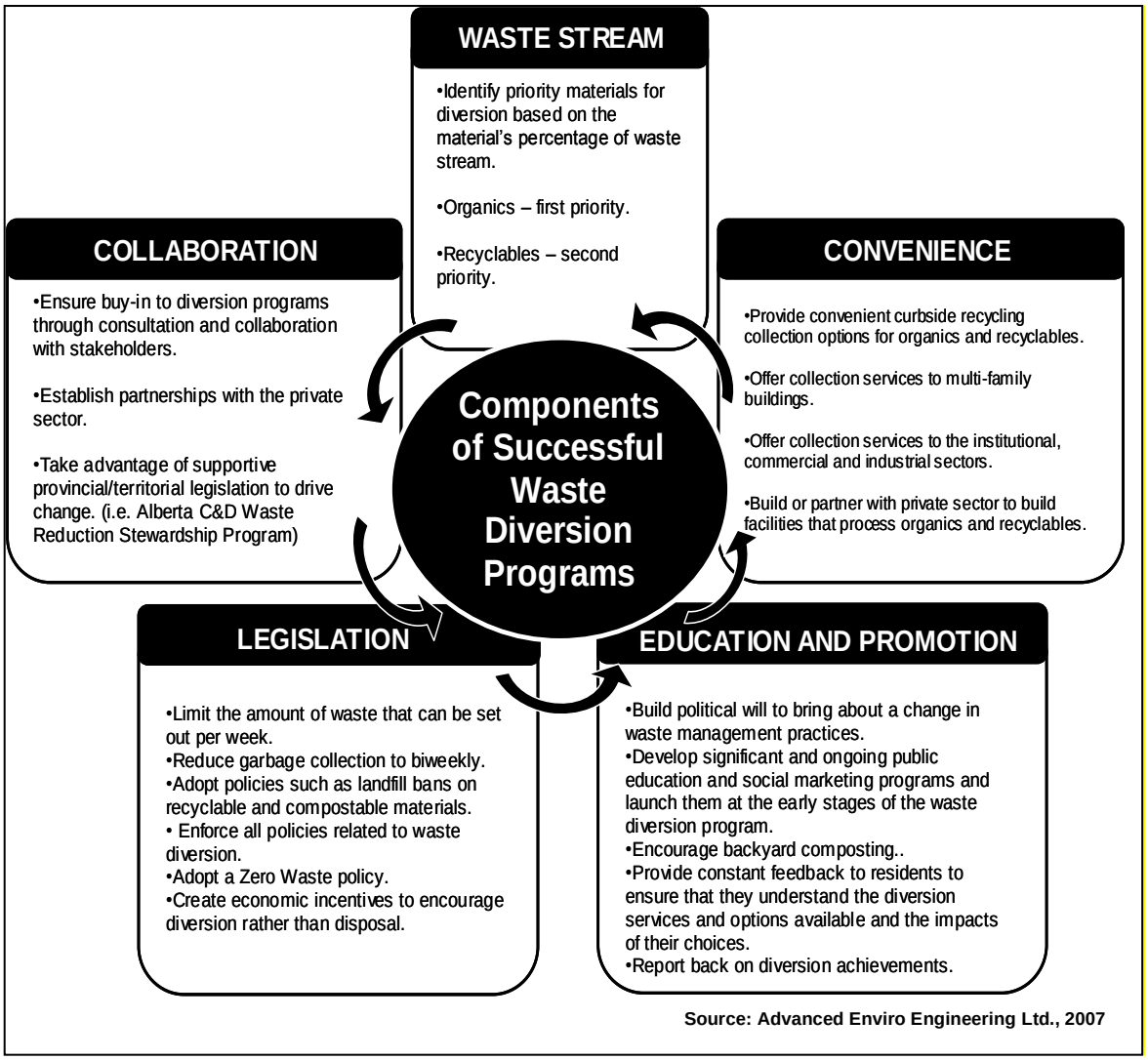

Figure 7.1 Components of Successful Waste Diversion Programs

7.2.2 Public Education Program and Enhanced Social Marketing

Successful waste management strategies require a strong public education campaign.

Based on the interviews and residential survey, educational initiatives are important and there is resident's interest to learn about waste issues. Council and Town staff interviews reinforced the need and desire for public education programs as well as educational programs about recycling in schools.

The education program should:

11. Identify a key staff member responsible for education program delivery.
12. Provide social marketing training to the education program coordinator.
13. Inform the public of the Town's Waste Management Strategy (Recommendation 2) and Goals (Recommendation 1).
14. Provide information on Vermilion's waste stream and waste generation rates (information provided in Section 1).
15. Inform the public of the associated benefits and costs of alternative waste management strategies.
16. Incorporate social marketing techniques to market the social good of participating in existing and new diversion programs.
17. Create environmental education programs for schools that target students from grade one to six; as this is when recycling behaviour is largely formed for life and they are extremely influential in teaching their families how to minimize waste and follow program rules.
18. Integrate all solid waste management programs under the Town's solid waste management strategy.
19. Town should educate residents first before implementing program changes.
20. Identify a theme that is used for all diversion programs that reinforces an integrated approach to solid waste diversion (i.e. Whistler's "Towards a Sustainable Future, Stony Plain's "Paint Your World Green", etc.).

A range of communication tools should be employed to reach all demographics (online information, schools, articles, etc.). Based on the survey, residents indicated that the best communication methods would be brochures with utility bills and the Town should consider this tool to reach residents. Solid waste management services and diversion programs should be easily accessible on the Town's website and linked to the solid waste management strategy and goals. The Town could add a regular section on waste reduction to keep residents upto date on the monthly newsletter "Talk of the Town".

Program implementation, management and review should include public education and involvement throughout. **An effective program includes a strong social marketing technique which is best recommended by an independent waste management consultant with social marketing expertise.**

The Town might also consider mailing the Executive Summary of this Study to households and/or providing the Executive Summary on the Town's website.

Recommendation 4: Implement an ongoing public education program that incorporates social marketing and integrates all collection and diversion programs under one theme and strategy.

7.2.3 Composting and Waste Limit

Waste management strategies targeted to organics provide municipalities with the biggest "bang for your buck" because organics are the largest component of the waste stream and provide the greatest diversion potential. In order to achieve this goal, the Town must enhance its current organics diversion program. For example, even if 100% of the available recyclable stream were captured in Vermilion, the maximum increase in diversion would be 35% compared to a potential 50% if all organics is captured.

Current program in place to address organics is limited to weekly collection of the twenty three green bins (3 yd^3. bins throughout the Town) that are available for residents to dispose of their yard waste (garden waste, grass clippings and leaves) from May to October. Organics collected from the green bins are piled up at the shop yard without any further management. The material is then eventually mixed with gravel/sand/aggregate and used in public work projects.

This program has a low capture rate (9%) and 60% of the garbage stream is comprised of organics (mainly food waste). This low capture rate is likely due to three factors: 1) service is not convenient for residents, 2) the limited time period for curbside collection of organic waste (6 months) is not of a sufficient duration to change residents' set out habits, and 3) organic collection is limited to yard waste.

Enhanced organics diversion programs that are integrated into a strong education program will likely be adopted quickly and favorably in Vermilion, as both interviews and the 2015 survey results indicated a high level of interest in the enhancement of organics program.

The Town currently pays $0.26/hh/month for 6 months of yard waste collection, excluding any organics processing. Year round curbside collection of both food and yard waste with 240L carts (rollout bins) could be implemented at an estimated cost of $7.33/hh/month including capital and operation cost for a new Town owned compost pad.

Assuming a 55% capture rate for organics (currently 9%) the following diversion would be realized:

- Residential diversion rate: Increase from 24% to 53%
  (When combined with a waste limit)
- Residential waste to landfill: Decrease from 76% to 47%

Therefore, implementing this option will allow the Town of Vermilion to reach the recommended goal (50% diversion rate by 2020) within the first year of program implementation.

It is recommended to evaluate (preferably with an external compost consultant) different options for organic waste composting in Vermilion including building and operating a compost pad (possibly on the former Class II landfill by the Transfer Station).

It is recommended to collaborate with Vegreville and evaluate to contract their organics for processing at the Vermilion compost pad.

A registered compost pad would allow the Town to be in compliance with Alberta Environment and Parks and with the Code of Practice for Compost Facilities to manage the organic stream.

Recommendation 5: Implement year round Curbside Organics Collection (every two weeks in the winter and every week in the summer) with 240L rollout bins (carts) for yard and food waste in 2016. Year round organics collection will increase the rate of organics diversion and decrease garbage disposal rate.

Recommendation 6: Evaluate different options for organic waste processing including building and operating a compost pad.

7.2.4 Garbage Collection

The Town of Vermilion provides weekly automated curbside residential garbage collection (360L) for 600 households and weekly automated garbage collection (3yd^3. dumpster) for approximately 866 households.

The Town of Vermilion's waste stream composition (based on the Sept 2015 waste sort), shows a high percentage of organics (60%) and recyclables (15%) in the sorted

garbage. In addition, based on the interviews and survey carried out by Advanced Enviro in Oct 2015, interviewees and survey respondents support a garbage limit.

The Town should evaluate the system to significantly increase the organics and recyclables diversion (with a goal to capture 55% of the organics and recyclables currently ending up in the waste stream) in the next 5 years. This will be achieved through the implementation of a more stringent waste limit.

The current waste management system does not include a sufficient incentive to reduce waste. The presence of 285 3yd^3 dumpsters in back alleys allow uncontrolled and blameless garbage generation. Implementation of an automated garbage collection with rollout bins (carts) throughout the Town in 2016 would allow increase of both garbage generation control and diversion rate. Furthermore, one cart limit every two weeks should be implemented at the same time as year round curbside collection of organics is implemented. Bag/cart limits achieve approximately a 20% reduction in waste generation through behavioral changes as a result of an increased awareness of waste habits. Implementing limits also significantly increases capture rates for diversion programs as it forces residents to use the diversion programs already in place. This option will therefore increase the diversion rates for the Town's curbside recyclables and organics programs.

Introducing a roll-out bin (cart) limit is an efficient method of reducing garbage generation, augmenting the Town diversion rate and reducing costs.

It is recommended the Town to use 240L carts for garbage collection as smaller carts would allow limiting the quantity of garbage generated and increasing diversion of recyclables and organics. Furthermore, based on public survey eighty percent (80%) of respondents indicated that they generate 1-2 bags of garbage per week and 240L carts would allow to contain 2 weeks of garbage generation and the Town of Vermilion could reduce its frequency of garbage collection (using 240L carts). Current 360L carts can be sold as they have good value on the market

Current garbage pick-up system in not efficient as the lift cycle for the truck currently in use is very long. Once Vermilion will implement automated garbage collection with 240L roll-out bins (carts) throughout the town is recommended to evaluate the use of different side loader trucks with faster lift cycle for residential collection in order to increase efficiency and reduce costs. Current truck (Pak-Mor) can be dedicated to commercial services.

Recommendation 7: Implement Automated Garbage Collection with 240L roll-out bins (carts) throughout the Town in 2016.

Recommendation 8: Implement a Cart Waste Limit – Reduce the garbage collection frequency from weekly to every two weeks.

Recommendation 9: Evaluate a faster side loader truck for residential garbage collection in order to increase efficiency and reduce costs.

7.2.5 Curbside Recycling Collection and Recycling processing

The Town diverts approximately 19% of the available recyclable waste stream. Based on the waste sort, recyclables comprise twelve percent (12%) of the sorted garbage.

Recyclables programs are limited to drop-off at Vermilion Recycle Centre**.**

The recommendation is to implement a biweekly (every two weeks) curbside manual collection (blue bags) throughout the year. The current service is not convenient for all residents and allows to capture recyclables by residents already committed to waste reduction but doesn't intercept the waste generated by other residents.

Implementation of a curbside collection for recyclables has to be linked with a public education campaign, social marketing and a waste limit, because this is the most effective means to increase participation and capture rates for the curbside recyclables collection program. Achieved and other good news stories should be shared with residents.

Implementing a year round organics collection program will also increase capture rates for recycling as long as the education program incorporates these diversion programs under one integrated system. Education focused on an integrated system aimed at increasing participation and capture rates for all components will increase diversion from all programs. If education is focused on only one program, the Town risks losing the benefits that could be achieved from increased service.

The public education campaign should also inform residents of the recycling services provided at the Transfer Station.

Once the capture rate for recyclables is close to 70%, the Town should evaluate to switch to a weekly curbside collection for recyclables (not earlier than two years).

Recommendation 10: Implement a biweekly (every two weeks) curbside collection throughout the year.

Recommendation 11: In two years' time evaluate to implement a weekly curbside collection for recyclables.

The cost paid by the Town of Vermilion for the recycling process at the VRC is based on these components (for details see Section 4):

- $137,361 total cost for processing 500 tonnes of recyclable waste (residential and commercial) in 2014
- $274.55/tonne cost for processing of recyclables.
- $65,188 cost for processing residential recyclables (dropped off by residents at the VRC or $3.71/hh/month
- $72,173 cost for processing commercial recyclables collected by the Town's truck or $23.05/ business/month.

The current high cost for recyclables processing at VRC and the lack of competitive MRFs in the area suggest that alternative suitable options need to be evaluated by the Town.

Efficiency and savings can be increased by reviewing the contract with the current contractor (C&S Enterprising), e.g. introducing a cost per tonne and/or introducing a revenue sharing condition.

The Town should evaluate other options for processing residential and commercial recyclables by 2016 (end of current contract with C&S Enterprising). Town could put out a request for EOI (expression of interest) to find a suitable long term options (response can be from public, Town itself or private) that would include taking recyclables elsewhere for processing (e.g. Edmonton, etc.).

It is recommended to evaluate a collaboration with the Vegreville Material Recovery Facility as it could represent an efficient and cost effective alternative for processing Vermilion's recyclables.

Recommendation 12: Review Recyclables Processing Contract at Vermilion Recycling Centre.

Recommendation 13: Evaluate the feasibility for more cost effective options for processing recyclables in Vermilion. Put out a request for EOI (public and private contractors can respond). Collaboration with Vegreville Material Recovery Facility is possible.

7.2.6 Commercial Diversion

Municipal solid wastes include residential, ICI and C&D (construction and demolition) waste. Although, the scope of this project is limited to residential waste it is recommended that the Town consider options for commercial waste, as it comprises 66% of municipal solid waste.

Currently Town provides weekly waste collection services (for garbage and cardboard) to 261 commercial businesses. The current rates charged to commercial businesses for garbage and recyclables pick up are very convenient when compared to rates applied by private contractors.

Total cost for collection and processing of commercial waste (garbage + recyclables) in 2014 was $113.98/business/month but the single businesses are currently charged approximately $91.3/month.

The cost for commercial garbage and recyclables management is currently not fully paid by businesses, but residents are covering part of the cost through utility bill.

Town should evaluate to increase current rates for commercial garbage pickup (and not recyclables service) in order to fully cover cost for commercial services and at the same time increase diversion. Town has unique opportunity to set rules.

Recommendation 14: Adjust current rate for commercial garbage pickup services to fully cover management costs.

7.2.7 Transfer Station

Transfer Station in Vermilion is currently managed by the Regional Waste Management Authority and the Town is charged approximately $60/tonne for waste received from residents and from Town's truck (residential and commercial garbage).

Out of Town residents are charged at the Transfer Station but identification of residents is based exclusively on statements of Transfer Station's users. The system brings confusion and lack of clarity.

The Town in collaboration with the Regional Commission should evaluate the implementation of a card system for waste acceptance at the Transfer Station in order to identify waste generators. Card system would also allow to manage waste quantities control, and in the future to evaluate waste acceptance limit at the Transfer Station. For positive examples of card systems implementation in the area it is suggested to contact Parkland County Transfer Stations and Leduc Transfer Station.

A drop off system for recyclables must to be implemented at the Transfer Station as a large amount of recyclables are mixed in with garbage and are not diverted. Recyclables collected should be then taken to the VRC for processing.

Town of Vermilion should evaluate and implement with the Regional Authority a strategy to reduce the presence of recyclables and organics in the garbage accepted at the Transfer Station. Strategy should be based on differential fees at the Transfer Station (e.g. fees applied for recyclables or organics present over a certain percentage in garbage loads).

Signage at the Recycle Centre and Transfer Station need to be updated as the items listed on the website and on signs are not consistent.

Recommendation 15: Implement a card system at the Transfer Station to unequivocally identify waste generators at the Transfer Station.

Recommendation 16: Provide drop off service for recyclables at the Transfer Station.

Recommendation 17: Implement with the Regional Authority a strategy to reduce the presence of recyclables and organics in the garbage accepted at the Transfer Station.

7.2.8 Out of Town usage of Municipal System

Based on interviews and survey responses many of the services provided by the Town of Vermilion are used by out of Town residents (mostly from the County of Vermilion).

In some cases, out of Town users have rights for using the services paying a fee (Transfer Station and Recycle Centre), but seems that other services as $3yd^3$ dumpster for garbage and Green bins are illegally used as they represent an easy and uncontrolled option for disposal of waste.

It is recommended to implement in collaboration with the County a communication campaign aimed to contrast illegal dumping in Town, with specific material and education programs. Town and County should also be present at the main events in the area (e.g. Vermilion agricultural fair) promoting environmental initiatives including battle against illegal dumping. The campaign should be executed in concomitance with the implementation of automated garbage collection with rollout bins (carts) throughout the Town.

Specific fines for illegal dumping of waste by out of Town users in $3yd^3$ dumpster and Green bins should be implemented and applied.

Discussion with Vegreville on illegal dumping issues would be useful before implementing the new strategy as they have similar experience with Minburn County' residents.

Recommendation 18: Implement a communication campaign and a specific bylaw to reduce illegal dumping of waste by out of Town users in $3yd^3$ dumpster and green bins should the cart system not being implemented.

7.2.9 Recommendations Summary

Table 7.1. Recommendations Summary

Recommendation	Description
Recommendation 1	Set a goal for the diversion rate and share it with the community. Increase the residential diversion rate to 50% by 2020.
Recommendation 2	Develop and Document a Solid Waste Management Strategy.
Recommendation 3	Consider components of the successful diversion programs chart when developing Solid Waste Management Strategy.
Recommendation 4	Implement an ongoing public education program that incorporates social marketing and integrates all collection and diversion programs under one theme and strategy.
Recommendation 5	Implement year round Curbside Collection of Organics (every two weeks in the winter and every week in the summer) with 240L rollout bins (carts) for yard and food waste by April 2016.
Recommendation 6	Evaluate different options for organic waste processing including building and operating a compost pad.
Recommendation 7	Implement Automated Garbage Collection with rollout bins (carts) throughout the Town in 2016.
Recommendation 8	Implement a Cart waste limit – Reduce the garbage collection frequency from weekly to every two weeks.
Recommendation 9	Evaluate the use of different side loader trucks for garbage collection in order to increase efficiency and reduce costs.
Recommendation 10	Implement a biweekly (every two weeks) curbside blue bag collection for recyclables throughout the year.
Recommendation 11	In two years' time evaluate implementation of a weekly curbside collection for recyclables.
Recommendation 12	Review Recyclables Processing Contract (Vermilion Recycling Centre).
Recommendation 13	Evaluate the feasibility for more cost effective options for processing recyclables in Vermilion. Put out a request for EOI (public and private contractors can respond). Collaboration with Vegreville Material Recovery Facility is possible.
Recommendation 14	Adjust current rate for commercial garbage pickup services to fully cover management costs.
Recommendation 15	Implement a card system at the Transfer Station to

	unequivocally identify waste generators at the Transfer Station.
Recommendation 16	Provide drop off service for recyclables at the Transfer Station.
Recommendation 17	Implement with the Regional Authority a strategy to reduce the presence of recyclables and organics in the garbage accepted at the Transfer Station.
Recommendation 18	In collaboration with the County implement a communication campaign and a specific bylaw to reduce illegal dumping of waste by out of Town users in $3yd^3$ dumpster and green bins should the cart system not being implemented.

7.2.10 Implementation Plan

Timeline for implementation recommended by Advanced Enviro include:

2016 (1st Half)

- Finalize Waste Management Strategy and goals:
  - Increase the diversion rate to 50% by 2020 by implementing year round curbside organics collection (food & yard waste), recyclables collection and a waste limit
  - Commit to a long-term Zero-Waste Strategy
- Implement Automated Garbage Collection with 240L roll-out bins throughout the Town
- In collaboration with the County implement a communication campaign and a specific bylaw to reduce illegal dumping of waste by out of Town users
- Evaluate the use of different side loader trucks for garbage collection in order to increase efficiency and reduce costs (faster lift cycle)
- Adjust current rate for commercial garbage pickup services to fully cover management costs
- Review Recyclables Processing Contract (Vermilion Recycling Centre)
- Evaluate the feasibility for more cost effective options for processing recyclables in Vermilion. Put out a request for EOI (public and private contractors can respond)
- Evaluate different options for organic waste processing including building and operating a compost pad (options evaluation and facility design to be carried out preferably by an external composting consultant)
- Develop and implement a public communication program (this will continue on an ongoing basis)

2016 (2nd Half)

- Change bylaw to implement a new organics and recyclables collection services
- Implement year round Curbside Collection of Organics (every two weeks in the winter and every week in the summer)
- Implement a biweekly (every two weeks) curbside blue bag collection for recyclables throughout the year
- Implement a card system at the Transfer Station to unequivocally identify waste generators (Town and out of Town users)
- Continue the Public Education Program focusing on a review of initial results of the Waste Management strategy and informing the public of the next stages

2017

- Change bylaw to implement a cart limit
- Implement a Cart waste limit – Reduce garbage collection from weekly to every two weeks
- Reinforce public education program sharing with residents the benefits of every two weeks garbage collection
- Implement with the Regional Authority a strategy to reduce the presence of recyclables and organics in the garbage accepted at the Transfer Station
- Provide a drop off service for recyclables at the Transfer Station

2018/2019

- Measure data against a baseline and share the results as part of the education campaign
- Waste audit to measure contamination and capture rate
- Review goals and set new targets for the next five years according to the diversion results
- Evaluate implementation of a weekly curbside collection for recyclables
- Continue the public education program sharing the diversion results

2020/2021

- Measure data against the baseline and the share results as a part of the education campaign
- Continue the public education program sharing the diversion results

This implementation plan achieves significant diversion results within a two-year time frame. A similar program was designed for Strathcona County and diversion increased from 27% to 65% in one year. As experienced in Strathcona County, implementing change is often better when done all at once rather than drawing it out, as long as a strong public education program has prepared residents.

Advanced Enviro recognizes that Vermilion is well situated to realize significant diversion gains, which can be achieved through the implementation of a year round curbside organics and recyclables collection program with a garbage limit.

8.0 PROJECT LIMITATIONS

This project was completed to the best of the consultants' abilities and in accordance with the APEGA Code of Ethics. The report is based on the information and data reviewed to the extent that the information was available and to the extent considered reasonable within the allocated project time frame and project budget. Advanced Enviro and the environmental consultants who prepared this report do not accept any liability for information that is not within the scope of the project and not identified in the final report. The purpose of the report is to provide the client with further information in order to make a well-informed decision. This report is specifically intended for use by the client and for the purpose the consultant agreed to with the client. This report is a confidential document for the client and will only be distributed with the client's and the consultant's permission. One copy of the report will be maintained in the consultant's files as required by APEGA.

APPENDIX A

TOWN OF LEAF RAPIDS BY-LAW

Leaf Rapids Single Use Plastic Bag Bylaw

TOWN OF LEAF RAPIDS
By-Law No. 462

Being a By-Law of the Town of Leaf Rapids for the establishment of Single Use Plastic Shopping Bags.

WHEREAS Single Use Plastic Shopping Bags are a very visible component of litter throughout the Town of Leaf Rapids, lake side, trails, roadside and the nuisance grounds;

AND WHEREAS Single Use Plastic Shopping Bags have a negative impact on our wildlife habitat and are not environmentally friendly;

AND WHEREAS the Town of Leaf Rapids incurs a significant cost to clean up the Single Use Plastic Shopping Bags each year;

AND WHEREAS local businesses can reduce merchandise cost by not having to purchase Single Use Plastic Shopping Bags;

AND WHEREAS the Town of Leaf Rapids has provided education to shoppers and school children about the environmental advantages and reduced cost of using reusable shopping bags;

AND WHEREAS by using a multi-use shopping bag, residents are reminded of the positive impact of recycling;

NOW THEREFORE upon passing this By-Law, the Council of the Town of Leaf Rapids, enacts as follows:

1. *THAT the Town of Leaf Rapids will be Single Use Plastic Shopping Bag free effective April 2, 2007.*

2. *THAT retailers in the Town of Leaf Rapids will not be permitted to give away or sell plastic shopping bags that are intended for single use.*

3. *THAT a person who contravenes this By-Law of the Town of Leaf Rapids is guilty of an offence and is liable on summary conviction of a fine of not more than $1000.00.*

4. *THAT where a contravention continues for more than one day, the person is guilty of a separate offence for each day it continues.*

5. *THAT on passing of this By-Law, By-Law No. 457 is hereby rescinded.*

6. DONE AND PASSED as a By-Law of the Town of Leaf Rapids at the Townsite of Leaf Rapids, in the Province of Manitoba, this 22nd day of March, 2007, A.D.

EXEMPTIONS TO THE BY-LAW

Small plastic bags that are used to store non-packaged goods such as: a) Dairy products b) Fruit, vegetables or nuts c) Confectionery d) Cooked foods, hot or cold e) Ice f) Smaller bags for fresh meat, fish, candy and poultry g) Bags that cost more than $1.50

APPENDIX C

BOULDER – ZERO WASTE RESOLUTION

RESOLUTION NO. _____

A RESOLUTION DECLARING BOULDER A ZERO WASTE COMMUNITY.

WHEREAS, an estimated 156,773 tons of waste is generated in the city of Boulder each year by residents, businesses and institutions and approximately 70% of this amount is sent for landfill disposal;

WHEREAS, though the city of Boulder has reached an overall recycling rate of more than 30% percent, more can be done, especially in "closing the loop" by purchasing products made with recycled content;

WHEREAS, the placement of materials in waste disposal facilities, such as landfills and incinerators wastes natural resources, transfers liabilities to future generations and has the potential to cause damage to human health;

WHEREAS, avoiding the creation of waste or discards in the first place is the most economically efficient and environmentally sustainable resource management strategy;

WHEREAS, a resource recovery-based economy will create and sustain more productive and meaningful jobs than a disposal-based economy;

WHEREAS, with the appropriate economic incentives, manufacturers can and will produce and businesses will sell products that are durable and repairable and that can be safely recycled back into the marketplace or nature;

WHEREAS, government can be ultimately responsible for establishing criteria needed to eliminate waste, for creating the economic and regulatory environment in which to achieve it, and for leading by example, and

WHEREAS, the city of Boulder has positioned itself as an environmental leader among local governments by adopting environmental initiatives, programs and policies including the broad community vision contained in the Boulder Valley Comprehensive Plan, City Council's Environmental Sustainability Goal, city recycling and environmental purchasing policies, and the city Master Plan for Waste Reduction,

WHEREAS, the guiding principles of zero waste are: managing resources instead of waste, conserving natural resources through waste prevention and recycling, turning discarded resources into jobs and new products instead of trash, promoting products and materials that are durable and recyclable, and discouraging products and materials that can only become trash after their use.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF BOULDER, COLORADO

The city of Boulder hereby encourages the pursuit of Zero Waste as a long-term goal in order to eliminate waste and pollution in the manufacture, use, storage, and recycling of materials. This goal must be addressed through the choices Council will make in the

context of the city's Business Plan and annual budget processes, by initiating action plans and measures that significantly reduce waste and pollution. These measures will include encouraging residents, businesses and agencies through incentives and legislation to judiciously use, reuse, and recycle materials, as well as to motivate businesses to manufacture and market less toxic and more durable, repairable, reusable, recycled, and recyclable products. In all cases, the guiding principles of the city's Master Plan for Waste Reduction will be followed. Mandatory programs will be employed only if the infrastructure exists and if convenient, voluntary programs prove not to be successful.

The city of Boulder will also review its own policies, contracts, and standard operating procedures to incorporate zero waste provisions and actions into all aspects of its organizational culture to encourage the use of materials and products that are durable, repairable, and reusable, have a minimum of packaging, toxic content or chemical hazard potential, are resource and energy efficient in their manufacture, use and disposal, and in their use or disposal minimize or eliminate the city's potential environmental liability.

ADOPTED this 2nd day of May, 2006

_____
Mark Ruzzin, Mayor

ATTEST:

_____
City Clerk on behalf of the
Director of Finance and Record

APPENDIX D

TRUCKS TECHNOLOGY

Waste Automated Collection - Trucks Technology

1. Heil Payton

Characteristics:

- 8 second lift cycle (as specified by Heil but Advanced Enviro staff has calculated around 10-11 seconds)
- 9-foot reach.

2. Heil Odyssey Automated Front Loader (AFL) with integrated CUROTTO-CAN

The Curotto-Can automated carry can has three main design innovations:

1. The arm is in front of the steer axle
2. It utilizes the front loader platform
3. It has a low lifting arm

The key factor in residential waste collection efficiency is how long a truck is stopped in front of a house for each pick-up. The longer the loading cycle, the lower the efficiency. With a front loader equipped with a Curotto-Can automated carry can, stop time (measured from wheel stop to wheel go) is 5 seconds as compared to 12-18 seconds for the other automated side loaders (ASL).

Comparison by Heil:

- ASL does 10 services @ 10 seconds = **100 seconds**
- Curotto-Can does 10 services @ 5 seconds + 20 second arm/fork cycle = **70 seconds**

AE staff calculates (through direct observation) a lift cycle of 7-8 sec + fork cycle.

Advantages:

- Very fast.
- Design allows for manual collection when necessary.
- A front loader offers a large hopper that allows for the pick up of a wide range of materials, including bulky items like furniture and appliances. Front loaders also have a far greater packing pressure and a larger packing blade than an automated side loader, thus more material can be more densely packed into the body.
- Organic liquids are better contained when emptied into the front loader platform as well as

when cycled into the truck's hopper.

Downside:

- Shorter arm compared to other models (around 6-foot reach).
- Very long cabin with the front loader platform.
- Possible debris dispersion during arm/fork cycle.

Figure 1. Heil Odyssey AFL with integrated Curotto-Can

This vehicle has the ability to access tighter corners during collection and allows the driver to have direct visibility of the cart he is approaching. Drivers can see contamination in the front loader platform and can remove it before it is off-loaded into the truck.

The truck can also be used for multi-unit and commercial collection.

Currently are many trucks in service in the USA and a smaller number in Ontario.

Note: the use of this design needs to be verified with Alberta weight restrictions.

3. Heil's STAAR System

Heil's STARR System is patented as the industry's only semi-trailer refuse and recycling collection system. The STARR consists of an automated arm mounted on a truck tractor, and a detachable semitrailer packer body. This design allows the STARR to circle around other "straight frame" trucks, and to navigate cul-de-sacs and tight spots with fewer potentially dangerous backups.

The STARR System uses Heil's Rapid Rail body design. The automated arm has an 8-foot reach, a 1,600 lb. lift capacity, and an 8-second cycle time.

Figure 2. Heil's STARR

Advantages:

- Very fast (8-10 second cycle time).
- Maneuvers easily around cul-de-sacs.

Downsides:

- Manual collection is not possible.
- Shorter arm compared to other Heil models (around 8-foot reach).
- Very long overall length.

4. Rotopac by Ginove

Auger type automated side loader.

This fully automated vehicle is the first auger compacted vehicle in North America. It has a compaction ability that is 30% above the industry norm allowing a shorter wheelbase for tighter corners (more precise cart collection and a 12 foot reach).

The truck's hopper is better sealed and hence organics collection is cleaner. Furthermore, organic materials are shredded, reducing work at the processing site.

Currently used in Quebec by Matrec.

Figure 3. Rotopac by Ginove

Advantages:

- Long arm, 12-foot reach, very efficient in cul-de-sacs.
- High compaction in the track's body.

Downsides:

- Slower than other trucks: 10-11 second lift cycle.
- Possible issues with auger efficiency and maintenance costs.

5. Labrie - Expert Dual Helping-Hand - Side Loader

The Expert Helping Hand is a drop frame, side-loading unit adapted for manual or fully automated waste collection operations on both sides. In the case of one-way streets, the operator will always be in the same direction as the traffic.

Advantages:

- Has a fully automated design with dual arms.
- Allows collection on both sides of lanes and one-way streets.
- Drop frame allows some access to check for contamination and manual collection if needed.
- Saves time on route and fuel costs.
- Lift cycle: 9-10 sec.

Downsides:

- Grabs roller carts within less than a foot (30 cm) and at a maximum distance of 6 feet (1.83 m) from the vehicle.

Figure 4. Expert Dual Helping-Hand

The Expert Helping Hand is currently in use in Spokane, WA and Town of Milwaukee, WI. Other fully automated designs are used in the Town of Calgary.

6. McNeilus

The McNeilus automated side loader is similar to Heil Payton's automated arm (8-foot reach) but has a slower lift cycle (14-15sec).

Figure 5. McNeilus auto reach automated side loader

5.1.3 Semi-Automated Collection

Semi-automated collection is also based on a cart system. Carts are manually rolled to the collection truck by an operator, attached to a "tipper" or mechanical arm which is then

automatically lifted and emptied into the truck. In Alberta, most semi-automated trucks are either side load or rear load.

Advantages

- Semi-automated trucks are able to get into more restricted spaces which could allow back lane pickup to continue if required (1 m distance restriction is eliminated).
- Retrofits for semi-automated collection are simple and relatively inexpensive (~ $7,000 or less per truck), although most collection service providers in Alberta have automated collection capabilities.
- Provides opportunity for public education through operator inspections (i.e. if organics collection program is in place, operator can check load before or after it is emptied for contamination and apply sticker, etc. according to the program) without any significant impact to collection time.
- Semi-automated system can be implemented and easily scaled up to fully-automated system.

Disadvantages

- In long term, collection is expected to go to full-automation. If semi-automated collection is selected to maintain back lane collection, this essentially postpones the change to front lane collection.
- Operational cost is higher in semi-automated collection (compared to fully-automated, and semi-automated collection time is longer (estimated at ~ 30 seconds/household rather than 15 seconds for fully automated trucks).
- Collection trucks can damage back lane roadways that are not designed for heavy vehicle traffic, thus significantly increasing costs.

Advantages and disadvantages of carts are the same for both fully- automated and semi-automated systems.

APPENDIX E

COLLECTIONS COSTS

Comparison of (5) municipal costs for residential waste collection programs*

	Manual collection				Automated collection		
	Weekly	**Every two weeks**	**6 months weekly and 6 months every two weeks**	**Every two weeks in summer – no collection in winter**	**Weekly**	**Every two weeks**	**6 months weekly and 6 months every two weeks**
Garbage	$5.00 - $7.00	-			$6.00 - $7.50	$4.00 - $6.00	
Co-Mingled Recycling	$4.50 - $5.50	$3.50 - $5.00			$4.00 - $6.00	-	
Organics	-	$4.00 - $5.00	$4.50 - $5.50	$3.00 - $4.00	$7.50 - $9.00	$3.00 - $4.00	$5.00 - $6.50

Costs are based on the following assumptions:

- Costs are considered per household per month ($/hh/month)
- Costs do not include disposal/processing costs
- Costs do not include carts cost ($0.80 - $1.20/hh/month)
- Range of prices for same service is due to distance, hauler convenience, size of carts, combined services, etc.
- Contractor can propose different options (or no options) and costs based on distance or presence of facilities in the area
- Some services are not currently present in northern Alberta and no costs are provided

* The above are preliminary costs for waste collection options for comparison purposes only and are based on municipalities the consultant has worked with (City of Cold Lake, City of Fort Saskatchewan, City of Leduc, Town of Blackfalds, Town of Beaumont)