

Northumberland County switch to dual stream box collection
CIF Project Number 1062

Final Report

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Prepared by:
County of Northumberland



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Executive Summary

In December 2020, Northumberland County made the bold move in transitioning from a decades-long single-stream bag recycling program to a dual stream box program.

The reason for moving away from the 20+ year bag program was to:

- Reduce contamination
- Increase MRF efficiency
- Increase market value of its recyclables
- Eliminate need for resident's requirement to buy recycling bags

Blue boxes for containers, and Grey boxes for papers were delivered to homes throughout the County in 2019 and 2020. With a phased approach adopted, residents were not required to begin using their boxes until December 2020, however many did. This allowed residents to become accustomed to sorting their recyclables before enforcement by collector began.

In 2020, Northumberland County was able to reduce contamination by 21% over 2019 which led to a \$60,000 savings in disposal costs.

The County was able to market 7% more, which can be directly related to the reduction in contamination.

The MRF increased its efficiency which led to shorter processing times, and a shorter work week.

Market value of recyclable products also jumped once the transition to two-stream was implemented due to improved quality.

While the initial cost to transition was high, the benefits in the long run outweigh the expense, with an expected payback period of 3 years. Some of the expense was incurred due to numerous delays in the program, which could have been avoided.

1. Introduction

1.1 Northumberland County, located between Toronto and Ottawa, is home to over 85,000 people. Since 1990, Northumberland County has provided weekly curbside waste collection to all seven of its member municipalities, with one Ward within the Municipality of Port Hope opting for depot collection only.

Northumberland County reached out to CIF in 2018 for financial assistance in transitioning the County's single-stream bagged recycling program, to a dual-stream box program.

1.2 The goals of switching from a single-stream bag program to a dual-stream blue box program was to reduce contamination, increase sorting efficiency, and increase the value and marketability of recyclable products.

2. Background

Collection of recyclables in the County have gone through major changes since 1996, when the County began offering a curbside service, and operating a Material Recovery Facility. The County began as a single stream bag program operating as a Wet/Dry system. If a material was wet, it was garbage. If it was dry, it was "recyclable". After 10 years, the County made the wise decision to do away with this system and move to what the County called "Recycle Clean" which clearly defined what was accepted in the recycling bag in line with Ontario Reg. 101/94 list of designated materials, but still operated as a single-stream bag program.

In 2014, the County released its Long-Term Waste Management Plan, which called for a move from single-stream to a dual-stream program to tackle high levels of contamination in the recycling and increase marketability and value of materials.

2.1 Community Profile

Northumberland County is located between Toronto and Ottawa easily accessed by the 401. Northumberland is bordered by two lakes, is comprised of rolling hills throughout, and is a natural gem in Eastern Ontario. The County is comprised of seven municipalities including:

- Township of Alnwick/Haldimand
- Municipality of Brighton
- Town of Cobourg
- Township of Cramahe
- Township of Hamilton
- Municipality of Port hope
- Municipality of Trent Hills



Figure 1 - Map of Northumberland County

Table 1: Number of households in Northumberland County (2016)

Municipality	Population	Single Family Households	Multi Family Households	Total Households
Northumberland County	85, 598	28, 345	7, 340	35, 690

2.3 Waste Management System Prior to Change

Northumberland County provided Garbage and Recycling Collection weekly for all of Northumberland County except for the rural ward (Ward 2) of the Municipality of Port Hope, which historically has opted to use a depot instead of curbside collection. This depot is owned and operated by the Municipality of Port Hope; however, the County funds the operation and collects the garbage and recycling via 40 yd roll-off bins, weekly. The downtown cores of Port Hope and Cobourg received two curbside collections per week.

The County used a Pay as You Throw model for garbage collection. Each household could set out no more than three bags of garbage to be collected weekly. Each bag could weigh no more than 40 lbs and required to have a bag tag to be affixed to it. Each bag had cost \$2.75. Businesses could receive collection if they followed the same rules as households.

An unlimited amount of single-stream recycling was picked up for households. Households could use clear or clear-blue bags or blue boxes, although most residents opted for bags. Businesses were allowed to set out no more than 20 bags or boxes of recycling per collection.

Garbage and recycling were co-collected via contractor using a split truck. Recyclables were tipped at the County owned and operated Material Recovery Facility in Grafton. Garbage was tipped at the County owned and operated landfill in Brighton.

Table 2: Waste Management System Overview for *Northumberland County (2018)*

Single Family Service	Service Description (curbside/Depot wkly/bi-wkly single/two/multi stream)	Collection Provider	Processing Provider
Garbage	Curbside/weekly/PAYT	GFL	County
Recycling	Curbside/Weekly/Single/Bag	GFL	County

2.2 Waste Management Performance Prior to Change

In 2018, Northumberland County's Waste Diversion Rate was 39.3% with a net operating cost of \$2.2 million. The County was able to market \$5,092 MT that year with 51.3% recyclables diverted.

In 2019, Northumberland County's Waste Diversion Rate was 42.3% with a net operating cost of \$2.5 million. The County was able to market 4,825 MT that year with 47.2% recyclables diverted. Overall, residual at the MRF in 2019 was 2,249 Metric Tonnes

The reason for using two years as a base, is due to delays in implementing the changes. September 2019 was the planned start date, but the start date had to be bumped to December 2020 due to challenges noted in Section 3.1.2.

The difference in marketed tonnes, and recyclables diverted between 2018 and 2019, is related to a loss of two local newspapers. Even with this loss the County was able to increase its overall waste diversion rate by 3%. This is due in part to a large ice storm which generated unprecedented levels of leaf and yard waste, as well as the launch of a new Green Bin (food waste) collection program in December of 2019.

Table 3: Waste Management System Overview for *Northumberland County (2018)*

		Blue Box Recycling		Total Waste Diversion		Disposal		Generation (Total)	
	Units	rate	% of total	rate	% of total		Units	rate	% of total
GAP Reported	tonnes	5,092.30	15.9%	12,602.92	39.3%	19,789.38	60.7%	32,092.30	100%
	Kg/hhld	126.97	15.9%	314.25	39.3%	485.96	60.7%	800.21	100%

Table 4: Waste Management System Overview for *Northumberland County (2019)*

		Blue Box Recycling		Total Waste Diversion		Disposal		Generation (Total)	
	Units	rate	% of total	rate	% of total		Units	rate	% of total
GAP Reported	tonnes	4,825.16	15.3%	13,334.27	42.3%	18,208.41	57.7%	31,542.68	100%
	Kg/hhld	119.04	15.3%	328.97	42.3%	449.21	57.7%	778.18	100%

Table 5: Waste Management System Overview for *Northumberland County (2020)*

		Blue Box Recycling		Total Waste Diversion		Disposal		Generation (Total)	
	Units	rate	% of total	rate	% of total		Units	rate	% of total
GAP Reported	tonnes	5,177.23	15.4%	15,866.01	47.3%	17,646.19	52.7%	33,512.2	100%
	Kg/hhld	126.37	15.4%	387.28	47.3%	430.73	52.7%	818.01	100%

2.4 Program Challenges

In 2014, the County released a new Long-term Waste Management Master Plan which called for sweeping changes the County's waste programs. These changes included adopting a Green Bin (food waste diversion) program, reducing the number of garbage bags collected weekly, and changing the County's single-stream bag program to a dual-stream box program.

For many years, the County has struggled with high levels of contamination in their recycling program. A historical problem that began with the Wet/Dry waste program. In 1996, The County began collection

and processing of the County's recycling and chose to build its own MRF. The Wet/Dry system intended to do two things:

- 1) Make collection as easy as possible for the resident
- 2) Collect items in its recycling program that did not have a market in the hopes that one day there would be a market

This system, while very simple for the resident, was difficult to manage after the curb. After 10 years of collecting everything that was dry, the County changed the program to which specifically list what was accepted in the recycling bag. These allowable items were now in line with the blue box regulations and were strictly marketable items. However, with residents now trained with 10 years of putting anything dry in a bag, little changed as residents continued to put non- recyclable dry items in their bags. With contamination levels well over 20 %, the County needed to make a proper change to keep its program cost efficient, and viable in an ever-changing post-consumer market.

By switching to a dual stream, colour-coded box program, staff believed they would see less contamination, cleaner material, and more efficient sorting at the MRF.

3. Approach

To undertake this change, boxes would need to be delivered to every household, residents would need to be aware of the changes, a new collection contract would need to be implemented, and changes at the MRF would need to happen.

3.1 Set Up and Implementation

3.1.1 Description

To roll out the boxes to all households a few things needed to be considered:

- 1) Blue boxes for both streams, or two colours? Size?
- 2) How many boxes and where to order?
- 3) Who will deliver the boxes?
- 4) How will we educate the public?

As the County had a contract to process the City of Kawartha Lakes' recyclables, we knew that a dual stream product was simpler to process. The City of Kawartha Lakes utilizes a blue box for containers, and a green box for papers. The County decided to follow a similar path but opting for a grey box for papers as the County was also in the process of rolling out a green bin for household food waste.

The County utilized the CIF blue box procurement program and ordered 40,000 tall blue boxes, and 40,000 tall grey boxes.

To save costs, the County hired seasonal summer staff to deliver the bins using rental trucks.

Education and promotion were a large part of this transition and incorporated many tools including:

- In-person community meetings in every municipality
- Pop-up displays in public settings (malls, grocery stores, etc.)

- Road signage
- Social media
- Newspapers
- Radio
- Press Releases

For any of this to truly work, a new collection contract was needed. Luckily, the current contract was set to expire in September of 2019, so a tender needed to be issued. Due to unforeseen circumstances, the planned transition date could not be met until December of 2020. The issuance of the Waste Collection Tender for the new contract was delayed until early 2019. This resulted in the new contract start date being delayed until December 1, 2020. As a result, a 1-year contract extension was negotiated with the existing contractor. Since the deployment of Blue and Grey boxes had already begun in the spring of 2019, it was decided to do a two-phase approach to the launch of the new “Recycle Right” two stream recycling program.

Phase 1 began in the fall of 2019, where residents were encouraged to start using their new Blue and Grey Boxes. The existing collection contractor continued to collect all recyclables set out for collection co-mingled, as they were doing co-collection of garbage and recycling using their existing fleet of split trucks.

Phase 2 began in December of 2020, when our new contractor started, and the new contractor was able to use a dedicated fleet of split body collection vehicles to collect recyclables in two streams. During Phase 1, while we encouraged residents to use the newly provided blue and grey boxes, their use wasn't mandatory, and we did still allow residents to continue to use clear bags to set out their recyclables.

MRF changes

Any major hardware changes at the MRF were decided to be made after at least a full year of dual stream collection and processing, but some changes were initiated once dual stream trucks were on the road. Instead of one single stream pile at the tipping floor, space needed to be made for a permanent containers pile, and a permanent fibres pile. Luckily, with our experience handling the City of Kawartha Lakes' material, these arrangements were easily made. Papers, after being visually inspected while being deposited onto the tip floor, were sent straight to a baler and baled as mixed fibres. This left only the inbound containers materials being sent to the MRF sorting lines for sorting and segregation.

The biggest challenge was processing the co-mingled single stream material collected from curbside during Phase 1, prior to the transition to two stream collection and delivery to the MRF.

3.1.2 Set Up and Implementation Challenges and Solutions

The County experienced major and minor challenges in switching from single stream to dual stream.

Table 6: Summary of Set Up and Implementation Challenges

Several challenges arose during the switchover resulting in delays, summarizes below:

Key Set Up Problems and Implementation Challenges	Solutions Implemented	Lessons Learned
Collection contract delayed due to County tender submission	Tender process was extended by a year. Current contractor agreed to a last-minute one-year extension	Tenders should be released two years before start date.
New contractor needed an additional year to supply dual stream trucks	Collected single stream recyclables in old fleet until new trucks arrived.	Tenders should be released two years before start date
Blue box manufacturer could/would not meet pre-determined delivery targets.	Delivered supplies as they arrived.	Enter a contract with manufacturer, which clearly states penalties for missing deadlines.
Blue box manufacturer delivered a load of sub-standard quality boxes leading to further delays	President of the company visited to assess bins, promised firm delivery dates, and higher quality bins thereout.	Enter a contract with manufacturer, which clearly states penalties for missing deadlines, and quality control

3.2 Monitoring and Measurement Results

3.2.1 Overview

Several measuring and monitoring tools were established to determine the various effects of switching to a dual-stream program.

- 1) Datacall
- 2) Market Value
- 3) MRF efficiency
- 4) Awareness
- 5) Curbside Waste Audits

3.2.2 Datacall

The County used the annual RPRA Blue Box Datacall as one measurement paying close attention to MRF residual, and marketed tonnages.

Table 7: MRF Residual

	2019	2020	Difference
MRF Residual	1,964 MT	1,545 MT	419 MT

We first looked at residual rate, as that was the main reason for moving away from a single-stream bag program. In 2019, MRF residual rate was at 1,964 MT. In 2020, that dropped by over 400 MT, or 21% to 1,545. The reason for the drop is two-fold. One, residents were now aware of what was, and was not recyclable, leading to less “wish-cycling”. Two, with less garbage on the sort lines, sorters were better able to see and capture acceptable recyclable materials from off of the sort lines. This difference in residual resulted in a savings of \$60,000 in disposal costs.

The other reason for switching to dual stream was to increase the amounts of recyclables we could send to market.

Table 8: Recyclables Marketed

	2019	2020	Difference
Recyclables Marketed	4,821 MT	5,178 MT	357 MT

The County was able market more than 350 MT in 2020 than in 2019. Approximately a 7% increase. This can be tied to the reduced residuals discussed earlier.

We also looked at waste diversion rates. It should be noted that the County was able to start a food waste diversion program in December of 2019.

Table 9: Waste Diversion Rate

	2019	2020	Difference
Waste Diversion Rate	42%	47%	5%

With the Datacall results above, it is anticipated that when we compare the 2021 to 2020 data, results will be even more impressive as the switchover did not occur until December 2020. Even with just a few months of operating as a dual stream program, the benefits already beginning to show.

Given that the full transition to a two-stream collection and processing system for recyclables did not occur until December of 2020, we have undertaken a comparison below to illustrate the successes of the fully implemented two stream “Recycle Right” program. The comparison looks at the first 3 quarters of 2019 and 2020 (as base / pre-transition years) versus the first 3 quarters of 2021, understanding that two-stream collection and processing did not start until December of 2020.

Table 10: Inbound Vs. Marketed Q1 to Q3

Residential Recyclables	2019 (Q1 to Q3)	2020 (Q1 to Q3)	2021 (Q1 to Q3)
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	Tonnes	% of Total	Tonnes	% of Total	Tonnes	% of Total
Residual	1,179	23%	1,034	20%	519	12%
Marketed	3,930	77%	4,041	80%	4,499	88%
Inbound	5,109	100%	5,075	100%	5,090	100%

From the above table it is clear to see that with the full implementation of the new two-stream “Recycle Right” program, there has been a significant drop in the amount of residual materials being generated through the MRF processing. This drop, in 2021, equates to 660 tonne (56%), as compared to 2019. The full transition has also resulted in a significant increase in the amount of material being marked. This increase, in 2021, equates to 569 tonnes (14%), as compared to 2019. This has all been achieved, while the total amount of inbound residential recyclable materials has stayed relatively static (+/- 0.2%) over the three-year period between 2019 and 2021.

3.2.3 Market Value

Recyclable material from single stream programs’ is often considered less desirable in the market due to higher levels of cross contamination. The County anticipated that switching to a dual stream program would boost the value of its marketable materials.

Table 11: Average Price

	2019	2020	2021 (Jan-Sep)
Avg. Price/MT	\$101.27	\$98.72	\$218.32

The County began seeing higher value for its material immediately after switching to a dual stream collection program. We are now seeing an average price of \$218/MT. The 2021 revenue per marketed tonne was calculated by dividing the tonnes marketed in Q1, Q2 and Q3 by the total revenue generated from the sales of these tonnes during the same timeframe. It should be noted that recyclable material values fluctuate considerably due to global demands and the increased value realized by the County is not solely due to improved quality resulting from the shift from single stream bags to dual stream boxes.

3.2.4 Communications

The County utilizes many techniques to educate the public. Some of these techniques are easier to gather information from in terms of if the message is getting across. Because of the delays mentioned earlier, several techniques were used over a couple of years.

2019 Communication methods

- **Bin Delivery**
The major method of communication for the switchover was the delivery of bins. Each Blue and Grey Box is “hot stamped” with images of what materials are acceptable. We also inserted an informational pamphlet inside each Blue and Grey box that was delivered which contained information on what materials were and were not acceptable in each box. Although residents may have heard about the switchover, it wasn’t until new bins arrived at the end of the driveway, did they understand the upcoming changes.
- **Annual Collection Calendar**

Both the 2018 and more so the 2019 annual waste collection calendar, that is distributed via local newspapers focused on the upcoming change. The 2019 calendar was so popular, an additional 5,000 copies over the original 50,000 had to be printed to keep up with demand.

- **Social Media**
Social media videos and posts were produced and shared widely. We were able to grow our page from under 200 followers, to over 3,000 in about one year. Our reach was over 170,000, gathering thousands of views, likes and shares on posts directly related to the switch to dual stream recycling. 2019 also began the Facebook Live Q&A sessions, which were used to keep residents up to date with what was happening with the new program and answer questions.
- **Public Presentations**
In 2019, over 14 public presentations were held throughout the County. Staff were able to speak to thousands of residents about the upcoming changes. At the end of presentations, residents had a better understanding of the need to switch to dual stream, and were open to the idea of sorting their recyclables.
- **Traditional Media**
Ongoing newspaper and radio ads ran weekly.
- **Postcard**
When the County realized that dual stream collection was not going to happen for September 2019, residents were mailed a postcard defining a Phased approach. The first phase was the delivery of the bins. The second phase, beginning November 2020, was the trucks, and mandatory use of the bins. As noted earlier, this worked in our favour as it allowed us more time to deliver the remaining bins to residents.
- **Hotline**
Additional staff were utilized to help answer calls from the public. Because the switchover did not come into full effect in 2019, calls were high, but not as high as anticipated.

2020 Communications methods

The phased approach was communicated throughout the year. Different this time around however, due mainly to the rise in COVID-19 was a greater emphasis on digital strategies. This included:

- **Sorting Game**
Implementation of the on-line Recollect Waste Sorting Game
- **Road signage**
Signage was installed throughout the County leading up to the December 2020 date to advise residents to start using their delivered Blue and Grey boxes.
- **Facebook Live**
Online Q&A sessions were held monthly throughout 2020. This helped greatly in keeping residents informed during COVID-19, as virtually all in-person or public engagement and education opportunities had to be cancelled. Including opportunities to meet with residents in person.

- Hotline
Additional staff were utilized to field calls. Approximately 300 calls per day once the program began. This high call volume lasted for approximately three weeks.

By the time dual stream collection officially began, residents were ready. The County firmly believes that these methods were not only well received by the public, but that they worked in preparing them for dual stream recycling.

3.2.5 MRF Efficiency

With the reduction in overall tonnage of materials being received and processed annual at the County's MRF, due to the loss of Blue Box materials from the City of Kawartha Lakes, the County was able to reduce the operating hours from 40 hours per week to 35 hours per week in late 2020. As a result of the efficiencies achieved through processing two stream materials versus single stream materials, the County reduced the overall compliment of sorting staff at the MRF in early 2021. Now the MRF operates fewer hours per week, and with fewer overall staff on any given day of production. The County went from 18 Full-Time and 11 Part Time Sorters down to 10 Full-Time and 6 Part-Time Sorters. We also reduced our weekly operating hours from 40 hours to 35 hours.

3.2.6 Pre and Post Transition Curbside Waste Audits

In lead-up to the transition from single stream curbside setout to two stream curbside setout, the County, in collaboration with CIF, under took residential curbside waste audits in the Summer and Fall of 2019 and Winter of 2020. Given that the transition to two stream curbside setout and collection was delayed until December of 2020, each of three audits are considered "pre" transition. Due to the ongoing COVID 19 pandemic, the County was unable to proceed with the "post" transition waste audits until September of 2021. The "post" transition waste audit was completed in September of 2021, however at the time of the writing of this report, the results of the "post" transition waste audit were not available for review and / or comparison to the "pre" transition waste audits. Once the results are available and an analysis can be completed, the findings of the analysis will be shared with CIF.

4. *Project Results and Analysis*

4.1 Project Results

After dealing with the challenges and delays associated with this transition to the new "Recycle Right" two stream recycling program, it is now apparent that the transition has achieved its intended objectives. We have experienced a significant reduction in the amount of inbound / curbside contamination, we have achieved processing efficiencies at our MRF and are realizing increased revenues for the improved quality of the recyclable materials we are now sending to markets. An added benefit is that residents are also seeing direct cost saving, as they no longer have to purchase bags to place their recyclables out for collection.

4.2 Analysis of Results

In addition to the benefits noted above, looking closer, the County is experiencing significant operational efficiencies.

With reduced inbound contamination, sort staff can more efficiently identify and capture recyclable materials from off sort lines.

Due to the increased productivity, the County now has the opportunity to re-process certain residual streams in order to capture additional recyclable materials that were missed the first pass.

As noted previously in this report, the MRF has experienced a 56% reduction in the amount of residuals being generated and a 14% increase in the amount of materials marketed, when compared to 2019.

The revenue per marketed tonne of material has increased from \$101.27 per tonne to \$218.32 per tonne partially attributable to improved quality associated with dual stream sorting.

From a resident perspective, the introduction of the blue and grey box has led to less confusion overall of what is accepted in the recycling program. While not perfect, ongoing random neighbourhood inspections show a high level of proper sorting and understanding of what goes where.

Residents are also benefitting from no longer having to purchase recycling bags on an ongoing basis. Assuming an average retail price of \$10 per box of 50 bags, and assuming each household set out at least 1 bag of recyclables per week, on an annual basis, more than 2 million bags were being used in the single stream program, at an overall cost to residents of \$400,000 annually. The County financed the capital purchase of the 40,000 Blue and 40,000 Grey boxes, over a 5-year period. The annual repayment cost is \$141,800. Therefore, the annual net savings to residents is approximately \$258,200 annually for the next 5 years, and \$400,000 annually beyond the 5-year mark.

While there were delays and other challenges with the transition, overall, the County has benefited from transitioning to two stream recycling, with the overall project objectives having been met within the first year of transition.

4.3 Lessons Learned

To say things could have run smoother would be an understatement. As stated above, the delay in the tender for the new long-term waste collection contract has ripple effects and ultimately delayed the transition. The vendor for the Blue and Grey boxes also did not meet expected delivery timelines.

Long-term waste collection contracts should be tendered at least 18 months to 2 years prior to the expected start date.

Vendor agreements should contain language and penalties related to delivery dates.

5. Project Budget

Approved funding of this project was up to 25% of the overall estimated cost, to a maximum of

Table 12: Project Budget and Actuals

Category	Estimated Cost	Total Actual Cost	% Change
Blue & Grey Boxes (including freight)	\$490,400	\$555,546	+13%
Box distribution	\$80,000	\$41,170	-49%
Promotion & Education, Monitoring & Report	\$32,170	\$39,950	+24%
Total	\$602,570	\$636,666	+5.7%

\$153,294. Funding was tied to the submission and approval of the final report to the CIF on the outcomes of the overall project.

6. Conclusions

Northumberland County is proud to have undergone such a challenge to add more value to its recycling program. We were able to achieve all goals and objectives it meant to accomplish including a reduction in contaminations, an increase in capture rates and MRF efficiency. The initial cost to switch the program will be paid back in as little as three years.