Volume 7: Northern Ontario

A Study of the Optimization of the Blue Box Material Processing System in Ontario

Final Report

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Prepared for Waste Diversion Ontario by:

Resource Recycling Systems
Sustainable Systems for a Waste-Free Future

STEWARDEDGE

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1. Introduction

The purpose of this study is to provide Waste Diversion Ontario (WDO), including the Continuous Improvement Fund (CIF), individual municipal owners, the Association of Municipalities of Ontario (AMO) and Stewardship Ontario (SO) with comprehensive independent information on a theoretical optimized MRF and transfer facility network for the province of Ontario.

The Project Team has developed a geographic information system (GIS) model that will:

- Theoretically reflect a cost-effective, efficient and successful recovery system for packaging & printed paper in Ontario, and
- Inform decision-making toward an optimized provincial system for the transfer, hauling and sorting of Blue Box recyclables for market

Volumes 4 through 7 present a range of options for each of four regions of the Province that would represent optimized systems depending on the criteria used for decision-making.

Also presented is a high level transition planning process that can be used in each region, which addresses the situations for each of the facilities and each municipality with respect to its existing infrastructure and the proposed optimized system options. These provide guidance regarding the steps and decisions that must be made.

The combination of the key options for the entire province, i.e. all regions is summarized for after the options for the region.

2. Development of Options

2.1. General Assumptions

1. The Province has been divided into four regions:
    I. Eastern Ontario (Volume 4)
    II. Central Ontario & GTA (Volume 5)
    III. Southwest Ontario (Volume 6), and
    IV. Northern Ontario (Volume 7)
2. Modelling excludes collection
    - It is acknowledged that there are likely impacts on the haul times from the end-of-route or depot locations.
    - Since this project does not model collection systems, the impacts cannot be quantified.
    - However, we have assessed a relative measure of the change in direct haul time between the options and variations.
    - It should be noted that assumed changes to the existing collection system could yield efficiencies, i.e. a move to automated, single-stream collection, but assessment of these is beyond the scope of this project and they have not been assessed.

3. Existing private sector facilities have been identified for possible inclusion in the optimized system, but since no cost and capacity data were available for private sector operations, a greenfield cost estimate has been used where necessary.
4. Similarly, some facilities outside Ontario have been identified and included in various options and a greenfield cost estimate has been used.

2.2. Steps to Develop Options

The following steps are taken to develop options for an optimized processing and transfer system. Options are developed for each region independently, although some options may involve material flowing across into different regions.

1. Establish a baseline based on the greenfield scenario in the year 2025 under natural growth recovery conditions with lowest number of MRFs.
2. Establish options:
    - Increase the number of MRFs
    - Define the cost implications for natural and high growth scenarios
    - Identify potential benefits, e.g.
        - Redundancy - the feasibility to offer sufficient capacity for processing operations within this or neighbouring regions in the event of emergency that doesn't potentially exist at other facilities in this or neighbouring regions
        - If the benefits are not considered significant, do not proceed to next option
3. Assess variations on options:
    - Eliminate small aggregation points (e.g. < ~2,000 tonnes per annum) and where material currently is hauled further than to the nearest alternative
    - Consider using existing facilities:
        A. Utilize existing public facilities as transfer station or MRFs without increasing the number of aggregation points.
        B. Add all public facilities that can feasibly handle the tonnes directed to it (based on best available data).
        C. Utilize all existing public and private facilities to minimize any effect on the existing collection infrastructure.
    - Develop cost estimates to upgrade and use public facilities and use greenfield operating costs for all facilities
        A. Refer to Volume 3 for details on estimating conversion costs
    - Consider using existing MRFs to minimize impacts on haul distances and construction costs, if they can be upgraded
    - Consider transfer of material from large population centres across provincial and US-Canada border when the distance is small

2.3. Presenting Results

- No single system has been recommended for a given region since there were no discussions with municipal officials and to acknowledge the need to consider local factors and criteria and analyse collection impacts

The results for each region are presented with:

- Maps showing the Baseline Greenfield System and options showing:
  - Existing infrastructure, identifying the flow of material to aggregation points and transfer to MRFs
  - The quantity of material handled at each location
  - The total gross cost per tonne for transfer, hauling and processing at each aggregation point
- Tables summarizing:
  - The number of facilities
  - The number of conversions: MRFs to transfer stations and upgrades of MRFs and transfer stations
  - The total annual capital and operating cost of the option
  - The total investment required in new facilities and conversion
  - The implication on neighbouring regions – when material moved from one region to a different region than in the Baseline Greenfield option so that the cost was not counted twice in the province-wide summary
  - The change in direct haul time for each option compared to the Greenfield Baseline
- A commentary briefly describing the key elements of the option, i.e. the number and location of MRFs

2.3.1. General Map Description

Each map of the Baselines and Options shows key information to inform decisions and metrics spatially. Each map shows three main items:

- Current System:
  - Current Blue Box program boundaries are shown in grey.
  - Blue and green triangles, squares and circles represent existing transfer and processing facilities. Some current facilities are used in variations on the Baseline and Options showing impact of using these facilities in the future system.
  - Direct Haul Collection:
    - Each of the small points represents generation of Blue Box material based on population. (See Volume 2 for more detail).
    - Each of the dissemination area points is coloured based on the maximum end-of-route haul time assumed for the location given its demographic situation
    - Purple lines represent direct hauling from the end-of-collection routes.
- Greenfield System:
  - Proposed transfer station locations are shown with orange triangles
  - The thicker red lines, in turn, represent the Blue Box tonnes transferred from each transfer station to applicable MRF Locations

2.3.2. Description of Summary Tables

The summary tables for each region present the cost of the options, covering the annual capital and operating cost as well as an estimate of the cost of the capital in the system. They also provide an indication of the relative effect of the option on the collection system resulting from changes to the number and location of aggregation points.

- Annual capital and operating cost:
  - All of the annual costs used are 'fully loaded' and include capital amortization, labour with benefits and operating costs. These fully-loaded operating costs are used even if an existing MRF or transfer station (TS) is used to ensure the cost reflects a sustainably-financed system
  - These costs are totaled for each regional scenario and divided by the total tonnes handled to determine the regional average cost per tonne
  - Capital costs are broken out as follows to provide information about the range of potential investment required, noting that new facilities could be financed through public funds or by the private sector:
    - Total capital in the system
    - Total capital for new MRFs and new TSs
    - Total capital for upgrades to existing MRFs, and
    - Total capital for conversions from existing MRFs to TSs and upgrades to existing TSs
    - No cost has been applied to assets that will be unused given that there likely could be residual value in the equipment and buildings could provide value through repurposing
- Effect on direct haul time
  - The effect of the different options on the collection system, which is beyond the scope of this analysis, would require a more detailed analysis of the collection operations in each locality because it would need to consider utilization rates of vehicles, numbers of routes, and the specific collection system
  - However, an indication of the relative effect of the option on the collection system resulting from changes to the number and location of aggregation points on the time required for direct haul from the end of collection routes or depot locations has been developed
  - These can be the basis for future analysis as part of more detailed transition planning
  - For each option the sum of the tonnes managed from each dissemination area multiplied by the corresponding time for direct haul between the location of the dissemination area (end of collection route or depot location) and aggregation points, (TS or MRF) is calculated
  - The figures (expressed as tonne-minutes) for each option are compared to those of the baseline and expressed as a percent difference

3. Northern Regional Options

The Northern Region is a vast area with one large population centre in Sudbury and large distances between other pockets of population. Currently, there are 11 MRFs (3 public and 8 private) and 4 transfer stations servicing the Northern Region. In the far west, several programs transfer their material into Winnipeg while some programs in the far east have their material direct hauled into Quebec. Additionally, Timmins transfers its material into Sudbury. In the Northern region, it is likely that only the Sudbury MRF has the capacity to process greater than 40,000 tonnes per year of Blue Box material.

Figure 1: Existing System

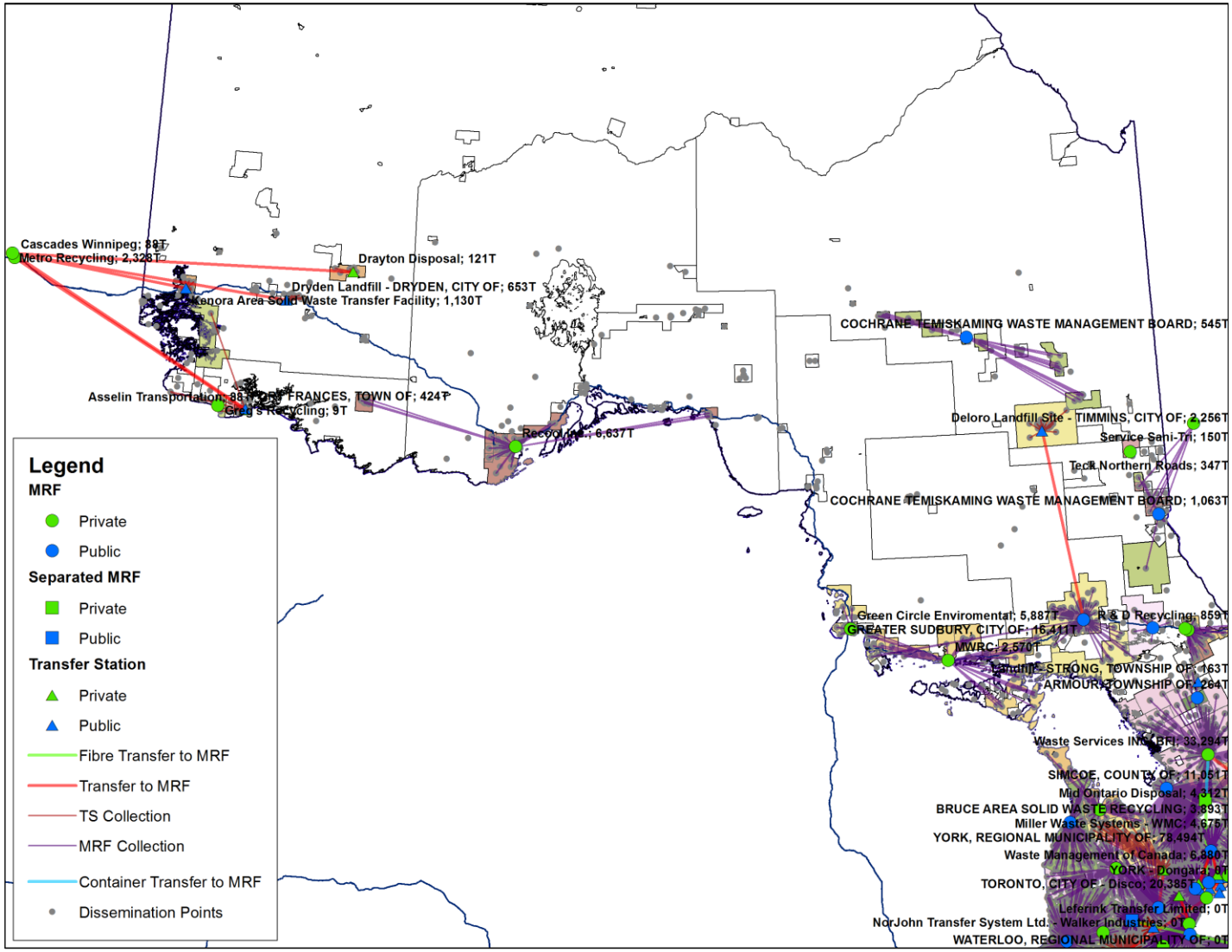
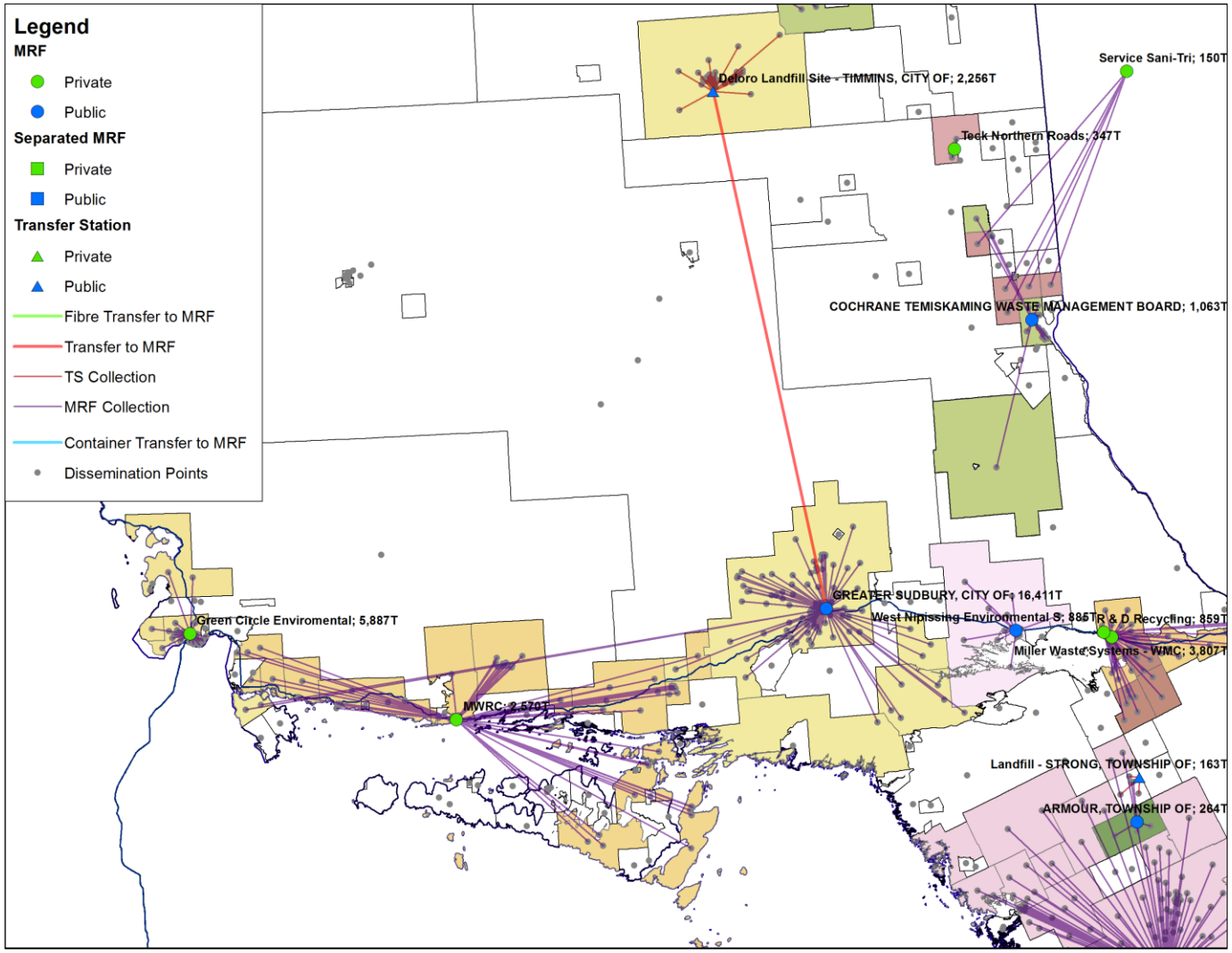


Figure 2: Greater Sudbury Area



3.1. Summary of Options

In the Northern Region, the following options and variations were included in the analysis.

- Baseline: 3 MRFs; 1 in Greater Sudbury, 1 in Thunder Bay, and 1 in Winnipeg (Natural growth recovery)
- Option 1: 4 MRFs; 1 in Greater Sudbury, 1 in Thunder Bay, 1 in Sault Ste. Marie and 1 in Winnipeg (Natural growth recovery)
- Variation A on the Baseline: Existing MRFs in Kapuskasing and New Liskard utilized as transfer stations, existing transfer stations in Timmins and Kenora District are utilized.
- Variation B on the Baseline: Existing transfer station in Kenora is utilized in addition to those used in Variation A
- Variation C on the Baseline: The existing Thunder Bay MRF is utilized as a MRF. All Existing MRFs and transfer stations (except for Greg's Recycling in Devlin, R & D Recycling in North Bay, Teck Northern Roads in Kirkland Lake, Asselin Transportation in Fort Frances, and the Fort Frances TS) are utilized as transfer stations (See Table 6 for full listing).
- High Recovery Baseline: Same as Baseline above but using the High Recovery tonnes
- High Recovery Option 1: Same as Option 1 above but using the High Recovery tonnes
- Variation C on the High Recovery Baseline: Same as Variation C on the Baseline above but using the High Recovery tonnes

Table 1: Northern Region Summary

	Baseline	Option 1	Baseline A	Baseline B	Baseline C
Wasteshed Tonnes	59,000	59,000	59,000	59,000	59,000
# of TS	8	7	8	9	10
# of MRFs	3	4	3	3	3
# of Current MRFs-> TS	0	0	2	2	3
# of Current TS Upgrades	0	0	3	3	3
# of public MRFs shutdown or repurposed	4	4	1	1	0
# of public TS shutdown or repurposed	4	4	1	1	1
Total Capital Investment	$24,601,000	$32,989,000	$16,398,000	$16,203,000	$15,068,000
Total Annual Operating Cost	$9,720,900	$10,349,100	$9,867,800	$9,823,500	$9,887,300
Average Annual Operating/Tonnes	$164.69	$175.34	$167.18	$166.43	$167.51
Relative Effect on	-	0.0%	1.1%	-6.9%	-15.8%

Direct Haul % Diff. from Baseline

Note:

A. Utilize existing public facilities as transfer station or MRFs without increasing the number of aggregation points.
B. Add all public facilities that can feasibly handle the tonnes directed to it (based on best available data).
C. Utilize all existing public and private facilities to minimize any effect on the existing collection infrastructure.

3.1.1. Northern Region Capital Cost Summary

Table 2: Capital Cost Summary

Capital Summary	Baseline	Option 1
Total capital in system	$24,601,000	$32,989,000
Total capital for new MRFs	$18,776,000	$28,164,000
Total capital for new TS	$5,825,000	$4,825,000

- In the Baseline, it is assumed that a new small MRF is built to handle the 41,304 tonnes of capacity needed in Sudbury and another small MRF in Thunder Bay to handle the 14,571 tonnes of capacity. Winnipeg is utilized as well but does not require any capital cost. In addition, 3 small and 5 medium transfer stations would be built.
- In Option 1, it is assumed that a new small MRF is built to handle the 33,694 tonnes of capacity needed in Sudbury, another small MRF in Thunder Bay to handle the 12,111 tonnes of capacity and a small MRF in Timmins to handle the 10,070 tonnes of capacity. Winnipeg is utilized as well but does not require any capital cost. In addition, 3 small and 4 medium transfer stations would be built.

Table 3: Summary of Capital Costs on Variations for the Baseline

	Baseline A	Baseline B	Baseline C
Total capital for new MRFs	$9,388,000	$9,388,000	$9,388,000
Total capital for upgrades to Existing MRFs	$3,000,000	$3,000,000	$3,000,000
Total capital for new TS	$ 2,550,000	$2,550,000	$275,000
Total capital for conversions from MRF to TS & upgrades to existing TS	$1,460,000	$1,265,000	$2,405,000
Total	$16,398,000	$16,203,000	$15,068,000

- In all three variations on the Baseline, a small MRF in Thunder Bay is assumed to be built and the MRF in Sudbury is upgraded with new equipment.
- In variation A on the Baseline, MRFs in Kapuskasing and New Liskard are utilized as transfer stations, existing transfer stations in Timmins is utilized. Two new medium transfer stations and 2 new small transfer stations are built as well.

- In variation B on the Baseline, an existing transfer station in Kenora is utilized. Two new medium transfer stations and 2 new small transfer stations are built as well.
- In variation C on the Baseline, 9 total existing facilities are upgraded (5 small, and 4 medium). One new small transfer station is built as well.

Sudbury MRF Upgrade

The Sudbury MRF is currently single stream with a throughput capacity of 42,000 tpy. The building is large enough for our small MRF, but the ceiling is not tall enough. The height issue comes into play with the stacking screens that we have assumed in our small MRF. We have assumed adding a larger pre-pick, improved feed metering, optical sorter for PET and a second fibre screen. This would require a major equipment overhaul and is estimated at $3 million.

3.2. Detailed Description of Each Option

3.2.1. Baseline

The Baseline for the Northern Region (see Figure 3) contains 3 MRFs, 8 transfer stations and handles 59,000 tonnes per year. The model indicates a total operating cost of $9,720,900 per year giving an average operating cost of $164.69 per tonne. All facilities are new resulting in a $24,601,000 total capital cost and shutdown or repurposing of 4 Public MRFs and 4 Public transfer stations. Table 1 compares this scenario to others for the region.

In comparison, the Baseline under High Growth for the Northern Region (see Figure 4) contains 2 MRFs, 8 transfer stations and handles 66,400 tonnes per year at a total gross operating cost of $11,067,600 per year and an average operating cost of $166.67 per tonne. Similar to the Natural Growth Scenario, all facilities are new resulting in a $30,138,000 total capital cost and shutdown or repurposing of 4 Public MRFs and 4 Public transfer stations. Table 4 compares this scenario to others for the region.

Table 4: Baseline under High Growth

	High Baseline	High Option 1	High Baseline C
Wasteshed Tonnes	66,400	66,400	66,400
# of TS	8	7	10
# of MRFs	2	3	2
# of Current MRFs-> TS	0	0	3
# of Current TS Upgrades	0	0	3
# of public MRFs shutdown or repurposed	4	4	0
# of public TS shutdown or repurposed	4	4	1
Total Capital Investment	$30,138,000	$34,439,000	$24,732,200
Total Annual Operating Cost	$11,067,600	$11,467,300	$11,500,900
Average Annual Operating/Tonnes	$166.67	$172.69	$173.20
Relative Effect on Direct Haul % Diff. from	8.2%	8.2%	-2.7%

Baseline

3.2.2. Option 1

Option 1 for the Northern Region (see Figure 5) contains 4 MRFs, 7 transfer stations and handles 59,000 tonnes per year. The model indicates a total operating cost of $10,349,100 per year giving an average operating cost of $175.34 per tonne. All facilities are new, resulting in a $32,989,000 total capital cost and shutdown or repurposing of 4 Public MRFs and 4 Public transfer stations. Finally, the weighted time for direct haul from the end of collection routes or depot locations to aggregation points is the same as the Baseline. Table 1 compares this scenario to others for the region.

3.2.3. Baseline A

Baseline A for the Northern Region (see Figure 6) contains 3 MRFs, 8 transfer stations and handles 59,000 tonnes per year. The model indicates a total operating cost of $9,867,800 per year giving an average operating cost of $167.18 per tonne. Since this scenario uses 2 existing MRFs and 3 transfer stations, a conversion investment replaces new build prices. Therefore, the model shows a $16,398,000 total capital cost and complete shutdown or repurposing of 1 Public MRF and 1 public transfer station. Table 6 shows the current facilities would be utilized. Finally, there is a 1.1% increase in the weighted time for direct haul from the end of collection routes or depot locations to aggregation points since the Greenfield Aggregation Points are closer to population centers than the current facilities. Table 1 compares this scenario to others for the region.

3.2.4. Baseline B

Baseline B for the Northern Region (see Figure 7) contains 3 MRFs, 9 transfer stations and handles 59,000 tonnes per year. The model indicates a total operating cost of $9,823,500 per year giving an average operating cost of $166.43 per tonne. This scenario uses suitable public facilities; therefore, one more transfer station is added to the operating budget. Since this scenario uses 2 existing MRFs and 3 existing transfer stations, a conversion investment replaces new build prices; therefore the model shows a $16,203,000 total capital cost. Table 6 shows which current facilities would be utilized. Finally, there is a 6.9% decrease in the weighted time for direct haul from the end of collection routes or depot locations to aggregation points since the current facilities are closer to population centers than the Greenfield Aggregation Points. Table 1 compares this scenario to others for the region.

3.2.5. Baseline C

Baseline C for the Northern Region (see Figure 8) contains 3 MRFs, 10 transfer stations and handles 59,000 tonnes per year. The model indicates a total operating cost of $9,887,300 per year giving an average operating cost of $167.51 per tonne. This scenario uses all public and private facilities capable of handling the tonnages; therefore, 2 more transfer stations are added to the operating budget. Since this scenario uses 3 existing MRFs and 3 existing transfer stations, a conversion investment replaces new build prices; therefore the model shows a $15,068,000 total capital cost. Table 6 shows which current facilities would be utilized. Finally, there is a 15.8% decrease in the weighted time for direct haul from the end of collection routes or depot locations to aggregation points since the current facilities are closer to population centers than the Greenfield Aggregation Points. Table 1 compares this scenario to others for the region.

Figure 3: Baseline for the Northern Region

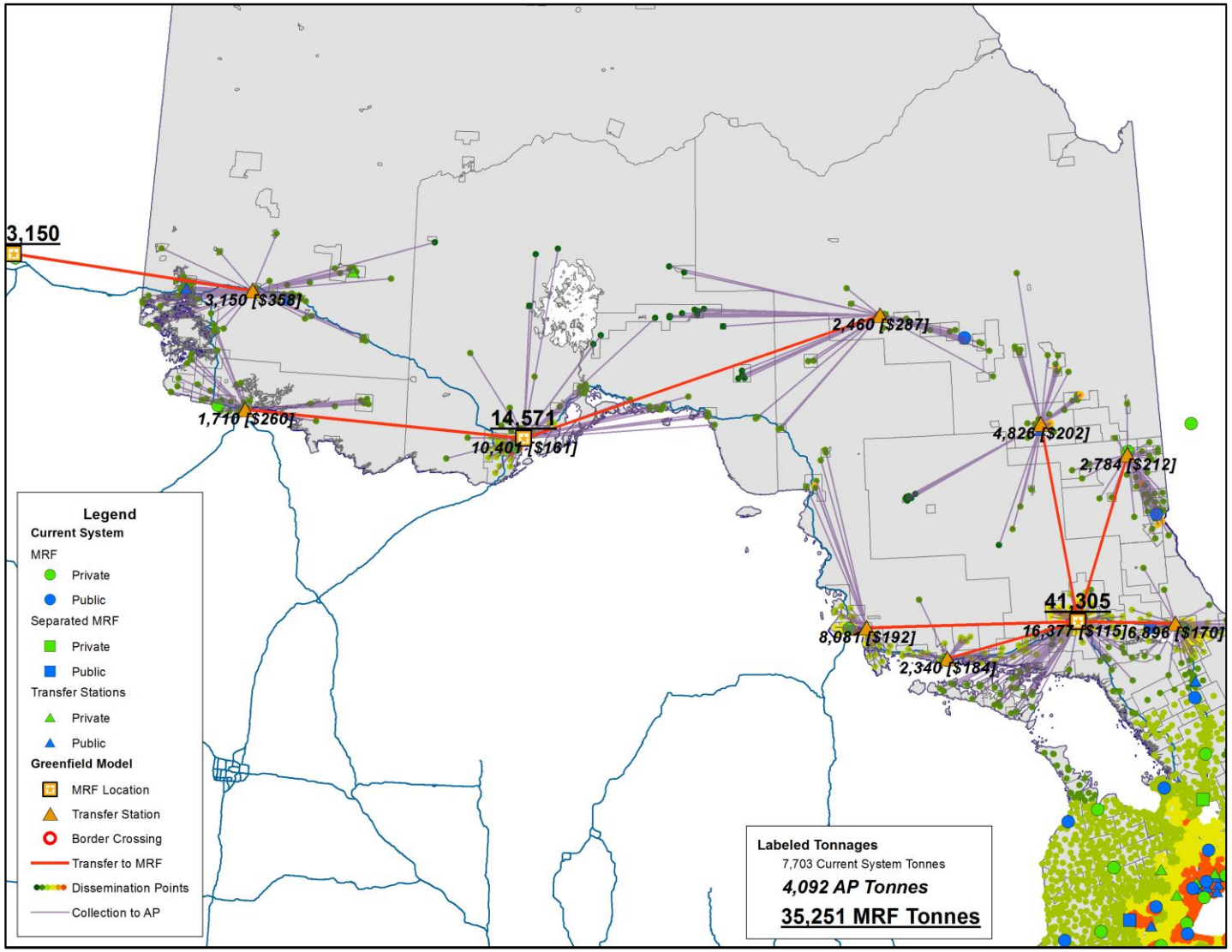


Figure 4: Baseline under High Growth for the Northern Region

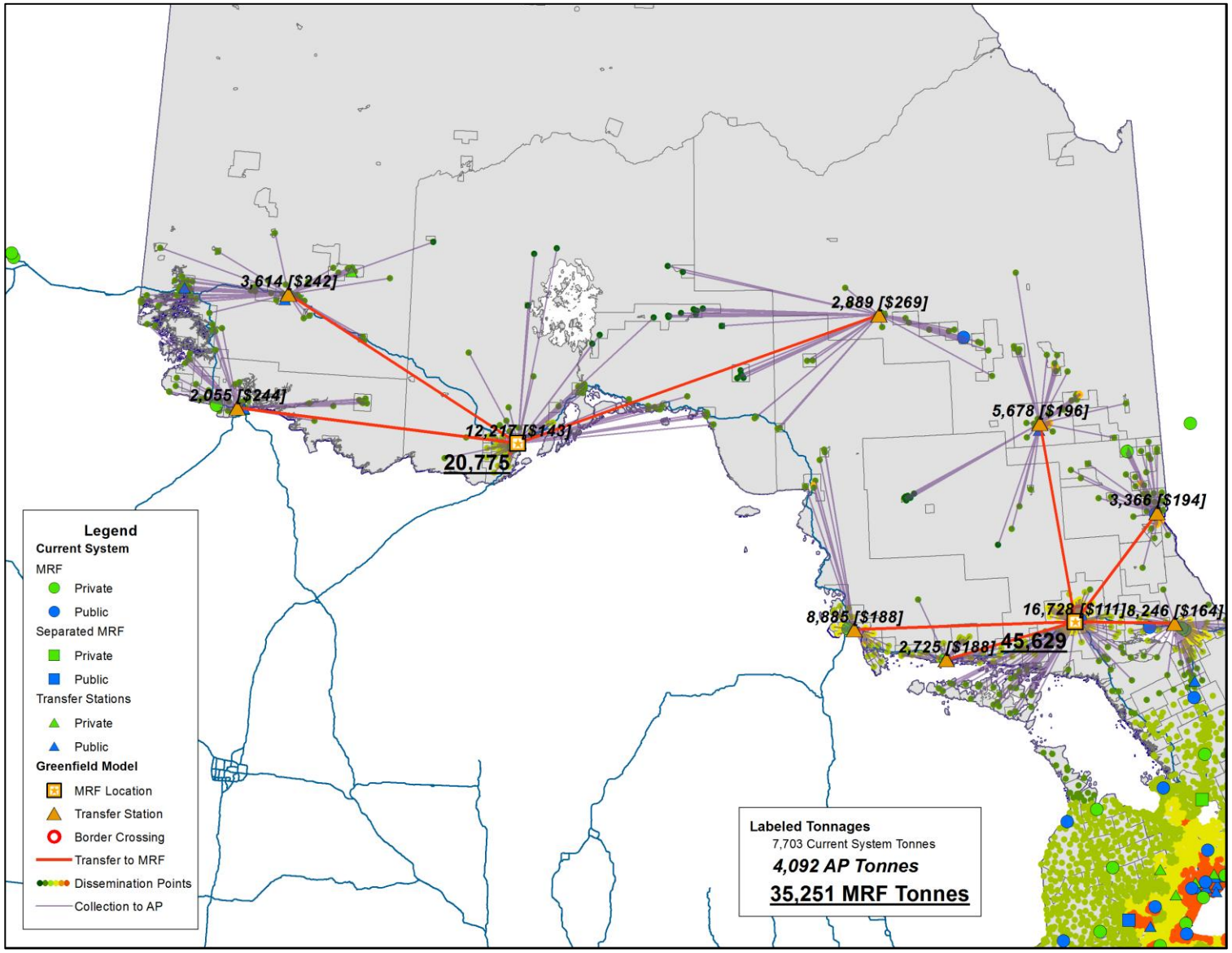


Figure 5: Option 1 for the Northern Region

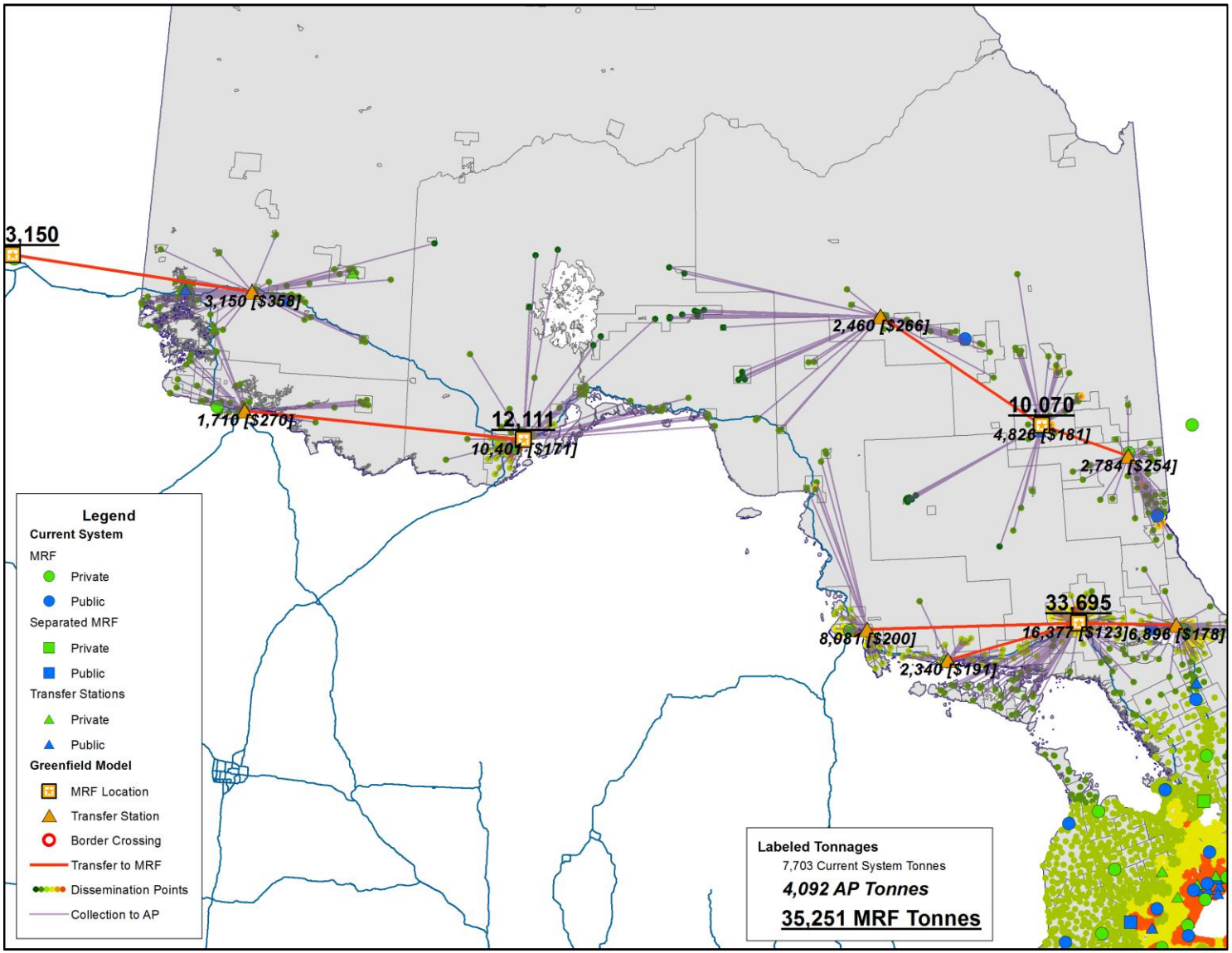


Figure 6: Baseline A for the Northern Region

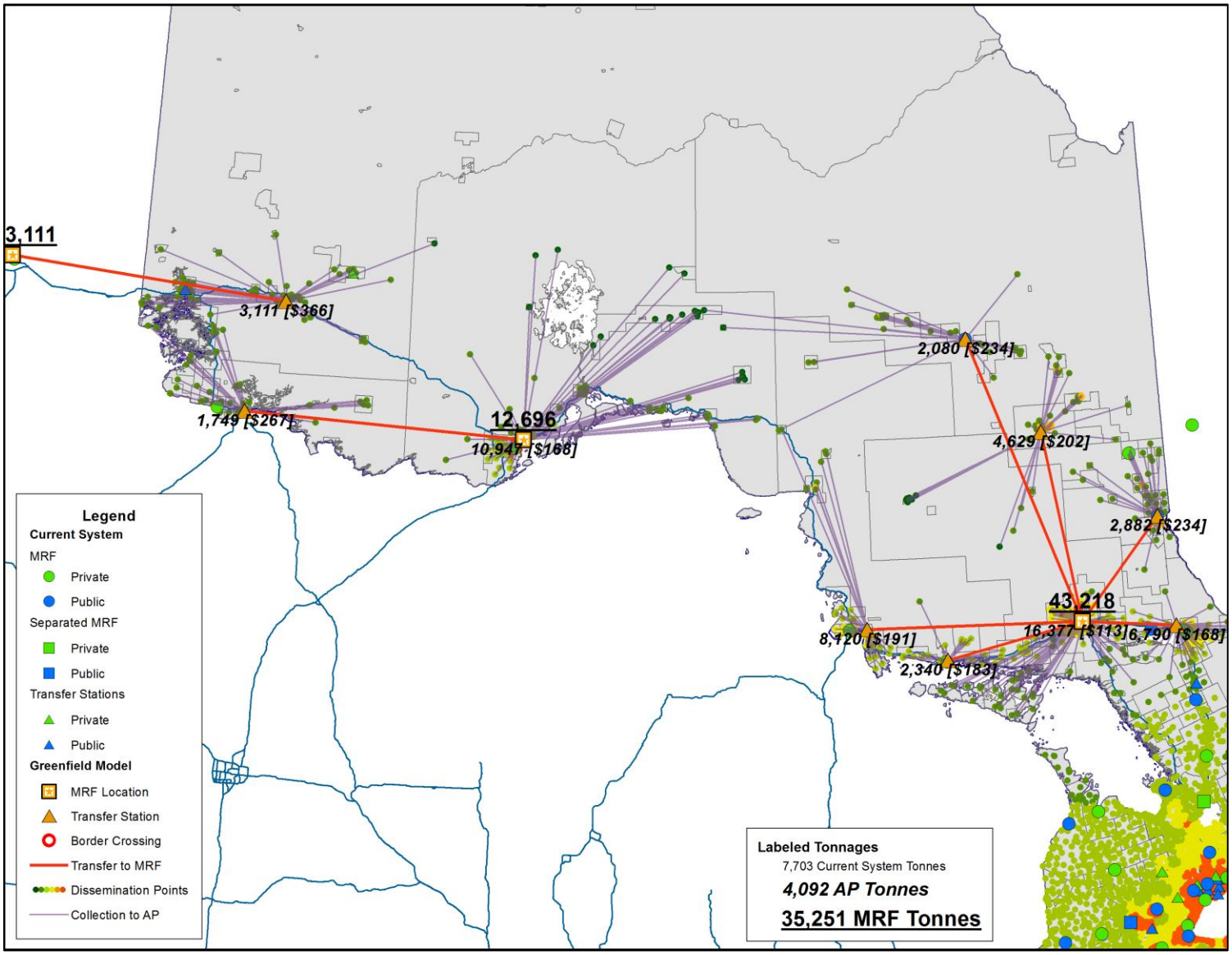


Figure 7: Baseline B for the Northern Region

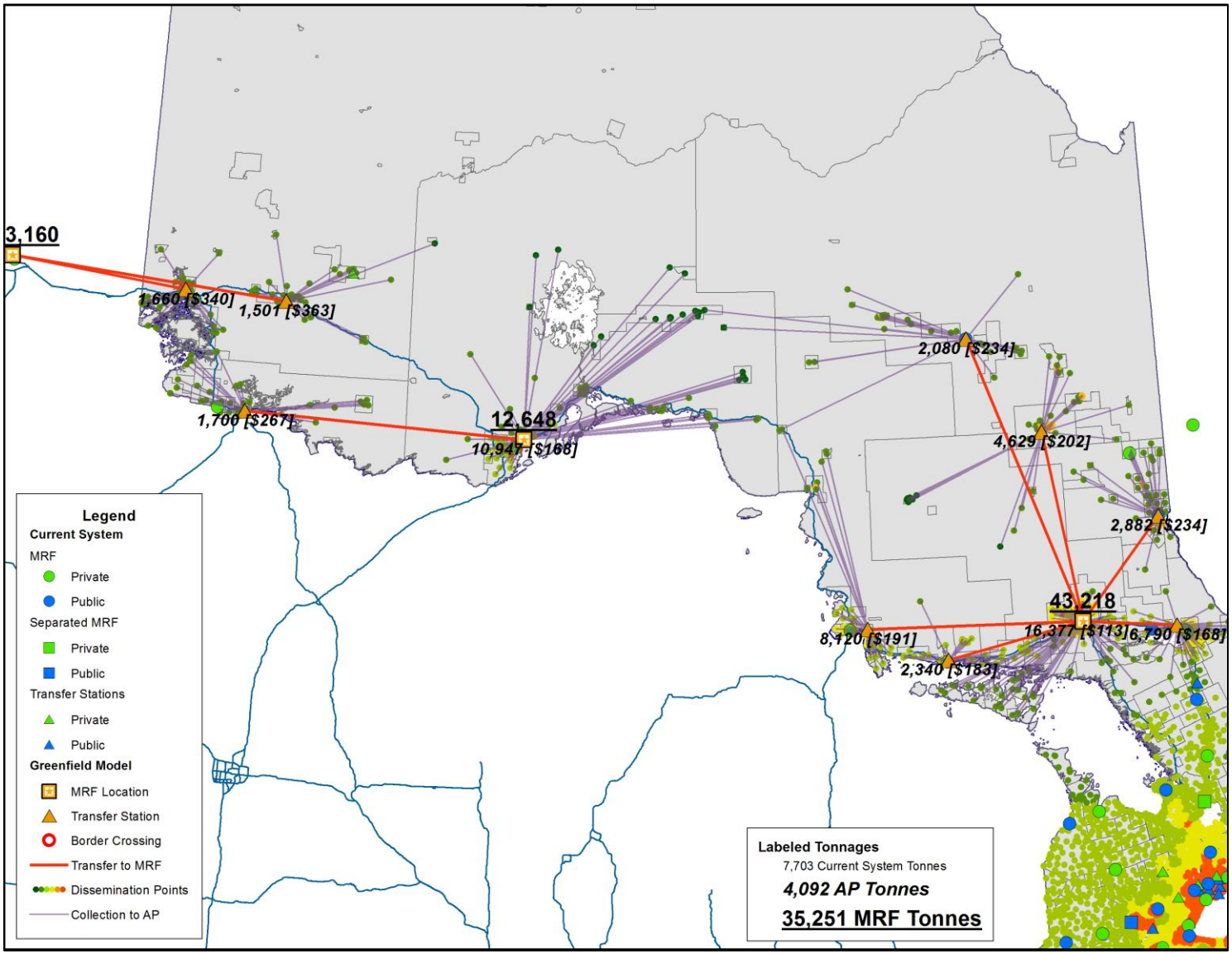
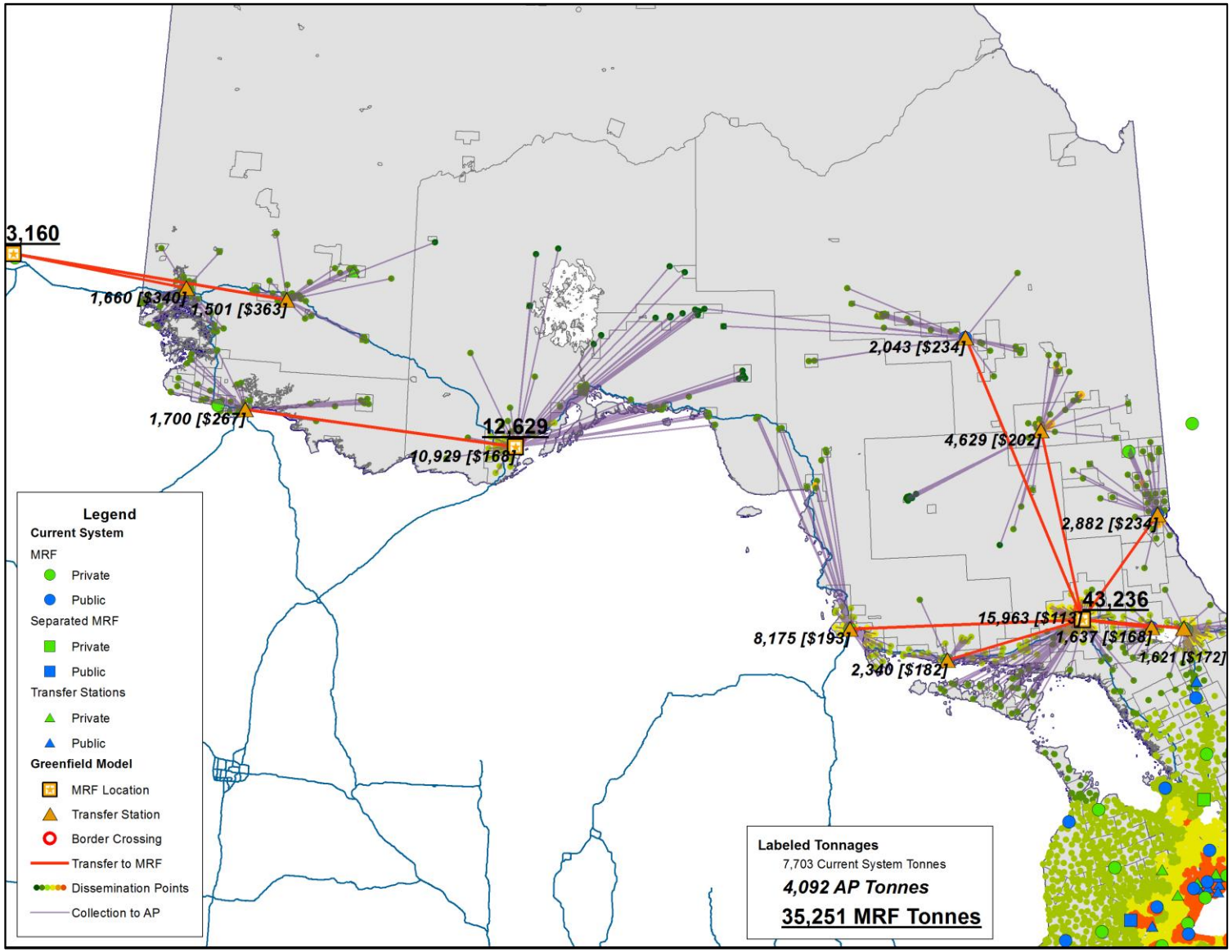


Figure 8: Baseline C for the Northern Region



3.2.6. Seasonal Tonnes

The effect of seasonal variation in the quantities of residential material recovered was based on seasonal households reported by municipalities and Stewardship Ontario data on seasonal per-household generation. Given these data and assumptions, the Northern Region has only one aggregation point that has a significant percentage of seasonal homes. The aggregation point located in Blind River may experience seasonal peaks increasing by up to 10%. This increases the average weekly tonnes from about 26 to 29. However, this will not significantly affect the design of this transfer station and so the estimated capital cost for the conversion has not been adjusted.

Further analysis of the local data will be required for actual design and sizing of all transfer stations, noting that other areas also may experience seasonal variation in the quantities of residential material managed.

3.3. Northern Region Conclusions

Conclusions that can be drawn from the analysis for the Northern Region are:

- Savings can be achieved in this region by reducing the number of MRFs from 14 down to a minimum of 3 state-of-the-art MRFs (though smaller in scale than optimum given the low density of the region) that would anchor the processing and transfer system
- Adding a fourth MRF in Timmins increases costs by 6% but still realizes significant savings
- Maximizing the use of existing facilities as transfer stations has minimal impact on operating costs and capital costs due to the low volumes, lack of existing facilities and the long haul distances
  - This means that decisions on transfer station locations should be based on direct haul collection optimization, not on the location of facilities determined by this processing optimization model

The optimized Northern Region system could utilize more than the minimum number of MRFs

- Regional hub MRFs should be situated in Sudbury, Thunder Bay and Winnipeg as well as a potential hub MRF in Timmins, and
- The optimal solution should utilize as many existing facilities as possible to minimize the effect on direct haul and to lower the capital investment

Thus, developing three primary hub MRFs and potentially a secondary hub MRF in Timmins could form an optimized system for the Northern Region.

4. Transition Plans

Optimization of the Blue Box recycling processing system for the Province of Ontario will take time, require the collaboration of a wide range of stakeholders and decision makers incorporating trade-offs during implementation and be a process of continuous improvement that always looks forward as the material stream changes and technology improves.

The transition path from current facilities, operational arrangements, responsibilities and funding, to more optimized Blue Box recyclables processing will vary for each current municipal MRF and/or transfer station location and for each community that delivers Blue Box material to that location.

Transition plans have been prepared as part of this study to outline the process that these municipal MRF and/or transfer station locations and affected communities may want to move through as options for optimization of the Blue Box recycling processing system are considered and then implemented. The

transition road maps are not intended for privately-owned MRFs or transfer stations. However, municipalities should consider contracting with private sector facilities where applicable.

Broadly speaking, the following types of transition plans have been developed, given the most common outcomes for each location:

- An existing municipal MRF will:
  - remain a MRF in current or upgraded form
  - convert to a transfer station
  - no longer have a role in the Blue Box system – to be repurposed or a stranded asset
- An existing municipal transfer station (TS) will:
  - remain a transfer station
  - no longer have a role in the Blue Box system – to be repurposed or a stranded asset
- A new greenfield MRF or TS in a new location may be required and some communities with no facilities or with facilities that will become stranded assets may need to sponsor development of or commit tonnage to that new greenfield MRF or TS

Communities that aren't directly sponsoring a MRF or TS in the new system (called in this report "direct haul communities") will need to choose the MRF or TS facilities to which they will deliver their Blue Box recyclables, i.e. existing municipal facilities, new greenfield facilities or existing private sector facilities Many factors will drive the process of actual transition for each current municipal MRF and/or transfer station location and its affected communities, some of which will be within the control of the stakeholders and decision makers involved in the process and some of which will not be.

Consider the following factors that will not be able to be controlled:

- Overall structure of the Blue Box system as determined by provincial law
- System funding structure - partial producer responsibility with reimbursement or shift to 100% producer responsibility with greater control
- Status of the location's CofA – does it allow change to take on a new role
- Private MRFs, existing or new, that may offer viable alternatives
- Timing of decision-making in transition plans for other municipal facilities that may affect your facility and community and your transition process
- Availability of funding from CIF or equivalent future program
- Realities of underlying costs that affect optimization and have been taken into account in this study (fuel costs, direct haul times, transfer costs and distances, MRF operating costs, economies of scale, available technology, etc.)

The best transition process will take into account these realities while integrating the many factors that are in the control of stakeholders and decision makers, including:

- Timing – how soon will the community begin the transition planning process for their facility
- Speed – how quickly will the community move through the transition planning process
- Supply – currently the communities that supply the facility choose where to take their material and are responsible for all arrangements for that delivery
- Cost Share – currently the facility's costs are partially covered by municipal partners
- Vision and Goals – the facility and affected communities must develop their own vision and goals for optimizing their Blue Box system, given the realities presented above, and make choices that best represent their interests and the larger mission.

The transition plans presented in this section for the Northern Region are designed to build in consideration of these factors. A variety of decision support tools are suggested in order to facilitate the process of both developing and implementing transition plans towards a more optimized Blue Box system for your region.

Some of these tools have already been provided as part of this body of work, including:

- The Blue Box processing optimization model: This CIF-funded study has resulted in the development of a GIS (Geographical Information System) decision support tool. The tool incorporates and analyzes data on the physical realities of your facility and affected communities (location of the households in each community, direct haul times from those locations, transportation routes and time/cost to transport, operating costs for transfer and processing, etc.). This tool is available to support your transition planning process as final solutions for optimization are being considered.
- The preliminary cost assumptions developed with the model: The CIF funded the development of cost data for transfer of recyclables across the province and for processing of recyclables into market ready commodities – cost information that can inform decision making as you move forward in your transition planning process.
- The preliminary options developed with the model: The CIF funded the use of the model to evaluate and present the most promising optimized solutions for each region, each municipal facility and each community – using the best information available to the study team at that time.

This section and Volume 8 include the following additional decision support tools:

- Decision Tree for Each Municipal Facility and Greenfield Location: Decision trees have been prepared for the situation of each location and its affected communities that describe a process for sifting through the preliminary options developed with the model and presented in this study. These decision trees identify “go/no-go” decision points at key stages in the process, given the specific options available to that location in an optimized system.
- “Go/No-Go” Decision Support Tools: At each of these “go/no-go” decision points the transition plans identify decision support tools and processes that can be used to move through that decision point.

4.1. Transition Plan Summary - Decision Trees and Lookup Tables

Each regional transition plan summary has a set of "lookup tables" that allow each municipal and greenfield facility and affected communities to determine how they fit into the baseline scenario or the options that vary from baseline for that particular region.

These lookup tables help guide each municipal facility or community as it undertakes the process of moving through a series of the "decision trees" that have "go/no-go" decision points for determining the most favourable outcome for their role in an optimized Blue Box recycling processing system.

The lookup tables help the municipal facility or community identify:

- What role it might play in a regional hub and spoke system – as a "hub" MRF, a "spoke" transfer station, or a feeder "direct haul" supply of Blue Box recyclables.
- How these roles might vary under the different options that are under consideration in a region.
- What key drivers will push the decision-making timeline in the hub and spoke system that they may be part of – contract expiration dates for existing MRF arrangements as an example.
- How greenfield MRF or TS development or private merchant capacity might be a factor in the hub and spoke systems they are potentially involved in.

The lookup tables then link with specific decision trees that are matched to that facility or communities' unique circumstances. These decision trees link, guiding the process in the right direction based on the "go/no-go" decisions that are made by the affected parties.

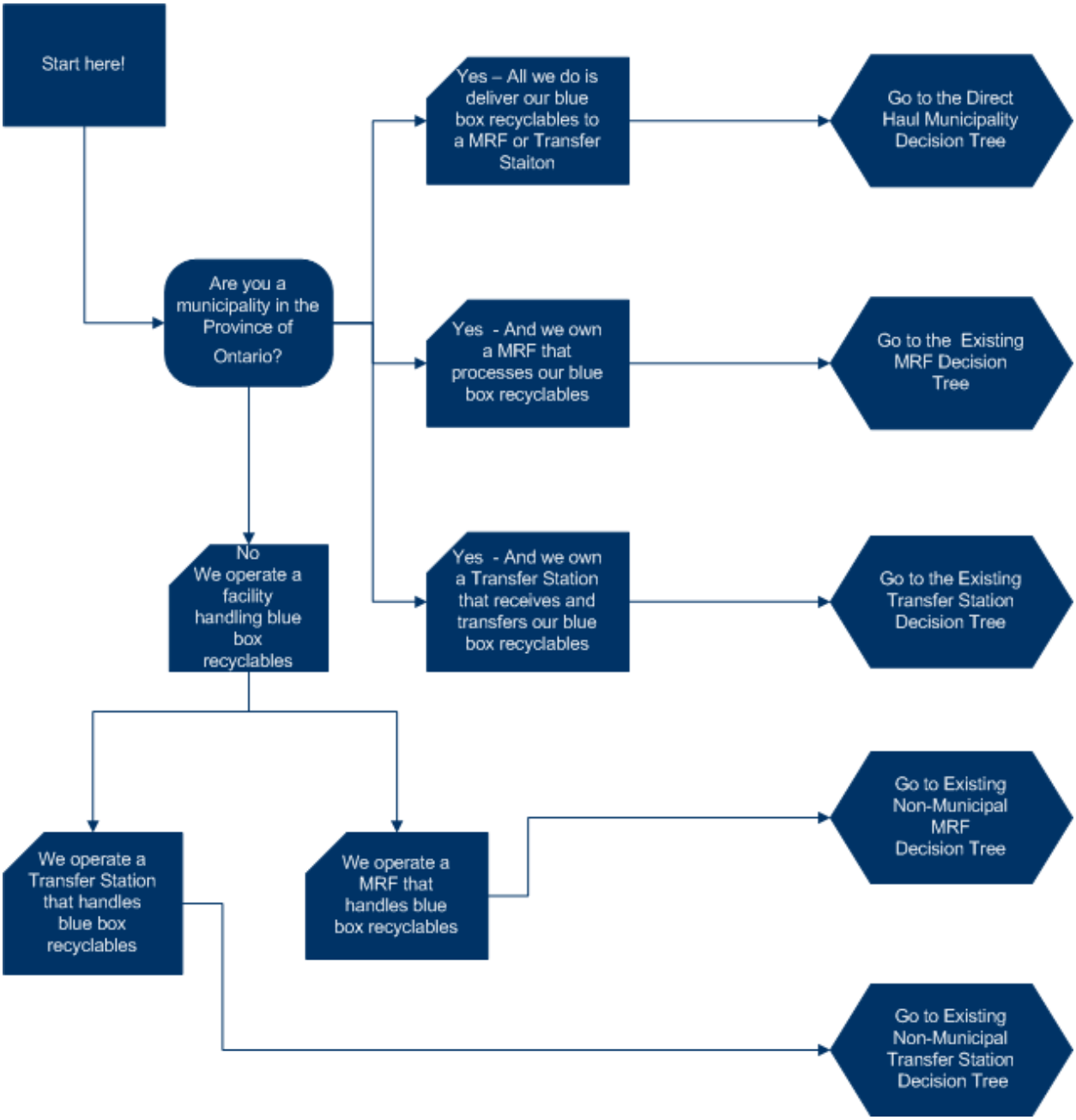
This series of decision trees move the user through key questions. Are they direct haul only? Do they operate a MRF? Do they operate a transfer station?

The decision tree then directs the user to the next sequential decision tree. For example:

- A direct haul only community would move to the "Direct Haul Municipality" decision tree that would then provide a road map for the steps and go/no-go decisions applicable to that situation.
- A municipality that operates a MRF would move to the "Existing MRF" decision tree with steps to evaluate its role as either an upgraded MRF, a complete rebuild MRF, a transfer station conversion or no role, i.e. a stranded asset.

These decision trees guide the transition plan for each facility and community and they are iterative. For example, a community with a MRF that will become a stranded asset then becomes a "Direct Haul Municipality" and then moves through that decision tree process.

Figure 9: Moving Through Your Transition Plan for an Optimized Blue Box Processing System



There are decision trees for every type of situation and outcome anticipated by the Blue Box processing optimization model.

- Direct Haul Municipality decision trees anticipate their delivery to either an existing or proposed MRF or transfer station, the potential to host a new greenfield MRF or transfer station and the possibility that private merchant capacity or a solid waste authority's capacity may be utilized.

- Existing MRF decision trees anticipate outcomes that include marketing of excess capacity, a major MRF upgrade, a complete MRF rebuild, conversion to a transfer station or the outcome of no role – repurpose or a stranded asset.
- Existing TS decision trees similarly anticipate marketing of excess capacity, a major upgrade, a complete rebuild, or the outcome of no role, i.e. repurpose or a stranded asset.
- New greenfield MRFs or Transfer Stations are accommodated.
- The potential interest of private merchant or other non-municipal (e.g. solid waste authority) capacity is anticipated in the process as well.

The Blue Box processing optimization model informs the transition planning process, as shown in each decision tree. The study results or new runs of the model identify roles and evaluates new variations as they surface. For example:

- Evaluation of an existing site location takes into account site constraints that could include CofA compliance questions, possibility of a successful CofA amendment, or the potential for an alternative site if CofA or other site issues cannot be resolved.
- A technical plan for the proposed project (upgrade, conversion to TS, etc.) is developed and the underlying business case justification is formulated – essentially that next level of technical and cost analysis needed to move forward.
- Negotiations with users, the municipalities whose recyclables (direct haul or transfer) will provide the necessary baseload of materials to allow the project to be financed and thus developed.
- The final stages of go/no-go decision-making as the project is coming together, all supply sources commit, the CofA is amended if required and financing, design, build and operation is authorized.
- Private merchant capacity options are considered.

Details on each type of decision tree, including the different components described above are provided in Volume 8.

4.2. Optimized Processing in the Northern Region

Moving to a more optimized Blue Box processing system in the Northern Region will require focused effort by the following stakeholders over a long period of time:

- The CIF, or similar champion, will need to provide leadership, direction and resources in the optimization process.
- The Hub MRF(s) and its host communities or sponsoring agencies will need to take responsibility for development of this key component of the optimized hub and spoke system.
- The Spoke Transfer Stations and their host communities or sponsoring agencies will need to take responsibility for development of these key aggregation points in the optimized hub and spoke system.
- The Direct Haul communities will need to take responsibility for any changes in their delivery locations for their Blue Box recyclables in the optimized hub and spoke system.
- All existing locations servicing the current Blue Box processing system will need to transition their facilities to new functions under the optimized hub and spoke system.

The length of time for the transition period to be completed cannot be predicted with any certainty. It could move quicker than anticipated with good coordination, appropriate resources, strong commitment on the part of all stakeholders and perseverance to surmount the many obstacles that will

arise. It also could take much longer than needed if good coordination is not provided, if the resources are not available, and if obstacles and other conflicting demands for attention of key stakeholders distract from the goal of moving toward an optimized Blue Box processing system.

4.2.1. Northern Region Lookup Tables

The results of the optimization model for the Northern Region presented in this volume provide a robust set of opportunities to achieve optimization. Table 5 identifies the Hub MRFs, development of which will be central to the success of an optimized Blue Box processing system for the region. Both the Baseline and Option 1 scenarios include the Sudbury, Winnipeg and Thunder Bay Hub MRFs. The Sault Ste. Marie Hub MRF is part of Option 1, but not the Baseline.

Table 5: Lookup Table for Hub MRFs

Facility	City	Province	Baseline	Option 1
Hub MRF	Sudbury	ON	MRF	MRF
Hub MRF	Thunder Bay	ON	MRF	MRF
Hub MRF	Winnipeg	MB	MRF	MRF
Hub MRF	Sault Ste. Marie	ON		MRF

Table 6 shows the transition of existing locations to their new potential functions in the Baseline A, B and C scenarios. Some of these existing locations have potential for Hub MRF roles – specifically Sudbury in all options, Winnipeg's Metro Recycling in all options and Thunder Bay's Recool, Inc. in Baseline C. Some locations have expected roles as transfer station in all options (e.g. Cochrane Temiskaming WMB's locations in Kapuskasing and New Liskard, the City of Timmins and the City of Dryden). Most locations may have a transfer station role under at least one scenario in the optimized system.

Table 6: Lookup Table for Role in Optimized Processing System for Current System Locations

Facility Owner - North	City	Province	Current Tonnes	Baseline A	Baseline B	Baseline C
Cochrane Temiskaming Waste Management Board	Kapuskasing	ON	544.8	TS	TS	TS
Cochrane Temiskaming Waste Management Board	New Liskard	ON	1,063.0	TS	TS	TS
Cascades Winnipeg	Winnipeg	MB	88.4			
Greater Sudbury, City of	Sudbury	ON	16,411.2	MRF	MRF	MRF
Greg's Recycling	Devlin	ON	9.4			
Green Circle Environmental	Sault Ste. Marie	ON	5,887.0			TS
MWRC	Blind River	ON	2,569.9			TS
Miller Waste Systems - WMC	North Bay	ON	3,868.9			TS
Metro Recycling	Winnipeg	MB	2,207.0	MRF	MRF	MRF

Facility Owner - North	City	Province	Current Tonnes	Baseline A	Baseline B	Baseline C
R & D Recycling	North Bay	ON	858.8			
Recool Inc.	Thunder Bay	ON	6,636.6			MRF
Service Sani-Tri	Rouyan-Noranda	QC	150.0			
Teck Northern Roads	Kirkland Lake	ON	347.3			
West Nipissing Environmental S	Sturgeon Falls	ON	885.4			TS
TS - Asselin Transportation	Fort Francis	ON	88.4			
TS - Deloro Landfill Site - Timmins, City of	Timmins	ON	2,255.9	TS	TS	TS
TS - Dryden Landfill - Dryden, City of	Kenora District	ON	652.9	TS	TS	TS
TS - Fort Frances, Town of	Fort Frances	ON	424.3			
TS - Kenora Area Solid Waste Transfer Facility	Kenora	ON	1,129.8		TS	TS

Direct haul communities that do not have existing facilities can use Table 7 to determine which transfer stations and or Hub MRFs are potential delivery points for their Blue Box recyclables under the various options.

4.2.2. Transition Plan Considerations

As these locations and municipalities move through the transition process of evaluating the future of their facility or the destination for their material in the optimized system they will need guidance in two forms:

- Leadership and Direction: We recommend that influential players such as WDO, AMO and Stewardship Ontario work with the government and other stakeholder forums such as the Regional Public Works Commissioners of Ontario (RPWCO) to support and mandate the CIF, or similar champion to take steps to promote and guide the transition process in the Northern Region. These steps are outlined below.
- Work Plan: The sequence of steps in the specific transition plans for each of the above locations and municipalities is rooted in the Decision Tree based transition planning process overview provided in section 4 above – further outlined for each key stakeholder group below.

Leadership

In order to achieve progress toward an optimized hub and spoke system in the current regulatory context, it is essential that the CIF, or similar champion, be supported and mandated to continue to press forward with region-wide review, discussion and tweaking of the initial results of the optimization model for the Northern Region. This would require resources and could be accomplished using the CIF staff with technical support to implement decision tree processes and actively use the dynamic GIS hub and spoke model. There are a number of key process outcomes that these leadership activities should include:

- Individual consultation: Providing one-on-one review of location specific recommendations
- Dialogue opportunities: Most easily achieved by hosting regional optimization summits
- Updated modelling: Putting additional analysis together to address remaining issues
- Transition plan technical and process support: Helping locations through their transition plans
- Seed capital resources: Funding a portion of key investments to seed system development

In the Northern Region, it is clear that the Sudbury, Winnipeg and Thunder Bay Hub MRFs are key to progress in moving towards an optimized hub and spoke Blue Box processing system. Depending on the outcome of the CIF or other leadership activities, the potential Sault Ste. Marie Hub MRFs could also be critical to progress.

Hub MRF Development

Towards that end, the Existing MRF Decision Tree is the starting point for identifying the Hub MRF development track for the Sudbury, Winnipeg, Thunder Bay and Sault Ste. Marie locations informed by the optimization model results presented in this section and the CIF or other leadership activities.

Private Merchant MRF Processing Capacity

The impact of potential private merchant MRF processing capacity on the Hub MRF development process in the Northern Region may be a factor in the transition to an optimized hub and spoke Blue Box recyclables processing system. The Transition Plan Decision Trees provide a mechanism for consideration of the value proposition that any private service providers could offer in determining whether they are a viable alternative approach to development of the Hub MRFs described in the options.

Spoke Transfer Station Development

The Spoke Transfer Stations for the Northern Region under each option are driven by existing locations that need to move through transition plans guided by the Transfer Station Conversion for Existing MRF Decision Trees. Use of the Existing MRF Decision Tree, informed by the results of the optimization model presented in this section, and the CIF or other leadership efforts, will allow these locations to navigate through their unique transition planning process – ending up either as Hub MRF, transfer station conversion or stranded asset outcomes.

As shown in the detailed steps included in these Decision Trees, the timing of each of these individual transition-planning processes will need to be coordinated with key stages in the Hub MRF development process. Commitments of tonnage can be made by way of letters of intent from transfer stations followed by long term intergovernmental agreements – all typically necessary for a “go” decision on the transition of the Hub MRF location into its potential new role in the optimized hub and spoke system. The tipping fee price points shown in the optimization model results for the North Region are key decision factors that will strongly influence both Hub MRF and Transfer Station development and their potential to find a win/win agreement needed for supporting the Hub MRF or MRFs in their new role.

Direct Haul Supply Development

The Direct Haul communities are a key for each transfer station and its development path, and thus the development path for each potential Hub MRF. Their supply commitment will be critical to this sequence of facility development. Again, coordination of these process steps with reference to Table 7 is key to the success of this process.

4.2.3. Key Drivers, Timing and Phasing

The WDO has compiled data on contract start and end dates and currently is verifying the data reported by the municipalities. This will be an important tool for the planning and phasing of the transition. According to information available to the Project team, contracts come due for 3 municipalities in the Northern Region in 2013 and another 3 come due in 2014, mainly collection/depot and transfer contracts.

Table 7: Direct Haul Lookup Table

Program	Direct Haul Facility Type	Region	Hub MRF	Multiple Regions	Baseline	Option 1
Sault Ste. Marie	TS	N	Greater Sudbury	No	X	X
Thunder Bay	MRF	N	Thunder Bay	No	X	X
North Bay	TS	N	Greater Sudbury	No	X	X
Greater Sudbury	MRF	N	Greater Sudbury	No	X	X
Cochrane Temiskaming Waste Management Board	TS	N	Thunder Bay	No	X	
	TS	N	Greater Sudbury	No	X	
	MRF/TS	N	Timmins	No		X
West Nippissing	TS	N	Greater Sudbury	No	X	X
Kirkland Lake	TS	N	Greater Sudbury	No	X	
	TS	N	Timmins	No		X
Elliot Lake	TS	N	Greater Sudbury	No	X	X
Timmins	TS	N	Greater Sudbury	No	X	
	MRF	N	Timmins	No		X
Casey	TS	N	Greater Sudbury	No	X	
	TS	N	Timmins	No		X
Gillies	MRF	N	Thunder Bay	No	X	X
Prince	TS	N	Greater Sudbury	No	X	X
Sables-Spanish Rivers	MRF/TS	N	Greater Sudbury	No	X	X
Kerns	TS	N	Greater Sudbury	No	X	
	TS	N	Timmins	No		X
Hudson	TS	N	Greater Sudbury	No	X	
	TS	N	Timmins	No		X
Neebing	MRF	N	Thunder Bay	No	X	X
Calvin	TS	N	Greater Sudbury	No	X	X
Mattawa	TS	N	Greater Sudbury	No	X	X
Baldwin	TS	N	Greater Sudbury	No	X	X

Program	Direct Haul Facility Type	Region	Hub MRF	Multiple Regions	Baseline	Option 1
Blind River	TS	N	Greater Sudbury	No	X	X
Central Manitoulin	MRF	N	Greater Sudbury	No	X	X
Espanola	MRF	N	Greater Sudbury	No	X	X
Nairn and Hyman	MRF	N	Greater Sudbury	No	X	X
Northeastern Manitoulin and the Islands	MRF	N	Greater Sudbury	No	X	X
Sault North Waste Management Council	TS	N	Greater Sudbury	No	X	X
North Shore	TS	N	Greater Sudbury	No	X	X
Atikokan	TS	N	Thunder Bay	No	X	X
Conmee	MRF	N	Thunder Bay	No	X	X
Dryden	TS	N	Winnipeg	No	X	X
Emo	TS	N	Thunder Bay	No	X	X
Fort Frances	TS	N	Thunder Bay	No	X	X
French River	MRF	N	Greater Sudbury	No	X	X
Harley	TS	N	Greater Sudbury	No	X	
	TS	N	Timmins	No		X
Hillard	TS	N	Greater Sudbury	No	X	
	TS	N	Timmins	No		X
Huron Shores	TS	N	Greater Sudbury	No	X	X
Johnson	TS	N	Greater Sudbury	No	X	X
Kenora	TS	N	Winnipeg	No	X	X
Killarney	MRF	N	Greater Sudbury	No	X	X
Macdonald, Meredith and Aberdeen Additional	TS	N	Greater Sudbury	No	X	X
Machar	TS	N	Greater Sudbury	C/N	X	X
Marathon	MRF	N	Thunder Bay	No	X	X
O'Connor	MRF	N	Thunder Bay	No	X	X
Oliver Paipoonge	MRF	N	Thunder Bay	No	X	X
Tri-Neighbours	TS	N	Greater Sudbury	No	X	X
Papineau-Cameron	TS	N	Greater Sudbury	No	X	X
Powassan	TS	N	Greater Sudbury	No	X	X

Program	Direct Haul Facility Type	Region	Hub MRF	Multiple Regions	Baseline	Option 1
Rainy River	TS	N	Thunder Bay	No	X	X
Spanish	TS	N	Greater Sudbury	No	X	X
Shuniah	MRF	N	Thunder Bay	No	X	X
Sioux Lookout	TS	N	Winnipeg	No	X	X
Sioux Narrows - Nestor Falls	TS	N	Winnipeg	No	X	X
St. Charles	MRF	N	Greater Sudbury	No	X	X
St. Joseph	TS	N	Greater Sudbury	No	X	X
Tarbutt and Tarbutt Additional	TS	N	Greater Sudbury	No	X	X
Bonfield	TS	N	Greater Sudbury	No	X	X
Chisholm	TS	N	Greater Sudbury	No	X	X
East Ferris	TS	N	Greater Sudbury	No	X	X
Rainy River First Nations	TS	N	Thunder Bay	No	X	X
Callander	TS	N	Greater Sudbury	No	X	X
Serpent River First Nations	TS	N	Greater Sudbury	No	X	X
Sagamok Anishnawbek First Nation	MRF	N	Greater Sudbury	No	X	X
Whitefish Lake First Nation	MRF	N	Greater Sudbury	No	X	X
Wikwemikong Unceded	MRF	N	Greater Sudbury	No	X	X
Charlton and Dack	MRF	N	Greater Sudbury	No	X	X
Wahnapitaw First Nation	MRF	N	Greater Sudbury	No	X	X