CITY OF CORNWALL

Landfill Full Cost Accounting Analysis

Financial Sustainability Final Report

PREPARED BY:

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DECEMBER 24, 2019

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Re: City of Cornwall
Landfill Full Cost Accounting Analysis Financial Sustainability Report

We are pleased to submit our report entitled: "City of Cornwall Landfill Full Cost Accounting Analysis Financial Sustainability Final Report". This report presents the full costs associated with managing the City of Cornwall's waste disposal and waste diversion systems for the period 2020 to 2044 and the projected net costs to be recovered from fees charges and taxes.

Please do not hesitate to call if you have any questions.

Respectfully Submitted by,

DFA Infrastructure International Inc.

Derek Ali, MBA, P.Eng.
President

Executive Summary

ES-1 Purpose of Report

The purpose of the rate study is to identify the full cost of services for the City's waste diversion and waste disposal services based on the most recent information. The period for this study is 25 years from 2020 to 2044 inclusive.

ES-2 Conclusions and Recommendations

Based on the information reviewed and analyses completed, the following are the main conclusions regarding the *waste diversion system costs*:

1. The gross cost of waste diversion is projected to be approximately $3,447,300 in 2020 and funded through a combination of operating revenue (including grants) and taxes. The operating revenue is projected to offset approximately 52% of the gross annual cost based on 2020 estimates. The remaining 48% i.e. the net operating cost of approximately $1,656,000 would require funding from taxes.
2. The net operating cost is projected to increase by approximately 4.7% in 2020 and by 3% - 4% over the remainder of the 25-year period.
3. The capital investment required over the next 25 years is approximately $2,102,000. On average this is 40% more than the historical annual average expenditure of $59,000 over the past 10 years
4. There is no existing or future debt to be incurred for waste diversion capital projects.
5. There is the requirement for a Waste Diversion Capital Reserve to fully fund the capital requirements of $2,102,000 over the next 25 years. Annual contributions of $ 87,333 in 2020 and $100,000 in 2021 and beyond.
6. The costs related to processing and marketing the recyclable materials from other municipalities would be fully offset by the charges to the respective municipalities.
7. The net cost for waste diversion is allocated to 88% to the residential sector and 12% to the IC&I sector.
8. The estimated gross cost per tonne of waste diverted is $171 for 2020. The net cost per tonne is estimated to be $82.
9. The transfer of responsibility for waste diversion to the packaging producers would result in a reduction in the gross annual cost of waste diversion by approximately $3,108,000 starting in 2026 and result in a net cost of approximately $774,000 in 2026. This is premised on the City transferring full control and cost of service to the producers or providing waste diversion services to the producers on a full cost recovery basis.

10. The introduction of an organics program by the City to achieve the Food and Organic Waste Policy 4.2(ii) objectives of 50% organics diversion by 2025 will require investment in green bins for the program at a capital cost of approximately $800,000 in 2025. This will require an additional $160,000 per year in contributions to the capital reserve staring in 2021. The annual operating cost will also increase due to the added cost to collect and process organics. This is estimated to be approximately $1,773,000 in 2025.

Based on the information reviewed and analyses completed, the following are the main conclusions regarding the *waste disposal system costs*:

11. The current waste disposal system cost does not include the full cost of service. The City's liability for closure and post closure care of the landfill site is currently unfunded and not considered in the annual costs. This cost is estimated to be approximately $2,458,000 per year for the period 2020 to 2032 at which time the liability will be fully funded. The annual reserve fund contributions would be approximately 3.33% of the 2019 tax levy.
12. If the City phases in the contribution to the Landfill Closure and Post Closure Care Reserve Fund starting with $250,000 in 2020 and increasing the contribution by $250,000 each year to a maximum annual contribution of $2,500,000, then the reserve balance at the beginning of 2033 would be approximately $24,127,000. Further annual contributions beyond closure would be required until the target balance of approximately $36,815,000 is achieved. This is projected to occur at the beginning of 2037. In this case there would be no opportunity to raise the funds from the tipping fees after 2032. The 2020 contribution of $250,000 is approximately 0.3% of the 2019 tax levy
13. The City has an operating policy whereby the cost of Leachate treatment at the Wastewater Treatment Plant (WWTP) is not charged back to waste disposal. Inclusion of this cost will add approximately $194,000 per year to the cost of service projections presented in this report for the period 2020 to 2032. Leachate treatment costs beyond 2033 are accounted for in the post closure care costs and included in the annual contributions to the reserve fund.
14. The City has an operating policy that exempts certain waste materials from tipping fees. These include contaminated soil and other waste (asphalt, concrete and fill material) from City projects and residential waste collected through the curbside waste collection program. Therefore the potential operating revenues are not maximized requiring more to be recovered from taxes. In 2018 approximately 43,300 tonnes of materials were received at the landfill site from City projects. Contaminated soil which accounts for 70% of the total was charged at a reduced tipping fee of $10.20 per tonne. The remaining material was handled at the landfill site at no charge. Although only some of these materials are actually landfilled, costs are incurred for handling and management e.g. testing, stockpiling, crushing, etc. The opportunity cost of not charging the going tipping fee of $77 per tonne is approximately $3,000,000. This means that the waste disposal operations is subsidizing other City programs that may have funding sources other than taxes e.g. water and wastewater that are user fee based, development related projects with funding from

development charges and other projects for which grant funding may be available. In terms of fairness and equity, these programs should be paying their fair share for the benefit received from disposal at the landfill site.

15. The landfill site also receives Septage directly into the Leachate Collection System from external sources. This is a unique service to the City and not consistent with industry best practices for Septage management. Typically Septage would be hauled directly to a wastewater treatment plant where there is a specifically designed receiving station for haulers to discharge the waste for treatment. This service would be provided for a fee per unit volume discharged on full cost recovery basis to the wastewater operations. Leachate Collection Systems are not designed to receive and convey Septage which has a high level of suspended solids and odour. These can complicate the landfill site operations and result in added costs for maintenance of the Leachate Collection System.
16. The gross annual cost of waste disposal is projected to be approximately $5,157,250 in 2020 and funded through a combination of operating revenue and taxes. This includes approximately $2,458,000 million for the annual contribution to the new Landfill Site Closure and Post Closure Care Reserve Fund which is currently not in the annual budget.
17. The operating revenue of $1,495,000 is projected to offset approximately 29 % of the gross annual cost based on 2020 estimates. The remaining 71% i.e. the net operating cost of approximately $3,662,500 would require funding from taxes or an adjustment to the current tipping fee.
18. Under the current policy to exempt curbside waste from the tipping fees the residential sector would contribute only 6% of the annual revenue of $1,495,000 when it should contribute 59% to match its share of the gross cost. This results in a cross subsidy from the IC&I sector to the residential sector of approximately $792,000.
19. The gross cost of disposal (not including waste collection) is estimated to be approximately $151 per tonne in 2020 increasing to $162 per tonne in 2021. The $151 includes approximately $53 per tonne for operations, $10 per tonne for capital related costs and $88 per tonne for the Landfill Closure and Post Closure Care Reserve Fund contributions and is based on both residential and IC&I waste disposal tonnages. The net costs for 2020 and 2021 are $97 and $107 respectively.
20. The current tipping fee of $77 per tonne is clearly not sufficient to recover the full cost of disposing waste at the landfill site which is estimated to be $151 per tonne.
21. The net operating cost is projected to increase by approximately 269 % in 2020 due mainly to the Landfill Closure and Post Closure Care Reserve Fund contribution. The 2021 increase is projected at 8.6% due to the increase in the transfer to the capital reserve. Annual increases of 0.6 %- 0.7% are projected between 2022 and 2032 with the exception of 2030 when there is a 9.4% decrease due to suspension of the contribution to the capital reserve pending further review. 2% per year increase on net annual cost is projected over the remainder of the 25-year period.

22. The capital investment required over the next 25 years is approximately $5,836,300. This is approximately $449,000 per year until closure and approximately 80% higher than the 10-year historical gross capital investment of $244, 000 per year.
23. There is no existing waste disposal debt. However, the New Landfill Gas Control System will be financed through debt in 2020 with annual repayment of approximately $140,225 beginning in 2021 for 15 years.
24. There is the requirement for a Waste Disposal Capital Reserve to fully fund the other capital requirements of $4,162,300 over the next 25 years. Annual contributions of $ 270,000 in 2020 and $420,000 from 2021 to 2029 to ensure that sufficient funds are available for all projects prior to closure of the landfill site.
25. If the City decides to extend the life of the existing landfill site and is successful in receiving approval for another 15 years, then the closure and post closure care costs would be deferred from 2033 to 2048. The reserve fund requirements would be approximately $58,950,000 by the beginning of 2048. This would require annual contributions of $1,466,000 starting in 2020 until 2048 instead of the $2,458,000 contributions currently projected for closure in 2032. In this case the $88 per tonne of waste disposed for the annual contribution to the Landfill Closure and Post Closure Care Reserve Fund would be reduced to $53 per tonne. The gross cost of disposal would be lower at $106 per tonne instead of $151 per tonne. The current tipping fee of $77 is well below this amount and insufficient should the City decide to extend use to the existing landfill site beyond 2032. The City would also have the opportunity to raise the funds through the tipping fees over a longer period. However, there would be the additional cost of extending the use of the landfill site which is not estimated as part of this study. Such costs would be additional to the cost of $106 per tonne.
26. The 2020 value of the remaining capacity at the landfill site is estimated to be approximately $41,720,000. This is a high level estimate that is based on the remaining capacity of approximately 409,000 tonnes and an estimated 2020 market tipping fee of $102 per tonne. This is a diminishing asset that would decline to zero at closure in 2032 when the benefits of disposal space and tipping fees would no longer available to the City.

The following are the primary recommendations for consideration by the City:

1. The cost of service projections developed through this study for the period 2020 to 2044 should be used to inform the City's decisions regarding changes to the current cost recovery mechanisms including increases to the tipping fee and/ or taxes to ensure that the full cost of service for waster diversion and waste disposal are recovered.
2. Establish a Waste Diversion Capital Reserve beginning in 2020 with an annual reserve contribution of $87,833 and $100,000 thereafter.
3. Obtain estimates from service providers to implement the organics program by 2025 in accordance with the Provincial Food and Organic Waste Policy 4.2 (ii).

4. Monitor Provincial discussions on the transfer of recycling and other waste diversion functions to the packaging producers to gauge and identify the City's role and responsibilities and any costs that may be incurred by the City.
5. Establish a Waste Disposal Capital Reserve beginning in 2020 with an annual contribution of $270,000 and $420,000 from 2021 to 2029 at which time continuation of the annual contribution should be re-assessed depending on if the landfill site would be closed in 2032 or its use extended.
6. Establish a restricted Landfill Closure and Post Closure Care Reserve Fund to set aside the funds that would be required to pay for all closure and post closure care work following closure of the landfill site in 2032. Ideally this reserve should be fully funded to the liability target balance of approximately $37.88 million by 2032 while there is the opportunity to raise the funds through the tipping fees. This would ensure from a fairness and equity perspective, that the users who benefit from the using the landfill site would pay for its post closure care. However given the potential significant impact on the tipping fees and/ or taxes, lower annual contributions may be considers provided that the target balance is achieved within a reasonable period to fully fund post closure care.
7. Review the City's policy to exempt waste disposed from City projects from the landfill tipping fees with a view to maximizing annual waste disposal revenues and reducing the amounts to be recovered from taxes. The estimated additional revenue to the waste disposal operations could be in the order of $3,000,000. This approach is consistent with the principle of user pay particularly in cases where these programs and projects are funded from sources other than property taxes.
8. Increase the current landfill tipping fee of $77 per tonne to recover more of the cost of service, if not the full cost of service for waste disposal estimated to be $151 per tonne.
9. Review the policy of exempting the curbside waste from the landfill tipping fees to facilitate fairness and equity between the residential and IC&I sectors and address the existing cross subsidization of approximately $792,000 from the IC&I sector to the residential sector.
10. The recovery of net costs from taxes should be structured such that the residential sector and IC&I sector pay their fair share of the amount required to mitigate any cross subsidy. The allocation of costs to each sector for waste diversion and waste disposal, as noted in this study, should be used to guide the restructuring.
11. Reassess the costs versus the benefits of accepting Septage at the landfill site in an effort to reduce disposal operating and capital costs associated with the Leachate Collection System. In any event alternative Septage disposal would be required prior to closure of the landfill site in 2032.
12. Review and update this cost of service study in five (5) years to account for new information regarding transferring recycling to producers of packaging, the cost of the organics program and the City's decision (and regulatory approval) on whether or not the use of existing landfill site would be extended.

Disclaimer:

The information and assumptions contained in this report are based on the best available data at the time of preparation and are unique to the City of Cornwall. This information is for the City of Cornwall's sole use and not intended for use by any third party. DFA Infrastructure International Inc. shall not in any way be liable for third party use and/ or interpretation of the information contained in this document.

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1 Introduction

1.1 Background

The City of Cornwall (City) with a population of approximately 46,723 (2016 Census) provides solid waste management services to its residential and Industrial, Commercial and Institutional (IC&I) sectors. Services include waste collection, waste disposal, blue box collection and processing and other waste diversion programs geared towards waste reduction and environmental stewardship. The City owns two (2) landfill sites located at 2590 Cornwall Centre Road West. The landfill at the north end of the site under ECA No. 480101 issued by the Ministry of the Environment Conservation and Parks (MECP) has been closed since 1985. The other a landfill site to the south is active under ECA No. A480109 and receives approximately 28,000 metric tonnes of solid waste annually for disposal not including contaminated soil. The site is projected to close by 2032 based on the current disposal rate and remaining capacity. Landfill gas and Leachate are managed at both sites through respective collection systems. The gas is collected and flared on site. The Leachate is collected in the Leachate Collection System (LCS) and directed to the City's sanitary sewer for treatment at the Wastewater Treatment Plant (WWTP). The site is also permitted to receive Septage which is discharged into the LCS, mixes with the Leachate and directed to the WWTP.

Waste management services are generally delivered through contractual arrangements with service providers. Costs are recovered through landfill tipping fees, Ontario Stewardship funding for materials recycling and property taxes. The waste diversion industry is expected to change over the next few years. The responsibility for the waste diversion programs is expected to shift from the municipalities to packaging producers starting in 2023. This would remove the program responsibility and costs from municipalities. There are also provincial initiatives to make organics collection and diversion from disposal mandatory by 2025. Municipalities are also required to calculate and plan for the landfill closure and post closure care costs under PSAB Standard 3270, soon to be replaced by PSAB 3280 effective April 1 2021. Because of these changes and the closure of the landfill site in 2032, the City retained the services of DFA Infrastructure International Inc. to update the cost of service to inform future decisions on waste management particularly regarding waste disposal with the impending closure of the landfill site.

1.2 Purpose

The purpose of this Cost of Service study is to:

- Determine the cost of the City's existing waste management services based on the most recent information;
- Develop the full cost of service for waste disposal and waste diversion over a 25-year period including identifying reserves requirements, to ensure the long-term financial sustainability of the City's waste management system; and
- Inform the preparation of the Terms of Reference for identifying and understanding the long-term waste disposal costs associated with landfilling.

2 Regulatory Requirements

2.1 Provincial Regulations

Key Ontario laws affect waste management activities include:

- the Environmental Assessment Act, 1990 (EAA);
- the Environmental Protection Act (EPA);
- the Waste-Free Ontario Act, 2016; and
- the Waste Diversion Transition Act, 2016.

The **Environmental Assessment Act** (EAA), R.S.O., 1990 c. E. 18, and O. Reg. 101/07 Waste Management Projects set the requirements for planning and decision-making process when conducting environmental assessments (EA) primarily for public sector projects. There are several documents that guide the EA process including:

- The Code of Practice for Consultation, and
- The Code of Practice for Preparing and Reviewing Terms of Reference.

The Environmental Protection Act (EPA) addresses waste collection, disposal and environmental approvals. Under this Act:

- O. Reg. 232/98 governs the regulatory and approval requirements for new or expanding landfills. The regulation includes requirements regarding ownership, design, financial assurance, operations, and closure;
- Revised O. Reg. 347 General Waste Management sets the standards for disposal sites; the management, tracking and disposal of hazardous and liquid industrial waste; and requirements for landfill gas collection and flaring.

Policies, rules and regulations that guide Ontario's **resource recovery and waste reduction** include the Waste-Free Ontario Act, 2016 which is comprised of the Resource Recovery and Circular Economy Act (RRCEA), 2016 and the Waste Diversion Transition Act, 2016.

- *Resource Recovery and Circular Economy Act, 2016*
  Ontario is making producers responsible for managing the waste generated from their products and packaging, paying for the full life-cycle of their products. It will require ministries, municipalities, producers and others to perform waste reduction and resource recovery activities in a manner that is consistent with provincial policies.

- *Waste Diversion Transition Act, 2016*
  The Waste Diversion Transition Act, 2016 will allow the products and packaging managed under existing waste diversion programs to be smoothly transitioned to the new producer responsibility framework. To ensure a seamless transition, regulations that make producers fully responsible will come into effect the same day each of the current programs end. These programs include:
  - ✓ Blue Box Program recycles printed paper, packaging (plastics, paper, glass, aluminum and steel) and textiles; (O. Reg. 386/16). The Blue Box Program will transition to

producer responsibility in phases over a three-year period, starting in 2023. By December 31, 2025, producers will be fully responsible for providing Blue Box services province wide.

- ✓ Municipal Hazardous or Special Waste Program recycles or properly disposes of paint, antifreeze, batteries, fertilizers and other hazardous or special materials; (O. Reg. 387/16). Battery materials will transition to the producer responsibility model on July 1, 2020 and the remaining program materials will transition on July 1, 2021.
- ✓ Waste Electrical and Electronic Equipment Program reuses or recycles electronic equipment like computers, televisions and stereos; (O. Reg. 389/16). It will transition to the producer responsibility model on January 1, 2021.
- ✓ Tire Collection Network is a regulatory framework, which makes tire producers responsible for creating an accessible, convenient and free tire collection network across the province, (O. Reg. 390/16).

There is also the Food and Organic Waste Framework, released on April 30, 2018, which consists of two complementary components:

- ✓ Food and Organic Waste Action Plan, which outlines strategic commitments to be taken by the province to address food and organic waste, and
- ✓ Food and Organic Waste Policy Statement, issued under section 11 of the RRCEA, 2016, provides direction to provincial ministries, municipalities, industrial, commercial and institutional establishments, and the waste management sector to increase waste reduction and resource recovery of food and organic waste. Under Policy 4.2 (ii) municipalities in Southern Ontario with a population between 20,000 and 50,000 and a population density greater than 100 persons/ km2 are required to achieve *"50% waste reduction and resource recovery of food and organic waste generated by single-family dwellings in urban settlement areas by 2025".* The City falls into this category.

2.2 Public Sector Accounting Board (PSAB) Requirements

PSAB 3270 Solid Waste Landfill Closure and Post Closure Care Liability sets out the requirements for municipalities to account for and report on the landfill closure and post closure care liability in their annual financial statement submissions (FIRs). The liability calculation must consider the closure and post closure care activities. However, PSAB 3270 recognizes that each landfill site is different and allows flexibility for municipalities to consider their specific situations. PSAB 3280 Asset Retirement Obligations is new and will replace PSAB 3270 with respect to landfill site liability effective April 1, 2021. It applies to public sector entities that "*have a legal obligation to permanently remove a tangible capital asset from service (i.e., retire) and control the tangible capital asset that needs to be retired"*. The requirements under both standards are similar. These standards and the liability calculations are presented in a separate report entitled: *City of Cornwall Landfill Site Closure & Post Closure Care Liability Report, December 2019*.

2.3 City By-laws

The City regulates waste management and recycling activities through the following by-laws:

- By-Law 2019-047 establishes the list of fees and charges for Tipping Fees Account Transactions, Tipping Fees Cash Transactions, tires, and Free Transactions;
- By-Law 2019-34 regulates the collection, removal and disposal of municipal solid waste in the City; and

The Waste Management department has a by-law enforcement officer that responds to complaints related to curbside waste and enforces the by-laws. Curbside infractions carry a minimum fine of $150.00.

3 Current Waste Management Services

The waste management services currently provided by the City include:

Waste Diversion

- Recycling Collection
- Apartment & IC&I Blue Cart Collection
- Processing of Blue Box Materials
- Household Hazardous Waste (HHW) Collection
- Leaf & Yard Waste Collection
- Drop off Diversion Depot
- Paint Reuse Centre
- Other Diversion Services – electronics, backyard composting, wood waste, scrap metal, etc.

Waste Disposal

- Curbside Waste Collection
- Apartment Waste Collection
- Landfill Disposal of Residential & IC&I Waste

The general level of service offered to residents and businesses is summarized in Table 3-1: Current Level of Service

Table 3-1 Current Level of Service

Service	Service Level
Recycling Collection:	• Once per week from 5 zones for residential buildings up to 6 units and small commercial buildings • Recyclables must be placed in blue or black boxes or blue bags not exceeding 60 lbs each • Unlimited number of containers • Cardboard may be set out separately • Single stream collection • Set out between 7pm the day before and 7am on collection day • Sale of recycling boxes and carts at City Hall
Apartment & IC&I Recycling:	• Cart collection of single stream materials is available for apartment buildings with 7 or more units • Twice a week recycling is available to BIA properties • Outside BIA can use the curbside program • Must use carts between 70L and 360L capacity
Blue Box Processing:	• Sorting and baling of all materials collected through the curbside and apartment collection programs • Transportation and sale to end markets
Household Hazardous Waste (HHW):	• Residents may drop of HHW 4 times per month between April and November at the depot • No service charge • Monday to Friday from 8:00am to 4:30pm and on Saturdays to 12 noon
Leaf & Yard Waste Collection:	• Curbside collection once per week during April to May and September to November each year • Christmas tree collection once per year in January.
Drop Depot & Reuse Centre:	• Residents may drop off recyclables at no charge during landfill operating hours • Residents may obtain paint and related items from the Paint Reuse Centre at no charge during HHW Depot operating hours
Other Diversion Programs:	• Residents may drop off tires and electronics for free at drop off depot, for recycling, during operating hours • Residents may drop off wood waste and mattresses for a fee at drop off depot, for recycling, during operating hour • Public space recycling including special event recycling that can be arranged

Service	Service Level
Curbside Waste Collection:	• Once per week from 5 zones for residential buildings up to 6 units and small commercial buildings • Garbage must be placed in container or bag not exceeding 60 lbs each • Limit of 6 bags or 3 containers per week with amnesty days twice per year • Bulk waste must be delivered to the landfill site for a fee – not collected at curb
Apartment Waste Collection:	• Weekly cart collection of waste at apartment buildings with 7 or more units. • Limit of 1 – 360 L cart for every 2 units
Waste Disposal at Landfill Site:	• Residents and IC&I customers may drop off waste Monday to Friday from 7:30am to 4:30pm and on Saturdays to 12 noon. The tipping fee is $77 per tonne or a minimum fee of $10 per visit

3.1 Waste Collection

The City provides weekly curbside and apartment waste collection through a contracted service provider. Small non-residential properties on the curbside collection routes and businesses in the Business Improvement Areas (BIAs) also receive garbage collection. Generally there are restrictions on the waste materials that are collected as indicated in the by-law. These include items such as hazardous waste, construction materials, tires, bulky wastes and white goods. Table 3-2 summarizes the number of residential and IC&I stops in 2019 for waste collection and the blue box program.

Table 3-2: Number of Collection Stops (2020 Estimate)

Type of Property	No. of Stops
Residential & Multi Residential	14,465
IC&I and BIA	1,050
Total	**15,515**

3.2 Waste Disposal

Waste collected through the weekly waste collection program and waste delivered by the IC&I sector and directly by residents, is disposed at the existing landfill site. Approximately 27,741 tonnes of waste was disposed in 2018. This includes approximately 2,800 tonnes of Biosolids from the City's wastewater treatment plant. The Landfill also receives approximately 3,100 tonnes of Septage from private haulers. However, the Septage is discharged directly into the

Leachate collection system and conveyed to the WWTP for treatment. Table 3-3 summarizes the waste disposed annually based on 2018 information.

Table 3-3: Annual Waste Disposed (2018)

Waste Type	Quantity (Tonnes)
Residential	14,138
IC&I	13,603
Total	**27,741**

3.3 Recycling Services

Weekly collection of recyclable materials is provided to residents and the IC&I sector through the curbside or cart collection program as noted in Table 3-1. Acceptable materials include newspapers, cardboard (OCC), boxboard, fine paper, magazines, glass and cans, PET plastics, high density polyethylene containers and aluminum foil. The materials collected are transported to the Materials Recycling Facility (MRF) located at 2590 Cornwall Centre Road for sorting and baling for shipment to end markets. The City owns the MRF and some equipment (conveyors and baler) but the collection and processing functions are outsourced to a single service provider. The City retains 100% of the revenues from the sale of materials. The MRF also receives recyclable materials from neighbouring municipalities for processing and sale. The City charges a tipping fee for the service and shares a percentage of the sales with the municipalities. The MRF is in the process of being updated with completion expected by March 2020. However ongoing major maintenance of equipment particularly the baler will be required.

3.4 Other Waste Diversion Services

The City also provides a range of other waste diversion services as noted in Table 3-1. These include leaf and yard waste, backyard composting, electronics collections, white good recycling, tires recycling, wood waste recycling, HHW and paint reuse. Residents are required to deliver the materials to the drop off depot either for a fee or free of change depending on the materials. The quantity of materials diverted from disposal in 2018 is summarized in Table 3-4.

Table 3-4: Annual Waste Diverted (2018)

Material	Quantity Diverted
Leaves	1,661
Metal	34
Wood	705
Wood Chips (Residential)	55
Tires	329
Christmas Trees	10
Hazardous Waste	58
Electronic Waste	40
Collected & Depot Blue Box	3,040
Mattresses	102
Brewers Retail	255
Back Yard Composting	746
Grass cycling	28
Asphalt	1,529
Concrete	11,421
Commercial OCC	127
Total Diversion	**20,140**

4 Current Waste Management Costs & Revenues

4.1 Annual Operating Costs

The gross annual cost to deliver waste management services are presented in Table 4-1. These are based on the 2019 budget and include operating costs and capital related costs that are included annually as part of the operating budget. The total gross annual cost is $5,493,452 split almost equally between water diversion and waste disposal. Contracted services account for approximately 81% of the cost at $4,456,000. Financial costs such as insurance and corporate costs account for approximately 7% ($388,000), salaries and benefits 3% ($172,730) and transfers to capital 5.5% ($300,000). Note that there are no annual transfers to capital reserves. Instead the capital needs are funded annually on a ‘pay as you go’ basis. This results in fluctuating annual costs depending on the capital projects to be funded in a given year.

Table 4-1: Gross Annual Costs (2019 Budget)

Account Description	Waste Diversion	Waste Disposal	Total ($)	% of Gross Annual Cost
OPERATING COSTS				
Salary and Benefits				
Full-time Salary	$101,565	$33,855	$135,420	2.5%
Benefits	$27,983	$9,328	$37,310	0.7%
Salary and Benefits	*$129,548*	*$43,183*	*$172,730*	*3.1%*
Purchase of Goods				
Public Relations	$1,000	$1,000	$2,000	0.0%
Gravel	$0	$3,500	$3,500	0.1%
Building Materials	$0	$1,000	$1,000	0.0%
Stationery Supplies	$0	$2,000	$2,000	0.0%
Books, Magazines	$50	$50	$100	0.0%
Parts & Accessories	$0	$1,000	$1,000	0.0%
Tires/Repair	$200	$200	$400	0.0%
Janitorial Supplies	$0	$500	$500	0.0%
Equipment Supplies	$650	$5,950	$6,600	0.1%
Replacement Equipment	$0	$6,000	$6,000	0.1%
Equipment Parts	$500	$1,500	$2,000	0.0%
Uniforms, Clothing	$150	$150	$300	0.0%
Safety Supplies, Shoes, etc	$300	$300	$600	0.0%
Electricity	$0	$17,350	$17,350	0.3%
Propane	$0	$75	$75	0.0%
Purchase of Goods	*$2,850*	*$40,575*	*$43,425*	*1%*
Services & Rent				
Lease Agreements	$0	$600	$600	0.0%
City Equipment Rental	$10,841	$3,614	$14,454	0.3%
Training/Educational	$1,250	$1,250	$2,500	0.0%
Conferences	$250	$250	$500	0.0%
Accomm/Meals	$500	$500	$1,000	0.0%
Transportation	$250	$250	$500	0.0%
Telephone Lines	$1,278	$2,393	$3,670	0.1%
Cellular Phones	$498	$1,323	$1,820	0.0%
Subscriptions	$125	$125	$250	0.0%
Memberships	$850	$850	$1,700	0.0%
General Advertising	$7,500	$14,500	$22,000	0.4%
Other Services	$65,600	$0	$65,600	1.2%
Christmas Tree Collection	$7,000	$0	$7,000	0.1%
Translation Costs	$0	$1,000	$1,000	0.0%
Contracted Services	$2,455,900	$2,000,094	$4,455,994	81.1%
Grass Cutting	$0	$10,000	$10,000	0.2%
Outside Building Mtce	$0	$1,000	$1,000	0.0%
Services & Rent	*$2,551,841*	*$2,037,748*	*$4,589,588*	*84%*
Financial				
Taxes	$30,397	$25,240	$55,637	1.0%
Corporate Costs	$129,008	$125,973	$254,981	4.6%

Account Description	Waste Diversion	Waste Disposal	Total ($)	% of Gross Annual Cost
IT Hardware/Software Direct	$0	$10,000	$10,000	0.2%
Financial Costs	$0	$31,000	$31,000	0.6%
Insurance Premiums	$18,046	$18,046	$36,091	0.7%
Financial	*$177,451*	*$210,259*	*$387,709*	*7%*
GROSS OPERATING COSTS	***$2,861,689***	***$2,331,764***	***$5,193,452***	***95%***
CAPITAL RELATED COSTS				
Contribution to Reserves	$0	$0	$0	0.0%
Contribution to Capital	$10,000	$290,000	$300,000	5.5%
CAPITAL RELATED COSTS	***$10,000***	***$290,000***	***$300,000***	***5%***
GROSS ANNUAL COSTS	***$2,871,689***	***$2,621,764***	***$5,493,452***	***100%***

The contract costs of $4,456,000 are for the services listed in Table 4-2. Waste diversion accounts for 55% of the contracts and disposal 45% based on cost. The blue box program which includes collection processing and sale of materials is 48% the contract costs at $2,152,320. Waste collection and disposal at the landfill site together form 38% of the costs at $1,659,212.

The other contracts are for other waste diversion services and activities that support the landfill operations. These account for approximately 14% of the contract costs.

Table 4-2: Breakdown of Contract Costs (2019 Budget)

Contract	Waste Diversion	
	$	%
Waste Diversion		
Household Hazardous Waste	$67,980	2%
Blue Box Program	$2,152,320	48%
Leaf Diversion Program	$214,600	5%
Wood Waste Diversion Program	$21,000	0.5%
Total Diversion Contracts	$2,455,900	55%
Waste Disposal		
Landfill Site Monitoring	$102,146	2%
Landfill Security	$69,656	2%
Landfill Maintenance	$32,400	1%
Gas / Leachate Collection Old Site	$136,680	3%
Solid Waste Disposal	$737,378	17%
Curbside Collection	$921,834	21%
Total Disposal Contracts	$2,000,094	45%
Total Contracts	**4,455,994**	**100%**

4.2 Annual Revenues

The annual revenue is approximately $2,788,000. This includes revenue generated from operations and ongoing provincial funding as shown in Table 4-3. Landfill tipping fees account for approximately 58% of the annual revenue at $1,624,650. Revenue from the sale of blue box materials is approximately $338,500 which is 12% of annual revenue and depends on the market prices for the respective materials. Provincial funding in support of waste diversion accounts for 21% ($585,000) and varies according to the quantity materials recycled each year and other funding criteria. Approximately 8% ($236,000) of the annual revenue is from the sale of other materials such as scrap metal, mattresses, etc. The City also receives and processes recyclables from five (5) other municipalities. The revenue generated from the sale of these materials is included with the revenue from the sale of City's blue box materials. Going forward the costs and revenues associated with the materials from the other municipalities will be tracked and accounted for separately.

Table 4-3: Annual Revenues (2019 Budget)

Account Description	Waste Diversion	Waste Disposal	Total ($)	% of Annual Revenue
OPERATING REVENUE				
Other Ontario	$585,300	$0	$585,300	21.0%
Concessions	$1,700	$0	$1,700	0.1%
Recycled Materials	$338,500	$0	$338,500	12.1%
Tipping Fees	$0	$1,624,650	$1,624,650	58.3%
Recoveries	$235,573	$0	$235,573	8.4%
Admin Fees	$0	$1,500	$1,500	0.1%
Misc Other Revenue	$800	$0	$800	0.0%
Annual Revenue	**$1,161,873**	**$1,626,150**	**$2,788,023**	**100%**

4.3 Net Annual Costs

Table 4-4 summarizes the current annual costs. The net annual cost of waste management recovered from taxes based on the 2019 budget is approximately $2,705,400. This indicates that approximately half of the gross annual costs are offset by revenue from operations and grants. Approximately 63% ($1,710,000) of the net cost is for waste diversion and 37% ($996,000) is for waste disposal. The total net waste management cost represents approximately 3.7% of the tax levy (based on the 2029 tax levy of $73,797,487).

Table 4-4: Net Annual Costs Recovered from Taxes (2019 Budget)

Account Description	Waste Diversion		Waste Disposal		Total ($)
	$	%	$	%	
Gross Operating Cost	$2,861,689	55%	$2,331,764	45%	$5,193,452
Capital Related Cost	$10,000	3%	$290,000	97%	$300,000
Gross Annual Cost	$2,871,689	52%	$2,621,764	48%	$5,493,452
Annual Revenue	($1,161,873)	42%	($1,626,150)	58%	($2,788,023)
Net Operating Cost	**$1,709,816**	**63%**	**$995,614**	**37%**	**$2,705,429**

4.4 Historical Capital Expenditures

The capital expenditures related to waste management over the past 10 years are summarized in Table 4-5. Approximately $3,028,036 were spent on capital projects in the past 10 years; $587,000 for waste diversion; and $2,441,000 on waste disposal projects.

Table 4-5: Historical Capital Expenditures

Historical Capital Project	Expenditure
Waste Diversion	
Recycling Equipment	$192,412
Solid Waste Recycling Review Implementation	$392,463
Waste Management Diversion and Program Implementation	$2,035
Subtotal	$586,909
Waste Disposal	
Landfill Site-Gas Collection	$1,685,155
Landfill Site Reception Area	$371,290
Landfill Site-Leachate Improvement	$22,616
Landfill Expansion / Alternative Disposal ECA	$1,275
Landfill Site Public Service Area	$59,944
Flare Replacement	$56,015
Landfill Leachate-Gas Collection	$244,831
Subtotal	$2,441,126
Total	**$3,028,036**

5 Future Waste Management Costs

The current waste management costs reflect the current services levels and regulatory environment. However higher costs are expected in the future due to the impending closure of the landfill site by 2032. The cost of disposal would depend on the approach taken by the City to provide waste disposal capacity beyond 2032 and funding for closure and post closure care of the landfill site. There are also potential regulatory changes to waste diversion services in the future that would affect costs if implemented. Costs related to asset renewal and replacement also needs to be considered.

5.1 Factors Influencing Future Costs

There are many factors that would have an impact on the future cost of waste management services.

- *Regulatory Requirements*. Compliance with all regulatory requirements and conditions of facility licences must be maintained. This would include ensuring that any remediation work required as a result of routine inspections by the Ministry of Environment Conservation and Parks (MECP) is implemented as needed.
- *Customer Growth.* Management of additional waste generated by new customers due to growth. Collection cost is expected to increase as the number of homes increase.
- *New Waste Disposal Capacity*. The cost of new waste disposal capacity would depend on the option pursued by the City. These include extending the use of the existing landfill site, seeking a new City-owned landfill site and accessing available private sector waste disposal capacity through contract. Accordingly waste disposal costs are expected to increase significantly
- *Landfill Liability*. This relates to the closure and post closure care of the existing landfill site and ensuring that funding would be available to undertake these activities. This is currently an unfunded liability that represents a significant future cost.
- *Recycling Changes*. Discussions are underway at the Provincial level to potentially change the structure of the recycling program by transferring the responsibility for recycling to the producers of packaging. This is intended encourage the design and use of more recyclable packaging and phased in between 2023 and 2025. Similar transitions are also anticipated for Household Hazardous Waste (HHW) and electronics recycling between July 2020 and July 2021. The eventual role that municipalities will play in the transitioning is yet to be determined. It is anticipated that the use of some facilities may not be required by producers as the overall system is rationalized. However, there is the possibility that municipalities may offer their services and facilities to producers on a cost recovery basis through a bidding process. The change in responsibility is expected to lower or remove the cost to municipalities for recycling. However until the details are known it is difficult to estimate the extent to which costs would decrease.
- *Organics Collection*. The Food and Organic Waste Policy Statement, issued under section 11 of the RRCEA, 2016, requires the City to achieve 50% organics waste reduction in urban areas by 2025. The collection and processing costs of organics will be a major increase to the level of service and are expected to result in much higher annual costs
- *Recyclable Materials Market Price*. The recent decline in the market price for recyclable materials means lower revenue to offset costs. These low prices are expected to continue over the next few years.
- *Customer Expectations*. Climate change and environmental impacts are current issues that are important to customers. Although there is pressure to deliver more for less, there is a growing recognition and acceptance that more environmentally friendly programs are

needed. Customers have also become accustomed to the current level of service particularly regarding the convenience of the drop-off container station at the landfill site. This would mean continuation of this facility after closure.

- *Asset Renewal and Replacement*. The existing assets will require capital investments in the future to maintain their current functionality and level of service. These will form part of the overall capital program related to waste management.
- *Contract Services Market Pricing*. The cost of services delivered by contractors is expected to rise by the annual rate of inflation as a minimum as reported by Statistics Canada. The cost of construction is also expected to increase by the annual rate of capital inflation.

5.2 Future Cost Assumptions

The full cost of managing the City's solid waste system takes into account all factors that have a bearing on the level of effort and costs required to ensure reliable service to customers and environmental stewardship over the long-term. These include both current and future considerations that would influence the cost of managing the system. These factors would have different implications depending on the type of activity. For example asset life cycle replacement needs and costs can be significant for the landfill site and diversion facilities but not the collection service which are contracted services and operational costs.

For the purposes of this assessment it was assumed that the current levels of service would be maintained over the period 2020 to 2044 (Study Period) inclusive without any major changes to the services offered and the City's current and future obligations under the status quo would apply. However, high level assumptions and estimates are included to indicate the cost changes that may occur due to the shift in recycling responsibility from the City to packaging producers and implementation of an organics program in 2025. The main assumptions for the status quo are:

- Continuing the current recycling collection and processing and other diversion programs indefinitely at existing levels of service. This assumes that a Residential Drop-Off Station would remain at the existing landfill site beyond 2032 for the convenience of residents.
- Current waste collection to continue indefinitely.
- Waste disposal at the City's Landfill Site would end in 2032.
- Waste disposal beyond 2032 would be at a private facility. The City will be pursuing extended use of the existing landfill site. Because the outcome is uncertain at this time the default of disposal at a private facility through a service contract is considered in the analysis.
- Establishing a dedicated reserve fund to fully address the landfill liability related to closure and post closure care by the time of closure in 2032. This is based on the principle that the users of the landfill (beneficiaries) would pay for the funding. The liability calculation is

presented in the report: City of Cornwall, Landfill Closure and Post Closure Care Liability Report, November2019.

The main drivers of cost and the assumptions made in quantifying costs are included in Table 5-1.

Table 5-1: Future Cost Assumptions

Waste Management Service	Assumptions Regarding Future Costs
Waste Collection	• There would be no significant change in the level of service. i.e. current collection frequency etc. • The 2020 proposed Operating budget reflects these costs with the following future increases: - Annual inflationary increases of 2% - 15,515 stops in 2020 with annual increase in households of 0.5% to 0.8% based on DC Study growth projections • Waste collection costs after 2032 will increase by an additional 10% to cover the cost of direct haulage of curbside waste by collection trucks to a private landfill site.
Landfill Waste Disposal	• There would be no significant change in the level of service. • The 2020 proposed Operating Budget reflects operating costs with annual inflationary increases of 2% to the year of closure (2032) • The Drop-Off Container Station at the existing landfill site would continue to operate beyond 2032 for the convenience of residential customers only. The operating cost would be 2019 costs indexed to 2033 plus 10% for the additional haulage distance to a private landfill site • The Landfill Site would close at the end of 2032 • Disposal operating cost per tonne would increase in 2033 based on based on a disposal fee of $132 per tonne ($100 in 2019 dollars inflated to 2033) applied to residential waste only beginning in 2033 • Capital costs related to the landfill site would be as noted in Table 7-1 up to the time of closure based on capital inflation of 5%. • All capital to be funded from reserve with the exception of the new Landfill Gas System to be built in 2020 at a cost of approximately $1.674 million. This will be debt financed over 15 years at 3% interest. • The landfill closure and post closure care estimated at $36,814,551 as of January 1, 2033 dollars based on a 50-year post closure period. • Annual contributions of $2,458,096 between 2020 and 2032 inclusive into dedicated landfill site closure and post closure care reserve fund • Annual contributions will be made to a disposal capital reserve in amounts sufficient to maintain sustainable funding of projects and account for unforeseen costs • Target reserve balance would be between 5% and 10% of current year asset replacement value • No annual contributions to an operating reserve. This will be at the corporate level. • Reserves would earn interest at 2.4% • 2019 waste disposal of 27,787 tonnes (14,184 residential; 13,603 IC&I) to

Waste Management Service	Assumptions Regarding Future Costs
	increase annually by 0.2%
Blue Box Recycling	• The current level of service would continue i.e. collection frequency, materials collected, etc. • The City would continue to be responsible for recycling indefinitely • The 2019 materials capture rate would apply over the period • 2020 budget is reflective of operating costs inflated at 2% per year over the period and revenues at 1%. Revenue from other municipalities would be $301/ tonne starting in 2020 increasing annually by the tonnage and cost per tonne each year. • Blue box curbside collection would increase by 2% inflation and the increase in the number of stops in the year • Recycling processing costs would increase by 2% inflation • Revenue would be based on sales of 5,200 tonnes at $55 per tonne • Capital costs would be as noted in Table 6-1, and funded from reserves • Annual contributions will be made to capital reserve in amounts sufficient to maintain sustainable funding of projects and account for unforeseen costs • Target reserve balance would be between 5% and 10% of current year asset replacement value • No annual contributions to an operating reserve. This will be at the corporate level • Reserves would earn interest at 2.4%
Other Waste Diversion	• The current level of service would continue • The 2019 materials capture rate would apply over the period • 2020 budget is reflective of operating costs and revenues inflated at 2% per year over the period. • Capital costs would be as noted in Table 6-1, and funded from reserves • Annual contributions will be made to capital reserve in amounts
Administration	• Administration costs would be based on 2019 budget inflated at 2% annually. • Cost would be allocated to Diversion and Disposal on a 50/50 basis

5.3 Data Sources

The primary sources of data used to prepare the cost of service are listed in Table 5-2. In addition, information was also developed from discussions with and input from the City's staff, as required.

Table 5-2: Cost of Service Study - Data Sources

Item	Data Source
O&M and Capital Costs	• City's 2019 & 2020 Budget • City's 2020- 2029 Capital Budget Forecast
Non-Rate Revenues	• City's 2019 & 2020 Operating Budgets
Asset Life Expectancy	• The City's PSAB 3150 Asset Registry
Asset Replacement Costs	• The City's 2016 Asset Management Plan • The City's PSAB 3150 Asset Registry • City's 2019 Capital Budget and 10-Year Capital Forecast
Customer Growth	• City's Development Charges Study
Non-Rate Revenues	• City's 2019 & 2020 Operating Budgets
Capital Financing	• City's financing policy including reserve policy • Industry best practices
Waste Diversion Quantities	• City's 2018 Historical Records
Waste Diversion Quantities	• City's 2018 Historical Records

5.4 Guiding Principles

The guiding principles used to develop the full cost of waste management services are noted below.

1. **Existing Levels of Service**. The current levels of service would continue indefinitely
2. **Landfill Liability Fairness & Equity**. The funding to offset this liability would be recovered from existing users of the landfill site before it closes in 2032
3. **Full Cost of Service.** Ensuring that all costs including asset life cycle costs are accounted for over the long-term (2020-2044 inclusive) to obtain the full cost of service.
4. **Capital Financing**. All capital projects will be funded through the respective waste diversion and waste disposal reserves. Debt will only be used to finance the new landfill gas control system.
5. **Transparency**. Cost of service calculations and assumptions must be transparent and easily explained.

6 Full Cost of Service – Waste Diversion

6.1 Waste Diversion Capital Costs

The waste diversion capital budget requirements over the study period are presented in Appendix A. This reflects the projects identified in the City's 10-year Capital Budget Forecast in conjunction with the replacement of existing diversion assets based on the asset inventory and life expectancies and age. The information provided in the 2016 Asset Management Plan was also considered. It should be noted that some of the projects identified in the 10-year Capital Budget Forecast include asset replacement. Therefore these projects were rationalized with the projected asset replacement needs to ensure that there was no duplication in the projections.

Table 6-1 shows the total requirements over the 25-year period by project. The total projected capital requirement is estimated to be $2,102,000. On average this is approximately $84,000 which is approximately 42% higher than the City's average annual gross expenditures over the past 10 years of approximately $59,000 on waste diversion projects.

Table 6-1: Waste Diversion Capital Needs (2020-2044)

Capital Project	2020-2044
City's Capital Program	
Diversion Facilities Equipment and Building Upgrades	$537,034
Inbound Scale Replacement	$31,500
Subtotal	$568,534
Asset Management Needs	
Weigh Scales & Building	$153,154
Recycling Facility	$1,290,709
Special Waste Depot (HHW)	$89,793
Subtotal	$1,533,656
Total	$2,102,189

Capital financing will be entirely through the capital reserve. Other sources of financing such as provincial and/ or federal grants are unpredictable and are therefore not considered over the long-term. However the City is encouraged to aggressively pursue these funding opportunities as they become available to reduce the overall amount to be funded from taxes and the Waste Diversion Capital Reserve.

6.2 Waste Diversion Capital Reserve Requirements

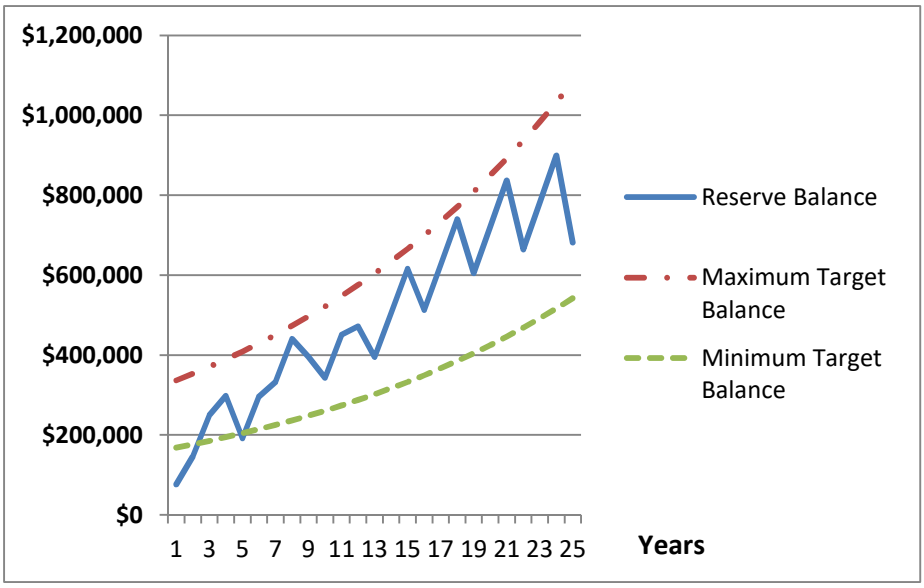
Capital projects are currently funded each year as needed. This method of capital funding results in fluctuations to the amounts required to be funded from taxes each year. Establishing a Waste Diversion Capital Reserve as the funding source for capital projects would facilitate stable annual contributions and provide sufficient funding for all future projects and emergency situations over time. Appendix A shows the projected continuity schedules for the reserve. This shows the transfers to and from the reserve and the opening and closing balances. The reserve is assumed to earn annual interest of 2.4% on balances. Typically an Operating Reserve would also be established to stabilize annual funding requirements from taxes. However in the City's case this is provided at a corporate level so a separate reserve is not required.

Waste Diversion Capital Reserve

The Waste Diversion Capital Reserve, with an opening balance of approximately $18,160 at the beginning of 2020, will be the main source of financing for future projects. This requires that annual contributions be made to the reserve to ensure that sufficient funds are available over the long-term for all projects including asset replacement/ rehabilitation requirements. These annual contributions (to be raised through the operations budget each year) are projected to be $87,833 in 2020 and $100,000 annually from 2021 to 2044.

The reserve closing balance is targeted to be a minimum of 5% and maximum of 10% of the asset replacement value adjusted for capital inflation each year over the study period. The annual reserve balance is projected to be $76,000 at the close of 2020 increasing to approximately $682,000 by 2044.

Figure 6-1: Waste Diversion Reserve (2020-2044)



6.3 Debt Related Costs

There is no existing debt related to the City's waste diversion system. Under the City's current financial policy debt financing would only be considered for projects greater than $2.5 million for assets with a life expectancy of at least 20 years. This need is not projected to arise within the study period but may apply closer to 2060 when replacement of the MRF is estimated to be required. Therefore there is no debt financing projected for the period 2020 to 2044.

6.4 Annual Cost of Service

The annual cost of service for waste diversion is presented in Appendix B. This shows the projected gross cost of service in each year over the period 2020 to 2044 the projected operating revenues and the resulting net cost. It also shows the estimated unit costs per capita, per household and per tonne. Table 6-2 shows the same information for 2019, 2020 and 2021.

The gross cost is projected to increase by approximately $525,000 in 2020 from $2,871,689 in 2019 to $3,447,256 in 2020. However the operating revenue is also projected to increase due mainly to the service charges to the other municipalities. This would result in a reduction in the net 2020 costs by approximately 3.2% compared to 2019. This translates into a net cost of approximately $82 per tonne of waste diverted in 2020. However, the revenue from the sale of recyclables is projected to be lower based on the recent decline in market prices. The gross cost to process recyclable materials at the MRF is estimated to be $301 per tonne.

Beginning in 2021 the net costs are expected to increase with a 2021 increase of approximately 4.7% and annually thereafter by approximately 3% to 4% over the 25-year period.

Table 6-3 shows the allocation of the 2020 costs to the City's residential and IC&I sectors and the other municipalities that receive recycling processing and marketing services from the City. It is also noted that the 2020 transfer to the capital reserve accounts for approximately 3% of the annual budget.

Table 6-2: Cost of Service – Waste Diversion (2019 – 2021)

Cost Description	2019	2020	2021
Operating Costs			
Household Hazardous Waste	$71,015	$102,766	$104,821
Blue Box Program - Curbside Collection (Based on Stops)	$921,834	$961,402	$987,682
Blue Box Program - Processing (Other Municipalities)	$705,872	$721,046	$742,822
Blue Box Program - Processing (City Materials)	$524,614	$783,954	$799,633
Blue Box Program - Revenue Sharing (Other Municipalities	$0	$111,202	$113,426
Blue Box Program - Other Costs	$171,849	$200,822	$204,838
Leaf Diversion Program	$214,600	$208,734	$214,534
Wood Waste Diversion Program	$21,000	$21,500	$21,930
Administration	$230,905	$247,997	$252,957
Gross Operating Costs	**$2,861,689**	**$3,359,423**	**$3,442,643**
Capital Related Costs			
Transfers to Capital Reserve	$10,000	$87,833	$100,000
Debt Servicing	$0	$0	$0
Gross Capital Related Costs	**$10,000**	**$87,833**	**$100,000**
COST OF SERVICE (GROSS)	**$2,871,689**	**$3,447,256**	**$3,542,643**
Program Revenues			
Household Hazardous Waste Program Revenues	$32,600	$16,500	$16,665
Blue Box Program Revenues - Ontario Grant (Collection)	$284,150	$286,349	$289,212
Blue Box Program Revenues - Ontario Grant (Processing)	$284,150	$286,349	$289,212
Blue Box Program Revenues - Other Municipalities	$0	$777,311	$785,084
Blue Box Program Revenues - Blue Box Materials Sales	$338,500	$286,022	$288,506
Blue Box Program Revenues - Other	$171,873	$87,800	$88,678
Leaf Diversion Program Revenues	$4,000	$4,000	$4,040
Wood Waste Diversion Program Revenues	$46,600	$47,300	$47,773
Total Program Revenues	**$1,161,873**	**$1,791,631**	**$1,809,171**
COST OF SERVICE (NET) TO BE RECOVERED	**$1,709,816**	**$1,655,625**	**$1,733,472**
Annual Percent Change		**-3.2%**	**4.7%**
Cost per Capita			
Gross Cost per Capita	$59	$71	$73
Revenue per Capita	$24	$37	$37
Net Cost per Capita	$35	$34	$36
Cost per Household			
Gross Cost per Household	$135	$160	$164
Revenue per Household	$54	$83	$84
Net Cost per Household	$80	$77	$80
Cost per Tonne of Total Waste Diverted			
Gross Cost per Tonne Diverted	$142	$171	$175
Revenue per Tonne Diverted	$58	$89	$90
Net Cost per Tonne Diverted	$85	$82	$86
Gross Cost per Tonne to Process Blue Box Materials			
Tonne Delivered to MRF	4,860	5,778	5,828
Processing Cost (including Capital Related)	$1,379,029	$1,741,631	$1,794,229
Gross Cost per Tonne for Blue Box Materials Processing	$284	$301	$308

Table 6-3: Allocation of Diversion Cost by Sector (2020)

Cost Description	Residential Sector		IC&I Sector		Other Municipal		2020 Cost	
	$	%	$	%	$	%	$	% of Total Cost
Gross Operating Costs	$2,232,542	66%	$276,777	8%	$850,104	25%	$3,359,423	97%
Gross Capital Related Costs	$52,611	60%	$1,074	1%	$34,148	39%	$87,833	3%
COST OF SERVICE (GROSS)	$2,285,153	66%	$277,851	8%	$884,252	26%	$3,447,256	100%
Total Program Revenues	$826,662	46%	$76,456	4%	$888,513	50%	$1,791,631	
COST OF SERVICE (NET) TO BE RECOVERED	$1,458,491	88%	$201,394	12%	($4,261)	0%	$1,655,625	

The residential sector accounts for approximately 66% of the gross cost but 46% of the revenue; the IC&I sector 8% of the gross cost and 4% of the revenue; and the other municipalities 26% of the gross costs and 50% of the revenue. This is because the majority of the costs and revenues are related to recycling. The cost incurred due to the processing services provided by the City to the other municipalities is offset by the revenue. Therefore the residential sector accounts for 88% of the net cost and the IC&C sector 8%.

6.5 Other Scenarios Affecting Diversion Costs

The cost of service for waste diversion assumes that the City would continue the current services without the addition of new services or changes to the existing service levels. There are two (2) scenarios that would affect the cost of service for which high level cost analyses were completed:

- Scenario 1- Transition to Packaging Producer Responsibility for Waste Diversion by 2025
- Scenario 2 - Implementing an organics program by 2025 in accordance with the Food and Organic Waste Policy Statement 4.2(ii)

Scenario 1- Transition to Packaging Producer Responsibility for Waste Diversion by 2025

The role that municipalities and specifically the City might have under the new structure has not yet been determined. Although the City may choose to be a service provider to the packaging producers on a cost recovery basis, for the purpose of this study, the following assumptions were made:

- packaging producers will be fully responsible for recycling by the end of 2025 and the HHW programs by the end of 2021
- packaging producers will be directly responsible for all costs and receive all revenues from the sale of recyclable materials following transfer
- if the City decides to divest from blue box recycling and HHW then there would be no requirement for capital investments in the MRF or HHW facilities beyond 2025 and 2021 respectively

The estimated changes to the cost of service projections presented in Section 6.4 are noted below.

- The capital requirements would be approximately $333,000 between 2020 and 2025 with no requirements beyond that period. This is significantly lower than the projected amount of $2,102,000 from 2020 to 2044.
- The capital reserve contributions of $100,000 would not be required from 2026 onward. The reserve balance at the end of 2025 would be approximately $302,000. This would be available for the City's use for other diversion programs such as organics collection or facility upgrades should the City have a role with the packaging producers to process recyclable materials.
- In 2022 the gross operating cost would be lower than projected by approximately$21,000 t to the transfer of the HHW program. The revenue would also be lower by approximately $16,000. The resulting net cost $1,711,000 would be a 1.3% decrease compared to 2021 net cost.
- In 2026 the gross operating cost would be lower than projected by approximately$3,108,000 due to the transfer of recycling. The revenue would also be lower by approximately $1,774,000. The resulting net cost of approximately $774,000 would be a 67% decrease compared to 2025 net cost.
- Annual increases in the net cost related to other diversion programs such as mattress recycling etc. would be in the 2.3% range after 2026.

Scenario 2- Implementing an Organics Program by 2025

The assumptions for this scenario are listed below.

- The City would implement an organics collection and processing program in 2025 for residential properties only.
- Green bins would be provided to residents free of charge to encourage participation. The 2019 cost is estimated at $42 per bin.
- 40% of the residential waste disposed would be diverted through the organics program
- The cost of collection and processing in 2025 would be approximately $66 per stop and $135 per tonne respectively

The estimated changes to the cost of service projections presented in Section 6.4 are noted below.

- The capital requirements would increase by approximately $800,000 for the purchase of green bins in 2026.
- The capital reserve contributions would increase from $100,000 to $260,000 for the period 2021 to 2025 so that sufficient funds are available from the reserve to purchase the bins.
- In 2025 the gross operating cost would increase by approximately $1,773,000 compared to the current projections. There would be no additional revenue generated by the organics program. The resulting net cost of $3,943,000 would be an increase of 88% compared to 2024 net cost.
- Annual increases in the net cost would be in the 2.7% range after 2025.

7 Full Cost of Service – Waste Disposal

7.1 Waste Disposal Capital Costs

The waste disposal capital budget requirements until site closure in 2032 are presented in Appendix C. This reflects the projects identified in the City's 10-year Capital Budget Forecast in conjunction with the replacement of existing disposal assets based on the asset inventory and life expectancies and age. The information provided in the 2016 Asset management Plan was also considered. It should be noted that some of the projects identified in the 10-year Capital Budget Forecast include asset replacement. Therefore these projects were rationalized with the projected asset replacement needs to ensure that there was no duplication in the projections. The capital needs beyond 2032 for assets such as the landfill gas and Leachate collection systems are included in the annual requirements to fund closure and post closure care costs. These projects are noted in the report: *City of Cornwall Landfill Site Closure & Post Closure Care Liability Report, December 2019*.

Table 7-1 shows the total requirements to closure. The total projected capital requirement is estimated to be $5,836,365 million. The annual average cost of$449,000 over the next 13 years is 80% higher than the 10-year historical average capital expenditures of $244,000.

Table 7-1: Waste Disposal Capital Needs to Closure (2020-2032)

Capital Project	2020-2032
City's Capital Program	
Landfill Leachate and Gas Collection Systems Upgrades	$1,752,122
Landfill Site - Service Area Infrastructure Upgrades	$402,212
Landfill Expansion / Alternative Disposal ECA	$1,286,669
New Landfill Gas Control System	$1,674,000
Flare Decommissioning	$90,000
Maintenance Building Repairs	$88,200
Landfill Site Paving Project	$85,575
Inbound Scale Replacement	$77,175
Subtotal	$5,455,953
Asset Management Needs	
Weigh Scales & Building	$282,100
Yard Improvements	$88,913
Storage Containers	$9,352
Subtotal	$380,365
Total	$5,836,318

Capital financing will be through the capital reserve. However, the New Landfill Gas Control System estimated at $1,674,000 will be financed through debt. The term is assumed to be 15 years at 3% interest for the purpose of this study. Other sources of financing such as provincial and/ or federal grants are unpredictable and are therefore not considered over the long-term. However the City is encouraged to aggressively pursue these funding opportunities as they become available to reduce the overall amount to be funded from the taxes and Waste Disposal Capital Reserve. Financing for closure and post closure care will be from the Landfill Closure and Post Closure Care Reserve Fund.

7.2 Waste Disposal Capital Reserve Requirements

Two (2) waste disposal reserves are required:

- Waste Disposal Capital Reserve
- Landfill Closure and Post Closure Capital Reserve Fund

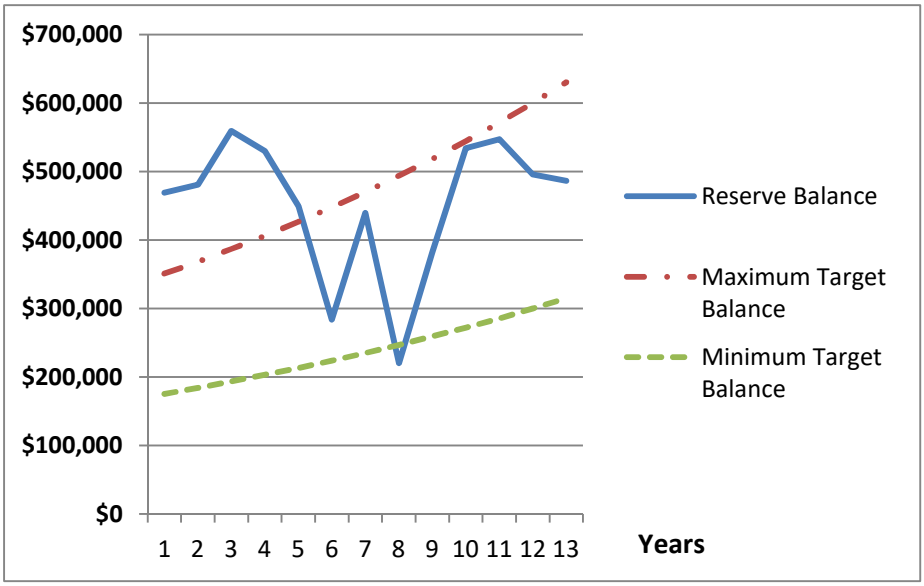
Capital projects are currently funded each year as needed. This method of capital funding results in fluctuations to the amounts required to be funded from taxes each year. Establishing a Waste Disposal Capital Reserve as the funding source for capital projects would facilitate stable annual contributions and provide sufficient funding for all future projects and emergency situations over time. Appendix C shows the projected continuity schedule for the reserve. This shows the transfers to and from the reserve and the opening and closing balances. The reserve is assumed to earn annual interest of 2.4% on balances.

Typically an Operating Reserve would also be established to stabilize annual funding requirements from taxes. However in the City's case this is provided at a corporate level so a separate reserve is not required.

Waste Disposal Capital Reserve

The Waste Disposal Capital Reserve, with an opening balance of approximately $469,270 at the beginning of 2020, will be the main source of financing for future projects. This requires that annual contributions be made to the reserve to ensure that sufficient funds are available over the long-term for all projects including asset replacement/ rehabilitation requirements. These annual contributions (to be raised through the operations budget each year) are projected to be $270,000 in 2020 and $420,000 annually from 2021 to 2029. It is recommended that the reserve needs be re-assessed in 2029 to ensure that it reflects the capital needs of the City's preferred strategy for new disposal capacity e.g. extension of the existing landfill site or seeking a green field site. The reserve closing balance is targeted to be a minimum of 5% and maximum of 10% of the asset replacement value adjusted for capital inflation each year over the study period. The annual reserve balance is projected to be $470,000 at the end of 2020 and approximately $486,000 by 2032 when the landfill site closes

Figure 7-1: Waste Disposal Reserve (2020-2032)



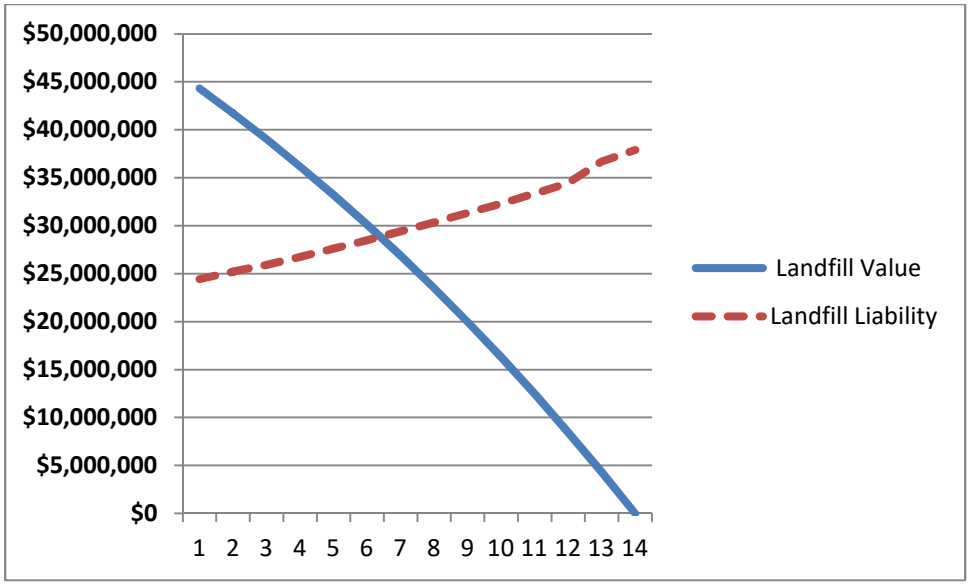
Landfill Closure and Post Closure Care Reserve Fund

There is an unfunded liability related to landfill closure and post closure care. This is estimated to be $25,205,195 at the beginning of 2020 increasing to $37,881,362 by the time of landfill site closure in 2032 as shown in Figure 7-2. The new Landfill Closure and Post Closure Care Reserve Fund is intended to be a restricted reserve for the sole purpose of funding projects and costs related to closure and post closure activities and reduce the liability. This is a new reserve with a 2020 opening balance of zero and a 2032 target balance equivalent to the estimated 2032 liability of $37,881, 362. The annual contributions are estimated to be approximately $2,458,000 from 2020 to 2032 inclusive. This amount is equivalent to a 3.3% increase in the 2019 tax levy. The annual contributions and the interest earned on the annual balances are projected to generate sufficient funding by the start of 2033 to pay for all closure and post closure care work over a 50-year post closure period from 2033. The intent is to fully fund the reserve by the time of landfill closure for fairness and equity purposes. The users of the landfill should pay for its post closure costs. When the landfill closes the opportunity to recover this cost from tipping fee revenues will no longer exist. However, this is a significant cost that the City may wish to recover through other means including property taxes. If lower annual reserve contributions are made prior to landfill closure then the reserve balance at the start of 2033 will not be sufficient to cover all closure and post closure costs as discussed under Section 7.5. The financial assurance required to address closure and post closure care obligations is expected to be a condition of approval should the City decide to extend the use of the existing landfill site or pursue a new landfill site.

The 2020 value of the remaining capacity at the landfill site is estimated to be approximately $41,720,000. This is a high level estimate that is based on the remaining capacity of approximately 409,000 tonnes and an estimated 2020 market tipping fee of $102 per tonne which may not include all costs associated with closure and post closure care. However, as

noted in Figure 7-2 this is a diminishing asset that would decline to zero at closure in 2032 when the benefits of disposal space and tipping fees would be no longer available.

Figure 7-2: Landfill Value & Liability (2020-2032)



7.3 Debt Related Costs

There is no existing debt related to the City's waste disposal system. However the City has decided to use debt financing for the New Landfill Gas Control System. Based on a 15-year term at 3% the annual debt repayment amount is estimated to be $140,225 including principal and interest from 2021 to 2035. This amount is required from the annual operating budget between 2021 and 2032. The last three (3) years from 2033 to 2035 are covered by the Landfill Closure and Post Closure Care Reserve Fund

7.4 Annual Cost of Service

The annual cost of service for waste disposal is presented in Appendix D. This shows the projected gross cost of service in each year over the period 2020 to 2044 the projected operating revenues and the resulting net cost. It also shows the estimated unit costs per capita, per household for waste collection and the gross and net cost per tonne for disposal (excluding collection). Table 7-2 shows the same information for 2019, 2020 and 2021.

The gross cost is projected to increase to approximately $5,157,250 in 2020 from $2,618,300 in 2019. This is a 269% increase in the net cost of service is due to adding the Landfill Closure and Post Closure Care Reserve transfer of $2,458,000 starting in 2020. This translates into a gross cost of approximately $151 per tonne of waste disposed in 2020 and a net cost of $97 per

tonne based on the projected 2020 annual tonnage of 27,832 (i.e. both residential and IC&I waste). The breakdown of the $151 per tonne is shown in Table 7-2. Operations account for $53 per tonne; capital related costs $10 per tonne; and landfill closure and post closure care $88 per tonne. This clearly indicates that the current tipping fee of $77 per tonne is not sufficient to recover the full cost of disposing waste at the landfill site. The gross waste collection cost is estimated to be $20 per capita or $45 per household.

In 2021 the net costs are expected to increase by approximately 8.6% due mainly to the increase in the Waste Disposal Capital Reserve transfer to $420,000 from $270,000 and inflationary increases for other cost items. Between 2022 and 2029 the net annual costs are projected to increase by approximately 0.6% to 0.7%. In 2030 net cost are projected to decrease by 9.4% due to the suspension of capital reserve transfers because the reserve balance would be sufficient to cover any remaining capital works prior to closure. Following landfill closure the annual net cost is expected to increase by approximately 2% for the remainder of the 25-year period. This is due to the following cost changes projected to occur in 2033 as noted in Appendix D:

- The Landfill Closure and Post Closure Care reserve contributions would cease because the reserve would be fully funded, resulting in a significant decrease to the annual costs in 2033.
- Landfill tipping fee revenue obtained from the IC&I sector would cease due to closure of the landfill site.
- The cost of disposing residential waste only at a private site would increase.
- The cost of maintaining a drop-off station for residential waste only would continue.
- The cost of waste collection would increase due to the additional cost of direct haul to the private landfill site.

The net result of the above cost changes is the 2% per year increase on net annual cost between 2033 and 2044.

Table 7-2: Cost of Service – Waste Disposal (2019 – 2021)

Cost Description	2019	2020	2021
Operating Costs			
Landfill Site Monitoring	$102,146	$108,356	$110,523
Landfill Security	$70,156	$71,539	$72,970
Landfill Maintenance	$33,900	$34,500	$35,190
Gas/Leachate Collection	$167,845	$172,129	$175,572
Solid Waste Disposal - Until 2032	$761,378	$819,375	$835,763
Solid Waste Disposal - After 2032 (Res. Waste Only)	$0	$0	$0
Stand Alone Drop-Off Station (Res. Waste Only)	$0	$0	$0
Solid Waste Management	$43,600	$13,800	$14,076
Curbside Waste Collection	$918,383	$961,458	$987,682
Administration	$230,905	$247,997	$252,957
Transfers to Operating Reserve	$0	$0	$0
Gross Operating Costs	**$2,328,313**	**$2,429,154**	**$2,484,732**
Capital Related Costs			
Transfers to Capital Reserve	$290,000	$270,000	$420,000
Transfers to Capital Life Cycle Reserve	$0	$0	$0
Debt Servicing	$0	$0	$140,225
Gross Capital Related Costs	**$290,000**	**$270,000**	**$560,225**
Landfil Closure & Post Closure Care Costs			
Transfers to Landfill Closure & Post Closure Care Reserve	$0	$2,458,096	$2,458,096
	$0	$0	$0
Gross Landfill Post Closure Care Costs	**$0**	**$2,458,096**	**$2,458,096**
COST OF SERVICE (GROSS)	**$2,618,313**	**$5,157,249**	**$5,503,053**
Program Revenues			
Landfill Site Monitoring	$0	$0	$0
Landfill Security	$0	$0	$0
Landfill Maintenance	$0	$0	$0
Gas/Leachate Collection	$0	$0	$0
Solid Waste Disposal	$1,500	$4,000	$4,080
Solid Waste Management (Tipping Fees)	$1,624,650	$1,490,750	$1,520,565
Curbside Waste Collection	$0	$0	$0
Administration	$0	$0	$0
Total Program Revenues	**$1,626,150**	**$1,494,750**	**$1,524,645**
COST OF SERVICE (NET) TO BE RECOVERED	**$992,163**	**$3,662,499**	**$3,978,408**
Annual Percent Change		**269.1%**	**8.6%**
Gross Collection Cost per Capita			
Gross Collection Cost per Capita	$19	$20	$20
Gross Collection Cost per Household			
Gross Collection Cost per Household	$43	$45	$46
Disposal Cost per Tonne (excluding Waste Collection)			
Gross Cost per Tonne of Total Waste Disposed			
Operations	$51	$53	$54
Capital Related	$10	$10	$20
Subtotal - Gross Cost per Tonne Operations & Capital	$61	$62	$74
Closure & Post Closure Care	$0	$88	$88
Total Gross Cost per Tonne	$61	$151	$162
Revenue per Tonne Disposed Based on Current Tipping Fee	$59	$54	$55
Net Cost per Tonne	$3	$97	$107

Table 7-3 shows the allocation of the 2020 costs to the City's residential and IC&I sectors. In 2020 the transfer to the capital reserve accounts for approximately 5% of the annual budget and the transfer to the Landfill Closure and Post Closure Care Reserve Fund 48%.

Table 7-3: Allocation of Disposal Cost by Sector (2020)

Cost Description	Residential Sector		IC&I Sector		2020 Total Cost	
	$	%	$	%	$	% of Total Cost
Gross Operating Costs	$1,624,093	66.9%	$805,061	33.1%	$2,429,154	47%
Gross Capital Related Costs	$138,034	51%	$131,966	49%	$270,000	5%
Gross Landfill Post Closure Care Costs	$1,256,667	51%	$1,201,429	49%	$2,458,096	48%
COST OF SERVICE (GROSS)	$3,018,793	59%	$2,138,456	41%	$5,157,249	100%
Total Program Revenues	$83,873	6%	$1,410,877	94%	$1,494,750	
COST OF SERVICE (NET) TO BE RECOVERED	$2,934,921	80%	$727,579	20%	$3,662,499	

The residential sector accounts for approximately 60% of the gross cost but only 6% of the revenue and the IC&I sector 41% of the gross cost and 96% of the revenue. This suggest that the tipping fee revenue received from the IC&I sector is subsidizing the residential sector which does not pay direct tipping fees. Accordingly 80% of the net cost is allocated to the residential sector and 20% to the IC&I sector.

To be fair the residential sector should be responsible for 59% of the revenue to match its share of the gross cost of service but only generates 6% of the revenue. This difference means that the IC&I sector is subsidizing the residential sector by approximately $792,000 because only the IC&I sector pays the tipping fees.

7.5 Other Scenarios Affecting Disposal Costs

The cost of service for waste disposal assumes that the Landfill Closure and Post Closure Care Reserve Fund would be fully funded by 2032. There are two (2) scenarios that would affect the annual contributions:

- Scenario 1- Lower contributions to the Reserve Fund due to affordability
- Scenario 2 – Approval is obtained to extend the use of the existing landfill site for 15years

Scenario 1- Lower Contributions to the Reserve Fund

Lower, more affordable annual contributions would be made to the Reserve Fund under this scenario. The main assumptions are noted below.

- The landfill site would close in 2032 as projected.
- The 2020 contribution would be $250,000 increasing by $250,000 each year thereafter to a maximum contribution of $2,500,000. The increase of $250,000 is equivalent to approximately 0.3% increase in the tax levy (2019)

The estimated changes to the cost of service projections presented in Section 7.4 are noted below.

- The reserve balance at the start of 2033 is estimated to be approximately $24,127,000 i.e. approximately $12,688,000 short of the 2033 target of 36,814,551
- The reserve balance would be approximately $36,733,000 by the beginning of 2037 i.e. almost equal to the target amount.
- Annual contributions of approximately $2,500,000 would be required after closure until 2036. During this period there would be no opportunity to recover the cost from the landfill tipping fees.

Scenario 1- Extended Use of the Existing Landfill Site by 15 years

The main assumptions for this scenario are noted below.

- The landfill site would close in 2047 instead of 2032 as projected.
- Closure and post closure care work would be deferred to 2048 and beyond for a 50-year period.

The estimated changes to the cost of service projections presented in Section 7.4 are noted below.

- The target reserve balance at the beginning of 2048 would be approximately $58,950,000 to fully fund closure and post closure work. This would require annual contributions of approximately $1,466,000 beginning in 2020 until site closure in 2047.
- The annual cost of landfill operations of approximately $1,039,000 for 2032 would continue for a further 15 years with annual increases for inflation and customer growth
- Waste disposal at a private landfill site beginning in 2033 at an estimated cost of $1,955,000 would not be required until 2048
- The additional cost of collection for haulage to the private landfill site estimated at $145,000 in 2033 would not be incurred
- The need for a stand-alone drop off container station at an estimated 2033 cost of $176,500 would not be required until 2048.

It should be noted that the additional cost to acquire the approval of the extended use of the landfill site to 2047 was not estimated as part of this study due to the uncertainty of the cost drivers and values. However this cost is estimated to be significant.

8 Conclusions and Recommendations

8.1 Conclusions

Based on the information reviewed and analyses completed, the following are the main conclusions regarding the *waste diversion system costs*:

1. The gross cost of waste diversion is projected to be approximately $3,447,300 in 2020 and funded through a combination of operating revenue (including grants) and taxes. The operating revenue is projected to offset approximately 52% of the gross annual cost based on 2020 estimates. The remaining 48% i.e. the net operating cost of approximately $1,656,000 would require funding from taxes.
2. The net operating cost is projected to increase by approximately 4.7% in 2020 and by 3% - 4% over the remainder of the 25-year period.
3. The capital investment required over the next 25 years is approximately $2,102,000. On average this is 40% more than the historical annual average expenditure of $59,000 over the past 10 years
4. There is no existing or future debt to be incurred for waste diversion capital projects.
5. There is the requirement for a Waste Diversion Capital Reserve to fully fund the capital requirements of $2,102,000 over the next 25 years. Annual contributions of $ 87,333 in 2020 and $100,000 in 2021 and beyond.
6. The costs related to processing and marketing the recyclable materials from other municipalities would be fully offset by the charges to the respective municipalities.
7. The net cost for waste diversion is allocated to 88% to the residential sector and 12% to the IC&I sector.
8. The estimated gross cost per tonne of waste diverted is $171 for 2020. The net cost per tonne is estimated to be $82.
9. The transfer of responsibility for waste diversion to the packaging producers would result in a reduction in the gross annual cost of waste diversion by approximately $3,108,000 starting in 2026 and result in a net cost of approximately $774,000 in 2026. This is premised on the City transferring full control and cost of service to the producers or providing waste diversion services to the producers on a full cost recovery basis.
10. The introduction of an organics program by the City to achieve the Food and Organic Waste Policy 4.2(ii) objectives of 50% organics diversion by 2025 will require investment in green bins for the program at a capital cost of approximately $800,000 in 2025. This will require an additional $160,000 per year in contributions to the capital reserve staring in 2021. The annual operating cost will also increase due to the added cost to collect and process organics. This is estimated to be approximately $1,773,000 in 2025.

Based on the information reviewed and analyses completed, the following are the main conclusions regarding the ***waste disposal system costs***:

11. The current waste disposal system cost does not include the full cost of service. The City's liability for closure and post closure care of the landfill site is currently unfunded and not considered in the annual costs. This cost is estimated to be approximately $2,458,000 per year for the period 2020 to 2032 at which time the liability will be fully funded. The annual reserve fund contributions would be approximately 3.33% of the 2019 tax levy.
12. If the City phases in the contribution to the Landfill Closure and Post Closure Care Reserve Fund starting with $250,000 in 2020 and increasing the contribution by $250,000 each year to a maximum annual contribution of $2,500,000, then the reserve balance at the beginning of 2033 would be approximately $24,127,000. Further annual contributions beyond closure would be required until the target balance of approximately $36,815,000 is achieved. This is projected to occur at the beginning of 2037. In this case there would be no opportunity to raise the funds from the tipping fees after 2032. The 2020 contribution of $250,000 is approximately 0.3% of the 2019 tax levy
13. The City has an operating policy whereby the cost of Leachate treatment at the Wastewater Treatment Plant (WWTP) is not charged back to waste disposal. Inclusion of this cost will add approximately $194,000 per year to the cost of service projections presented in this report for the period 2020 to 2032. Leachate treatment costs beyond 2033 are accounted for in the post closure care costs and included in the annual contributions to the reserve fund.
14. The City has an operating policy that exempts certain waste materials from tipping fees. These include contaminated soil and other waste (asphalt, concrete and fill material) from City projects and residential waste collected through the curbside waste collection program. Therefore the potential operating revenues are not maximized requiring more to be recovered from taxes. In 2018 approximately 43,300 tonnes of materials were received at the landfill site from City projects. Contaminated soil which accounts for 70% of the total was charged at a reduced tipping fee of $10.20 per tonne. The remaining material was handled at the landfill site at no charge. Although only some of these materials are actually landfilled, costs are incurred for handling and management e.g. testing, stockpiling, crushing, etc. The opportunity cost of not charging the going tipping fee of $77 per tonne is approximately $3,000,000. This means that the waste disposal operations is subsidizing other City programs that may have funding sources other than taxes e.g. water and wastewater that are user fee based, development related projects with funding from development charges and other projects for which grant funding may be available. In terms of fairness and equity, these programs should be paying their fair share for the benefit received from disposal at the landfill site.
15. The landfill site also receives Septage directly into the Leachate Collection System from external sources. This is a unique service to the City and not consistent with industry best practices for Septage management. Typically Septage would be hauled directly to a wastewater treatment plant where there is a specifically designed receiving station for

haulers to discharge the waste for treatment. This service would be provided for a fee per unit volume discharged on full cost recovery basis to the wastewater operations. Leachate Collection Systems are not designed to receive and convey Septage which has a high level of suspended solids and odour. These can complicate the landfill site operations and result in added costs for maintenance of the Leachate Collection System.

16. The gross annual cost of waste disposal is projected to be approximately $5,157,250 in 2020 and funded through a combination of operating revenue and taxes. This includes approximately $2,458,000 million for the annual contribution to the new Landfill Site Closure and Post Closure Care Reserve Fund which is currently not in the annual budget.

17. The operating revenue of $1,495,000 is projected to offset approximately 29 % of the gross annual cost based on 2020 estimates. The remaining 71% i.e. the net operating cost of approximately $3,662,500 would require funding from taxes or an adjustment to the current tipping fee.

18. Under the current policy to exempt curbside waste from the tipping fees the residential sector would contribute only 6% of the annual revenue of $1,495,000 when it should contribute 59% to match its share of the gross cost. This results in a cross subsidy from the IC&I sector to the residential sector of approximately $792,000.

19. The gross cost of disposal (not including waste collection) is estimated to be approximately $151 per tonne in 2020 increasing to $162 per tonne in 2021. The $151 includes approximately $53 per tonne for operations, $10 per tonne for capital related costs and $88 per tonne for the Landfill Closure and Post Closure Care Reserve Fund contributions and is based on both residential and IC&I waste disposal tonnages. The net costs for 2020 and 2021 are $97 and $107 respectively.

20. The current tipping fee of $77 per tonne is clearly not sufficient to recover the full cost of disposing waste at the landfill site which is estimated to be $151 per tonne.

21. The net operating cost is projected to increase by approximately 269 % in 2020 due mainly to the Landfill Closure and Post Closure Care Reserve Fund contribution. The 2021 increase is projected at 8.6% due to the increase in the transfer to the capital reserve. Annual increases of 0.6 %- 0.7% are projected between 2022 and 2032 with the exception of 2030 when there is a 9.4% decrease due to suspension of the contribution to the capital reserve pending further review. 2% per year increase on net annual cost is projected over the remainder of the 25-year period.

22. The capital investment required over the next 25 years is approximately $5,836,300. This is approximately $449,000 per year until closure and approximately 80% higher than the 10-year historical gross capital investment of $244, 000 per year.

23. There is no existing waste disposal debt. However, the New Landfill Gas Control System will be financed through debt in 2020 with annual repayment of approximately $140,225 beginning in 2021 for 15 years.

24. There is the requirement for a Waste Disposal Capital Reserve to fully fund the other capital requirements of $4,162,300 over the next 25 years. Annual contributions of $

270,000 in 2020 and $420,000 from 2021 to 2029 to ensure that sufficient funds are available for all projects prior to closure of the landfill site.

25. If the City decides to extend the life of the existing landfill site and is successful in receiving approval for another 15 years, then the closure and post closure care costs would be deferred from 2033 to 2048. The reserve fund requirements would be approximately $58,950,000 by the beginning of 2048. This would require annual contributions of $1,466,000 starting in 2020 until 2048 instead of the $2,458,000 contributions currently projected for closure in 2032. In this case the $88 per tonne of waste disposed for the annual contribution to the Landfill Closure and Post Closure Care Reserve Fund would be reduced to $53 per tonne. The gross cost of disposal would be lower at $106 per tonne instead of $151 per tonne. The current tipping fee of $77 is well below this amount and insufficient should the City decide to extend use to the existing landfill site beyond 2032. The City would also have the opportunity to raise the funds through the tipping fees over a longer period. However, there would be the additional cost of extending the use of the landfill site which is not estimated as part of this study. Such costs would be additional to the cost of $106 per tonne.
26. The 2020 value of the remaining capacity at the landfill site is estimated to be approximately $41,720,000. This is a high level estimate that is based on the remaining capacity of approximately 409,000 tonnes and an estimated 2020 market tipping fee of $102 per tonne. This is a diminishing asset that would decline to zero at closure in 2032 when the benefits of disposal space and tipping fees would no longer available to the City.

8.2 Recommendations

The following are the primary recommendations for consideration by the City:

1. The cost of service projections developed through this study for the period 2020 to 2044 should be used to inform the City's decisions regarding changes to the current cost recovery mechanisms including increases to the tipping fee and/ or taxes to ensure that the full cost of service for waster diversion and waste disposal are recovered.
2. Establish a Waste Diversion Capital Reserve beginning in 2020 with an annual reserve contribution of $87,833 and $100,000 thereafter.
3. Obtain estimates from service providers to implement the organics program by 2025 in accordance with the Provincial Food and Organic Waste Policy 4.2 (ii).
4. Monitor Provincial discussions on the transfer of recycling and other waste diversion functions to the packaging producers to gauge and identify the City's role and responsibilities and any costs that may be incurred by the City.
5. Establish a Waste Disposal Capital Reserve beginning in 2020 with an annual contribution of $270,000 and $420,000 from 2021 to 2029 at which time continuation of the annual contribution should be re-assessed depending on if the landfill site would be closed in 2032 or its use extended.

6. Establish a restricted Landfill Closure and Post Closure Care Reserve Fund to set aside the funds that would be required to pay for all closure and post closure care work following closure of the landfill site in 2032. Ideally this reserve should be fully funded to the liability target balance of approximately $37.88 million by 2032 while there is the opportunity to raise the funds through the tipping fees. This would ensure from a fairness and equity perspective, that the users who benefit from the using the landfill site would pay for its post closure care. However given the potential significant impact on the tipping fees and/ or taxes, lower annual contributions may be considers provided that the target balance is achieved within a reasonable period to fully fund post closure care.
7. Review the City's policy to exempt waste disposed from City projects from the landfill tipping fees with a view to maximizing annual waste disposal revenues and reducing the amounts to be recovered from taxes. The estimated additional revenue to the waste disposal operations could be in the order of $3,000,000. This approach is consistent with the principle of user pay particularly in cases where these programs and projects are funded from sources other than property taxes.
8. Increase the current landfill tipping fee of $77 per tonne to recover more of the cost of service, if not the full cost of service for waste disposal estimated to be $151 per tonne.
9. Review the policy of exempting the curbside waste from the landfill tipping fees to facilitate fairness and equity between the residential and IC&I sectors and address the existing cross subsidization of approximately $792,000 from the IC&I sector to the residential sector.
10. The recovery of net costs from taxes should be structured such that the residential sector and IC&I sector pay their fair share of the amount required to mitigate any cross subsidy. The allocation of costs to each sector for waste diversion and waste disposal, as noted in this study, should be used to guide the restructuring.
11. Reassess the costs versus the benefits of accepting Septage at the landfill site in an effort to reduce disposal operating and capital costs associated with the Leachate Collection System. In any event alternative Septage disposal would be required prior to closure of the landfill site in 2032.
12. Review and update this cost of service study in five (5) years to account for new information regarding transferring recycling to producers of packaging, the cost of the organics program and the City's decision (and regulatory approval) on whether or not the use of existing landfill site would be extended.

Appendix A

Waste Diversion Capital Cost & Capital Reserve Projections (2020-2044)

WASTE DIVERSION CAPITAL RESERVE SCHEDULE

Capital Reserve	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Opening Balance	$18,160	$77,817	$149,829	$255,825	$305,095	$195,754	$302,852	$340,477	$451,048	$405,418	$350,750	$461,568	$483,098	$404,002
Transfer from Operating	$87,833	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Transfer to Capital	$30,000	$31,500	$0	$57,881	$213,929	$0	$70,355	$0	$155,133	$162,889	$0	$89,793	$188,565	$0
Transfer to Operating	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Closing Balance	$75,993	$146,317	$249,829	$297,944	$191,166	$295,754	$332,497	$440,477	$395,916	$342,529	$450,750	$471,775	$394,533	$504,002
Interest	$1,824	$3,512	$5,996	$7,151	$4,588	$7,098	$7,980	$10,571	$9,502	$8,221	$10,818	$11,323	$9,469	$12,096
Target Levels														
Maximum Target Balance (10% of Asset Replacement Value)	$336,200	$353,009	$370,660	$389,193	$408,653	$429,085	$450,539	$473,066	$496,720	$521,556	$547,634	$575,015	$603,766	$633,954
Above Maximum Target Balance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Minimum Target Balance (5% of Asset Replacement Value)	$168,100	$176,505	$185,330	$194,596	$204,326	$214,543	$225,270	$236,533	$248,360	$260,778	$273,817	$287,508	$301,883	$316,977
Below Minimum Target Balance	($92,107)	($30,188)	$0	$0	($13,160)	$0	$0	$0	$0	$0	$0	$0	$0	$0

WASTE DIVERSION CAPITAL FORECAST (2020-2044)

Capital Project	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
City's Capital Program														
Waste Management Diversion Review and Program Implementation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Diversion Facilities Equipment and Building Upgrades	$30,000	$0	$0	$57,881	$60,775	$0	$70,355	$0	$155,133	$162,889	$0	$0	$0	$0
Inbound Scale Replacement	$0	$31,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal	$30,000	$31,500	$0	$57,881	$60,775	$0	$70,355	$0	$155,133	$162,889	$0	$0	$0	$0
Asset Management Needs														
Weigh Scales & Building	$0	$0	$0	$0	$153,154	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recycling Facility	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$188,565	$0
Special Waste Depot (HHW)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$89,793	$0	$0
Subtotal	$0	$0	$0	$0	$153,154	$0	$0	$0	$0	$0	$0	$89,793	$188,565	$0
Total	$30,000	$31,500	$0	$57,881	$213,929	$0	$70,355	$0	$155,133	$162,889	$0	$89,793	$188,565	$0

WASTE DIVERSION CAPITAL RESERVE SCHEDULE

Capital Reserve	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Opening Balance	$516,098	$630,884	$524,899	$639,897	$757,655	$619,479	$736,746	$856,828	$680,245	$798,971	$920,546
Transfer from Operating	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Transfer to Capital	$0	$218,287	$0	$0	$252,695	$0	$0	$292,526	$0	$0	$338,635
Transfer to Operating	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Closing Balance	$616,098	$512,597	$624,899	$739,897	$604,960	$719,479	$836,746	$664,302	$780,245	$898,971	$681,911
Interest	$14,786	$12,302	$14,998	$17,758	$14,519	$17,267	$20,082	$15,943	$18,726	$21,575	$16,366
Target Levels											
Maximum Target Balance (10% of Asset Replacement Value)	$665,652	$698,935	$733,881	$770,575	$809,104	$849,559	$892,037	$936,639	$983,471	$1,032,645	$1,084,277
Above Maximum Target Balance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Minimum Target Balance (5% of Asset Replacement Value)	$332,826	$349,467	$366,941	$385,288	$404,552	$424,780	$446,019	$468,320	$491,736	$516,322	$542,138
Below Minimum Target Balance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

WASTE DIVERSION CAPITAL FORECAST (2020-2044)

Capital Project	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
City's Capital Program											
Waste Management Diversion Review and Program Implementation	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Diversion Facilities Equipment and Building Upgrades	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inbound Scale Replacement	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Asset Management Needs											
Weigh Scales & Building	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Recycling Facility	$0	$218,287	$0	$0	$252,695	$0	$0	$292,526	$0	$0	$338,635
Special Waste Depot (HHW)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal	$0	$218,287	$0	$0	$252,695	$0	$0	$292,526	$0	$0	$338,635
Total	$0	$218,287	$0	$0	$252,695	$0	$0	$292,526	$0	$0	$338,635

Appendix B

Cost of Service – Waste Diversion (2020-2044)

CITY OF CORNWALL
Landfill Full Cost Accounting Analysis Financial Sustainability Final Report
APPENDIX B

COST OF SERVICE - WASTE DIVERSION (2020-2044)

Cost Description	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Operating Costs												
Household Hazardous Waste	$102,766	$104,821	$106,918	$109,056	$111,237	$113,462	$115,731	$118,046	$120,407	$122,815	$125,271	$127,777
Blue Box Program - Curbside Collection (Based on Stops)	$961,402	$987,682	$1,014,570	$1,040,569	$1,067,201	$1,094,483	$1,122,429	$1,151,055	$1,178,210	$1,205,991	$1,234,412	$1,263,488
Blue Box Program - Processing (Other Municipalities)	$721,046	$742,822	$765,255	$788,365	$812,174	$836,702	$861,970	$888,002	$914,819	$942,447	$970,909	$1,000,230
Blue Box Program - Processing (City Materials)	$783,954	$799,633	$815,626	$831,938	$848,577	$865,549	$882,860	$900,517	$918,527	$936,898	$955,636	$974,748
Blue Box Program - Revenue Sharing (Other Municipalities)	$111,202	$113,426	$115,695	$118,008	$120,369	$122,776	$125,232	$127,736	$130,291	$132,897	$135,555	$138,266
Blue Box Program - Other Costs	$200,822	$204,838	$208,935	$213,114	$217,376	$221,724	$226,158	$230,681	$235,295	$240,001	$244,801	$249,697
Leaf Diversion Program	$208,734	$214,534	$220,482	$226,120	$231,896	$237,812	$243,872	$250,080	$255,908	$261,869	$267,966	$274,203
Wood Waste Diversion Program	$21,500	$21,930	$22,369	$22,816	$23,272	$23,738	$24,212	$24,697	$25,191	$25,694	$26,208	$26,733
Administration	$247,997	$252,957	$258,016	$263,176	$268,440	$273,809	$279,285	$284,871	$290,568	$296,379	$302,307	$308,353
Gross Operating Costs	**$3,359,423**	**$3,442,643**	**$3,527,865**	**$3,613,163**	**$3,700,542**	**$3,790,053**	**$3,881,749**	**$3,975,683**	**$4,069,215**	**$4,164,991**	**$4,263,065**	**$4,363,493**
Capital Related Costs												
Transfers to Capital Reserve	$87,833	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Debt Servicing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gross Capital Related Costs	**$87,833**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**
COST OF SERVICE (GROSS)	**$3,447,256**	**$3,542,643**	**$3,627,865**	**$3,713,163**	**$3,800,542**	**$3,890,053**	**$3,981,749**	**$4,075,683**	**$4,169,215**	**$4,264,991**	**$4,363,065**	**$4,463,494**
Program Revenues												
Household Hazardous Waste Program Revenues	$16,500	$16,665	$16,832	$17,000	$17,170	$17,342	$17,515	$17,690	$17,867	$18,046	$18,226	$18,409
Blue Box Program Revenues - Ontario Grant (Collection)	$286,349	$289,212	$292,105	$295,026	$297,976	$300,956	$303,965	$307,005	$310,075	$313,176	$316,307	$319,471
Blue Box Program Revenues - Ontario Grant (Processing)	$286,349	$289,212	$292,105	$295,026	$297,976	$300,956	$303,965	$307,005	$310,075	$313,176	$316,307	$319,471
Blue Box Program Revenues - Other Municipalities	$777,311	$785,084	$792,935	$800,864	$808,873	$816,962	$825,131	$833,383	$841,716	$850,134	$858,635	$867,221
Blue Box Program Revenues - Blue Box Materials Sales	$286,022	$288,506	$291,002	$293,180	$295,370	$297,574	$305,787	$314,223	$322,523	$331,044	$339,792	$348,773
Blue Box Program Revenues - Other	$87,800	$88,678	$89,565	$90,460	$91,365	$92,279	$93,201	$94,133	$95,075	$96,026	$96,986	$97,956
Leaf Diversion Program Revenues	$4,000	$4,040	$4,080	$4,121	$4,162	$4,204	$4,246	$4,289	$4,331	$4,375	$4,418	$4,463
Wood Waste Diversion Program Revenues	$47,300	$47,773	$48,251	$48,733	$49,221	$49,713	$50,210	$50,712	$51,219	$51,731	$52,249	$52,771
Total Program Revenues	**$1,791,631**	**$1,809,171**	**$1,826,874**	**$1,844,410**	**$1,862,113**	**$1,879,984**	**$1,904,021**	**$1,928,440**	**$1,952,882**	**$1,977,706**	**$2,002,921**	**$2,028,533**
COST OF SERVICE (NET) TO BE RECOVERED	**$1,655,625**	**$1,733,472**	**$1,800,991**	**$1,868,753**	**$1,938,429**	**$2,010,069**	**$2,077,728**	**$2,147,243**	**$2,216,333**	**$2,287,284**	**$2,360,144**	**$2,434,960**
Annual Percent Change	**-3.2%**	**4.7%**	**3.9%**	**3.8%**	**3.7%**	**3.7%**	**3.4%**	**3.3%**	**3.2%**	**3.2%**	**3.2%**	**3.2%**
Population & Tonnage Projections												
Projected Population*	48,612	48,766	48,920	49,076	49,232	49,388	49,544	49,700	49,858	50,016	50,174	50,332
Projected Households*	21,497	21,649	21,801	21,920	22,039	22,157	22,276	22,395	22,469	22,543	22,617	22,691
Projected Tonnage Diverted - Residential & IC&I	20,179	20,199	20,218	20,238	20,258	20,278	20,297	20,317	20,337	20,357	20,377	20,398
**Projections from DC Study*												
Cost per Capita												
Gross Cost per Capita	$71	$73	$74	$76	$77	$79	$80	$82	$84	$85	$87	$89
Revenue per Capita	$37	$37	$37	$38	$38	$38	$38	$39	$39	$40	$40	$40
Net Cost per Capita	$34	$36	$37	$38	$39	$41	$42	$43	$44	$46	$47	$48
Cost per Household												
Gross Cost per Household	$160	$164	$166	$169	$172	$176	$179	$182	$186	$189	$193	$197
Revenue per Household	$83	$84	$84	$84	$84	$85	$85	$86	$87	$88	$89	$89
Net Cost per Household	$77	$80	$83	$85	$88	$91	$93	$96	$99	$101	$104	$107
Cost per Tonne of Total Waste Diverted												
Gross Cost per Tonne Diverted	$171	$175	$179	$183	$188	$192	$196	$201	$205	$210	$214	$219
Revenue per Tonne Diverted	$89	$90	$90	$91	$92	$93	$94	$95	$96	$97	$98	$99
Net Cost per Tonne Diverted	$82	$86	$89	$92	$96	$99	$102	$106	$109	$112	$116	$119
Gross Cost per Tonne to Process Blue Box Materials												
Tonne Delivered to MRF	5,778	5,828	5,879	5,923	5,967	6,012	6,056	6,101	6,140	6,178	6,217	6,257
Processing Cost (including Capital Related)	$1,741,631	$1,794,229	$1,835,690	$1,878,210	$1,921,815	$1,966,536	$2,012,401	$2,059,441	$2,107,687	$2,157,172	$2,207,929	$2,259,990
Gross Cost per Tonne for Blue Box Materials Processing	$301	$308	$312	$317	$322	$327	$332	$338	$343	$349	$355	$361

COST OF SERVICE - WASTE DIVERSION (2020-2044)

Cost Description	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Operating Costs													
Household Hazardous Waste	$130,332	$132,939	$135,598	$138,310	$141,076	$143,897	$146,775	$149,711	$152,705	$155,759	$158,874	$162,052	$165,293
Blue Box Program - Curbside Collection (Based on Stops)	$1,293,232	$1,322,612	$1,352,649	$1,383,359	$1,414,756	$1,446,856	$1,479,685	$1,513,259	$1,547,594	$1,582,709	$1,618,621	$1,655,348	$1,692,909
Blue Box Program - Processing (Other Municipalities)	$1,030,437	$1,061,556	$1,093,615	$1,126,643	$1,160,667	$1,195,719	$1,231,830	$1,269,031	$1,307,356	$1,346,838	$1,387,513	$1,429,416	$1,472,584
Blue Box Program - Processing (City Materials)	$994,243	$1,014,128	$1,034,411	$1,055,099	$1,076,201	$1,097,725	$1,119,679	$1,142,073	$1,164,914	$1,188,213	$1,211,977	$1,236,216	$1,260,941
Blue Box Program - Revenue Sharing (Other Municipalities)	$141,031	$143,852	$146,729	$149,663	$152,657	$155,710	$158,824	$162,000	$165,240	$168,545	$171,916	$175,354	$178,861
Blue Box Program - Other Costs	$254,691	$259,785	$264,980	$270,280	$275,686	$281,199	$286,823	$292,560	$298,411	$304,379	$310,467	$316,676	$323,010
Leaf Diversion Program	$280,581	$286,958	$293,478	$300,144	$306,959	$313,927	$321,053	$328,340	$335,794	$343,416	$351,211	$359,184	$367,337
Wood Waste Diversion Program	$27,267	$27,813	$28,369	$28,936	$29,515	$30,105	$30,707	$31,321	$31,948	$32,587	$33,239	$33,903	$34,581
Administration	$314,520	$320,811	$327,227	$333,771	$340,447	$347,256	$354,201	$361,285	$368,510	$375,881	$383,398	$391,066	$398,888
Gross Operating Costs	**$4,466,335**	**$4,570,453**	**$4,677,056**	**$4,786,205**	**$4,897,963**	**$5,012,394**	**$5,129,577**	**$5,249,580**	**$5,372,473**	**$5,498,327**	**$5,627,216**	**$5,759,216**	**$5,894,404**
Capital Related Costs													
Transfers to Capital Reserve	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Debt Servicing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gross Capital Related Costs	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**	**$100,000**
COST OF SERVICE (GROSS)	**$4,566,335**	**$4,670,453**	**$4,777,056**	**$4,886,205**	**$4,997,963**	**$5,112,394**	**$5,229,577**	**$5,349,580**	**$5,472,473**	**$5,598,327**	**$5,727,216**	**$5,859,216**	**$5,994,405**
Program Revenues													
Household Hazardous Waste Program Revenues	$18,593	$18,779	$18,966	$19,156	$19,348	$19,541	$19,736	$19,934	$20,133	$20,334	$20,538	$20,743	$20,951
Blue Box Program Revenues - Ontario Grant (Collection)	$322,665	$325,892	$329,151	$332,442	$335,767	$339,124	$342,516	$345,941	$349,400	$352,894	$356,423	$359,987	$363,587
Blue Box Program Revenues - Ontario Grant (Processing)	$322,665	$325,892	$329,151	$332,442	$335,767	$339,124	$342,516	$345,941	$349,400	$352,894	$356,423	$359,987	$363,587
Blue Box Program Revenues - Other Municipalities	$875,893	$884,652	$893,499	$902,434	$911,458	$920,573	$929,779	$939,076	$948,467	$957,952	$967,531	$977,207	$986,979
Blue Box Program Revenues - Blue Box Materials Sales	$357,993	$367,358	$376,972	$386,840	$396,971	$407,371	$417,464	$427,818	$438,440	$449,336	$460,515	$471,983	$483,749
Blue Box Program Revenues - Other	$98,935	$99,925	$100,924	$101,933	$102,952	$103,982	$105,022	$106,072	$107,133	$108,204	$109,286	$110,379	$111,483
Leaf Diversion Program Revenues	$4,507	$4,552	$4,598	$4,644	$4,690	$4,737	$4,785	$4,832	$4,881	$4,930	$4,979	$5,029	$5,079
Wood Waste Diversion Program Revenues	$53,299	$53,832	$54,370	$54,914	$55,463	$56,018	$56,578	$57,144	$57,715	$58,292	$58,875	$59,464	$60,058
Total Program Revenues	**$2,054,551**	**$2,080,882**	**$2,107,630**	**$2,134,806**	**$2,162,416**	**$2,190,470**	**$2,218,395**	**$2,246,758**	**$2,275,569**	**$2,304,837**	**$2,334,570**	**$2,364,779**	**$2,395,473**
COST OF SERVICE (NET) TO BE RECOVERED	**$2,511,784**	**$2,589,571**	**$2,669,425**	**$2,751,399**	**$2,835,547**	**$2,921,924**	**$3,011,183**	**$3,102,822**	**$3,196,904**	**$3,293,490**	**$3,392,646**	**$3,494,437**	**$3,598,931**
Annual Percent Change	**3.2%**	**3.1%**	**3.1%**	**3.1%**	**3.1%**	**3.0%**	**3.1%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**	**3.0%**
Population & Tonnage Projections													
Projected Population*	50,490	50,592	50,694	50,796	50,898	51,000	51,102	51,205	51,307	51,410	51,513	51,616	51,720
Projected Households*	22,765	22,828	22,891	22,953	23,016	23,079	23,142	23,205	23,268	23,332	23,396	23,459	23,524
Projected Tonnage Diverted - Residential & IC&I	20,418	20,431	20,444	20,457	20,469	20,482	20,495	20,508	20,521	20,535	20,548	20,561	20,574
**Projections from DC Study*													
Cost per Capita													
Gross Cost per Capita	$90	$92	$94	$96	$98	$100	$102	$104	$107	$109	$111	$114	$116
Revenue per Capita	$41	$41	$42	$42	$42	$43	$43	$44	$44	$45	$45	$46	$46
Net Cost per Capita	$50	$51	$53	$54	$56	$57	$59	$61	$62	$64	$66	$68	$70
Cost per Household													
Gross Cost per Household	$201	$205	$209	$213	$217	$222	$226	$231	$235	$240	$245	$250	$255
Revenue per Household	$90	$91	$92	$93	$94	$95	$96	$97	$98	$99	$100	$101	$102
Net Cost per Household	$110	$113	$117	$120	$123	$127	$130	$134	$137	$141	$145	$149	$153
Cost per Tonne of Total Waste Diverted													
Gross Cost per Tonne Diverted	$224	$229	$234	$239	$244	$250	$255	$261	$267	$273	$279	$285	$291
Revenue per Tonne Diverted	$101	$102	$103	$104	$106	$107	$108	$110	$111	$112	$114	$115	$116
Net Cost per Tonne Diverted	$123	$127	$131	$134	$139	$143	$147	$151	$156	$160	$165	$170	$175
Gross Cost per Tonne to Process Blue Box Materials													
Tonne Delivered to MRF	6,296	6,334	6,372	6,411	6,450	6,489	6,519	6,550	6,581	6,612	6,644	6,676	6,708
Processing Cost (including Capital Related)	$2,313,393	$2,368,171	$2,424,362	$2,482,004	$2,541,136	$2,601,798	$2,664,030	$2,727,875	$2,793,377	$2,860,579	$2,929,529	$3,000,272	$3,072,857
Gross Cost per Tonne for Blue Box Materials Processing	$367	$374	$380	$387	$394	$401	$409	$416	$424	$433	$441	$449	$458

Appendix C

Waste Disposal Capital Cost & Capital Reserve Projections (2020-2044)

CAPITAL RESERVE (2019-2032) - WASTE DISPOSAL

Capital Reserve	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Opening Balance	$469,270	$480,532	$492,065	$572,687	$542,348	$460,085	$290,451	$450,277	$225,482	$390,918	$546,822	$559,946	$507,453
Transfer from Operating	$270,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$0	$0	$0
Transfer to Capital	$270,000	$420,000	$352,800	$463,050	$513,046	$596,442	$270,727	$650,080	$263,726	$276,912	$0	$64,386	$21,149
Transfer to Operating	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Closing Balance	$469,270	$480,532	$559,265	$529,637	$449,302	$283,644	$439,724	$220,197	$381,756	$534,006	$546,822	$495,560	$486,304
Interest	$11,262	$11,533	$13,422	$12,711	$10,783	$6,807	$10,553	$5,285	$9,162	$12,816	$13,124	$11,893	$11,671
Target Levels													
Maximum Target Balance (10% of Asset Replacement Value)	$350,816	$368,356	$386,774	$406,113	$426,419	$447,739	$470,126	$493,633	$518,314	$544,230	$571,442	$600,014	$630,014
Above Maximum Target Balance	$118,454	$112,176	$172,491	$123,524	$22,883	$0	$0	$0	$0	$0	$0	$0	$0
Minimum Target Balance (5% of Asset Replacement Value)	$175,408	$184,178	$193,387	$203,056	$213,209	$223,870	$235,063	$246,816	$259,157	$272,115	$285,721	$300,007	$315,007
Below Minimum Target Balance	$0	$0	$0	$0	$0	$0	$0	($26,619)	$0	$0	$0	$0	$0

WASTE DISPOSAL CAPITAL FORECAST (2020-2032)

Capital Project	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
City's Capital Program													
Landfill Leachate and Gas Collection Systems Upgrades	$40,000	$262,500	$44,100	$347,288	$48,620	$382,884	$56,284	$443,237	$62,053	$65,156	$0	$0	$0
Landfill Site - Service Area Infrastructure Upgrades	$40,000	$0	$0	$0	$60,775	$76,577	$70,355	$59,098	$46,540	$48,867	$0	$0	$0
Landfill Expansion / Alternative Disposal ECA	$100,000	$105,000	$110,250	$115,763	$121,551	$127,628	$140,710	$147,746	$155,133	$162,889	$0	$0	$0
New Landfill Gas Control System	$1,674,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Flare Decommissioning	$90,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Maintenance Building Repairs	$0	$0	$88,200	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Landfill Site Paving Project	$0	$52,500	$33,075	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Inbound Scale Replacement	$0	$0	$77,175	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal	$1,944,000	$420,000	$352,800	$463,050	$230,946	$587,090	$267,349	$650,080	$263,726	$276,912	$0	$0	$0
Asset Management Needs													
Weigh Scales & Building	$0	$0	$0	$0	$282,100	$0	$0	$0	$0	$0	$0	$0	$0
Yard Improvements	$0	$0	$0	$0	$0	$0	$3,378	$0	$0	$0	$0	$64,386	$21,149
Storage Containers	$0	$0	$0	$0	$0	$9,352	$0	$0	$0	$0	$0	$0	$0
Subtotal	$0	$0	$0	$0	$282,100	$9,352	$3,378	$0	$0	$0	$0	$64,386	$21,149
Total	$1,944,000	$420,000	$352,800	$463,050	$513,046	$596,442	$270,727	$650,080	$263,726	$276,912	$0	$64,386	$21,149

Note: the New Landfill Gas Control System will be Debt Financed and not funded from the Capital Reserve

Appendix D

Cost of Service – Waste Disposal (2020-2044)

COST OF SERVICE - WASTE DISPOSAL (2019-2044)

Cost Description	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Operating Costs														
Landfill Site Monitoring	$102,146	$108,356	$110,523	$112,734	$114,988	$117,288	$119,634	$122,026	$124,467	$126,956	$129,495	$132,085	$134,727	$137,422
Landfill Security	$70,156	$71,539	$72,970	$74,429	$75,918	$77,436	$78,985	$80,565	$82,176	$83,819	$85,496	$87,206	$88,950	$90,729
Landfill Maintenance	$33,900	$34,500	$35,190	$35,894	$36,612	$37,344	$38,091	$38,853	$39,630	$40,422	$41,231	$42,055	$42,896	$43,754
Gas/Leachate Collection	$167,845	$172,129	$175,572	$179,083	$182,665	$186,318	$190,044	$193,845	$197,722	$201,677	$205,710	$209,824	$214,021	$218,301
Solid Waste Disposal - Until 2032	$761,378	$819,375	$835,763	$852,478	$869,527	$886,918	$904,656	$922,749	$941,204	$960,028	$979,229	$998,814	$1,018,790	$1,039,166
Solid Waste Disposal - After 2032 (Res. Waste Only)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stand Alone Drop-Off Station (Res. Waste Only)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Solid Waste Management	$43,600	$13,800	$14,076	$14,358	$14,645	$14,938	$15,236	$15,541	$15,852	$16,169	$16,492	$16,822	$17,159	$17,502
Curbside Waste Collection	$918,383	$961,458	$987,682	$1,014,570	$1,040,569	$1,067,201	$1,094,483	$1,122,429	$1,151,055	$1,178,210	$1,205,991	$1,234,412	$1,263,488	$1,293,232
Administration	$230,905	$247,997	$252,957	$258,016	$263,176	$268,440	$273,809	$279,285	$284,871	$290,568	$296,379	$302,307	$308,353	$314,520
Transfers to Operating Reserve	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gross Operating Costs	**$2,328,313**	**$2,429,154**	**$2,484,732**	**$2,541,561**	**$2,598,099**	**$2,655,883**	**$2,714,938**	**$2,775,293**	**$2,836,976**	**$2,897,850**	**$2,960,024**	**$3,023,525**	**$3,088,383**	**$3,154,626**
Capital Related Costs														
Transfers to Capital Reserve	$290,000	$270,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$0	$0	$0
Transfers to Capital Life Cycle Reserve	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt Servicing	$0	$0	$140,225	$140,225	$140,225	$140,225	$140,225	$140,225	$140,225	$140,225	$140,225	$140,225	$140,225	$140,225
Gross Capital Related Costs	**$290,000**	**$270,000**	**$560,225**	**$560,225**	**$560,225**	**$560,225**	**$560,225**	**$560,225**	**$560,225**	**$560,225**	**$560,225**	**$140,225**	**$140,225**	**$140,225**
Landfil Closure & Post Closure Care Costs														
Transfers to Landfill Closure & Post Closure Care Reserve	$0	$2,458,096	$2,458,096	$2,458,096	$2,458,096	$2,458,096	$2,458,096	$2,458,096	$2,458,096	$2,458,096	$2,458,096	$2,458,096	$2,458,096	$2,458,096
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gross Landfill Post Closure Care Costs	**$0**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**	**$2,458,096**
COST OF SERVICE (GROSS)	**$2,618,313**	**$5,157,249**	**$5,503,053**	**$5,559,882**	**$5,616,420**	**$5,674,203**	**$5,733,258**	**$5,793,613**	**$5,855,297**	**$5,916,170**	**$5,978,344**	**$5,621,846**	**$5,686,704**	**$5,752,947**
Program Revenues														
Landfill Site Monitoring	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Landfill Security	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Landfill Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gas/Leachate Collection	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Solid Waste Disposal	$1,500	$4,000	$4,080	$4,162	$4,245	$4,330	$4,416	$4,505	$4,595	$4,687	$4,780	$4,876	$4,973	$5,073
Solid Waste Management (Tipping Fees)	$1,624,650	$1,490,750	$1,520,565	$1,550,976	$1,581,996	$1,613,636	$1,645,908	$1,678,827	$1,712,403	$1,746,651	$1,781,584	$1,817,216	$1,853,560	$1,890,631
Curbside Waste Collection	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Administration	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Program Revenues	**$1,626,150**	**$1,494,750**	**$1,524,645**	**$1,555,138**	**$1,586,241**	**$1,617,965**	**$1,650,325**	**$1,683,331**	**$1,716,998**	**$1,751,338**	**$1,786,365**	**$1,822,092**	**$1,858,534**	**$1,895,704**
COST OF SERVICE (NET) TO BE RECOVERED	**$992,163**	**$3,662,499**	**$3,978,408**	**$4,004,744**	**$4,030,180**	**$4,056,238**	**$4,082,934**	**$4,110,282**	**$4,138,299**	**$4,164,833**	**$4,191,980**	**$3,799,754**	**$3,828,170**	**$3,857,242**
Annual Percent Change		**269.1%**	**8.6%**	**0.7%**	**0.6%**	**0.6%**	**0.7%**	**0.7%**	**0.7%**	**0.6%**	**0.7%**	**-9.4%**	**0.7%**	**0.8%**

Cost Description	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Population & Tonnage Projections														
Projected Population*	48,458	48,612	48,766	48,920	49,076	49,232	49,388	49,544	49,700	49,858	50,016	50,174	50,332	50,490
Projected Households*	21,345	21,497	21,649	21,801	21,920	22,039	22,157	22,276	22,395	22,469	22,543	22,617	22,691	22,765
Projected Tonnage Disposed - Residential Only	14,184	14,229	14,274	14,319	14,365	14,410	14,456	14,502	14,547	14,593	14,640	14,686	14,732	14,778
Projected Tonnage Disposed - Residential & IC&I	27,787	27,832	27,877	27,922	27,968	28,014	28,059	28,105	28,151	28,197	28,243	28,289	28,336	28,382
**Projections from DC Study*														
Gross Collection Cost per Capita														
Gross Collection Cost per Capita	$19	$20	$20	$21	$21	$22	$22	$23	$23	$24	$24	$25	$25	$26
Gross Collection Cost per Household														
Gross Collection Cost per Household	$43	$45	$46	$47	$47	$48	$49	$50	$51	$52	$53	$55	$56	$57
Disposal Cost per Tonne (excluding Waste Collection)														
Gross Cost per Tonne of Total Waste Disposed														
Operations	$51	$53	$54	$55	$56	$57	$58	$59	$60	$61	$62	$63	$64	$66
Capital Related	$10	$10	$20	$20	$20	$20	$20	$20	$20	$20	$20	$5	$5	$5
Subtotal - Gross Cost per Tonne Operations & Capital	$61	$62	$74	$75	$76	$77	$78	$79	$80	$81	$82	$68	$69	$71
Closure & Post Closure Care	$0	$88	$88	$88	$88	$88	$88	$87	$87	$87	$87	$87	$87	$87
Total Gross Cost per Tonne	$61	$151	$162	$163	$164	$164	$165	$166	$167	$168	$169	$155	$156	$157
Revenue per Tonne Disposed Based on Current Tipping Fee	$59	$54	$55	$56	$57	$58	$59	$60	$61	$62	$63	$64	$66	$67
Net Cost per Tonne	$3	$97	$107	$107	$107	$107	$107	$106	$106	$106	$106	$91	$91	$90

COST OF SERVICE - WASTE DISPOSAL (2019-2044)

Cost Description	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Operating Costs												
Landfill Site Monitoring	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Landfill Security	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Landfill Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gas/Leachate Collection	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Solid Waste Disposal - Until 2032	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Solid Waste Disposal - After 2032 (Res. Waste Only)	$1,954,698	$1,997,725	$2,041,691	$2,086,617	$2,132,530	$2,179,455	$2,227,411	$2,276,423	$2,326,514	$2,377,706	$2,430,026	$2,478,626
Stand Alone Drop-Off Station (Res. Waste Only)	$176,538	$180,069	$183,670	$187,344	$191,091	$194,912	$198,811	$202,787	$206,843	$210,979	$215,199	$219,503
Solid Waste Management	$17,852	$18,209	$18,573	$18,944	$19,323	$19,710	$20,104	$20,506	$20,916	$21,335	$21,761	$22,196
Curbside Waste Collection	$1,451,935	$1,484,559	$1,517,907	$1,551,995	$1,586,840	$1,622,468	$1,658,898	$1,696,146	$1,734,232	$1,773,175	$1,812,993	$1,853,706
Administration	$320,811	$327,227	$333,771	$340,447	$347,256	$354,201	$361,285	$368,510	$375,881	$383,398	$391,066	$398,888
Transfers to Operating Reserve	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gross Operating Costs	**$3,921,834**	**$4,007,789**	**$4,095,613**	**$4,185,347**	**$4,277,040**	**$4,370,746**	**$4,466,508**	**$4,564,373**	**$4,664,385**	**$4,766,593**	**$4,871,045**	**$4,972,919**
Capital Related Costs												
Transfers to Capital Reserve	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Transfers to Capital Life Cycle Reserve	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt Servicing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gross Capital Related Costs	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Landfil Closure & Post Closure Care Costs												
Transfers to Landfill Closure & Post Closure Care Reserve	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1
Gross Landfill Post Closure Care Costs	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$1**
COST OF SERVICE (GROSS)	**$3,921,834**	**$4,007,789**	**$4,095,613**	**$4,185,347**	**$4,277,040**	**$4,370,746**	**$4,466,508**	**$4,564,373**	**$4,664,385**	**$4,766,593**	**$4,871,045**	**$4,972,920**
Program Revenues												
Landfill Site Monitoring	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Landfill Security	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Landfill Maintenance	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Gas/Leachate Collection	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Solid Waste Disposal	$5,174	$5,278	$5,383	$5,491	$5,601	$5,713	$5,827	$5,944	$6,063	$6,184	$6,308	$6,434
Solid Waste Management (Tipping Fees)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Curbside Waste Collection	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Administration	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Program Revenues	**$5,174**	**$5,278**	**$5,383**	**$5,491**	**$5,601**	**$5,713**	**$5,827**	**$5,944**	**$6,063**	**$6,184**	**$6,308**	**$6,434**
COST OF SERVICE (NET) TO BE RECOVERED	**$3,916,659**	**$4,002,511**	**$4,090,229**	**$4,179,855**	**$4,271,439**	**$4,365,033**	**$4,460,681**	**$4,558,429**	**$4,658,323**	**$4,760,409**	**$4,864,737**	**$4,966,487**
Annual Percent Change	**1.5%**	**2.2%**	**2.2%**	**2.2%**	**2.2%**	**2.2%**	**2.2%**	**2.2%**	**2.2%**	**2.2%**	**2.2%**	**2.1%**

Cost Description	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Population & Tonnage Projections												
Projected Population*	50,592	50,694	50,796	50,898	51,000	51,102	51,205	51,307	51,410	51,513	51,616	51,720
Projected Households*	22,828	22,891	22,953	23,016	23,079	23,142	23,205	23,268	23,332	23,396	23,459	23,524
Projected Tonnage Disposed - Residential Only	14,808	14,838	14,868	14,898	14,928	14,958	14,988	15,018	15,048	15,078	15,108	15,138
Projected Tonnage Disposed - Residential & IC&I	28,412	28,442	28,471	28,501	28,531	28,561	28,591	28,621	28,651	28,681	28,711	28,742
**Projections from DC Study*												
Gross Collection Cost per Capita												
Gross Collection Cost per Capita	$29	$29	$30	$30	$31	$32	$32	$33	$34	$34	$35	$36
Gross Collection Cost per Household												
Gross Collection Cost per Household	$64	$65	$66	$67	$69	$70	$71	$73	$74	$76	$77	$79
Disposal Cost per Tonne (excluding Waste Collection)												
Gross Cost per Tonne of Total Waste Disposed												
Operations	$167	$170	$173	$177	$180	$184	$187	$191	$195	$199	$202	$206
Capital Related	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal - Gross Cost per Tonne Operations & Capital	$167	$170	$173	$177	$180	$184	$187	$191	$195	$199	$202	$206
Closure & Post Closure Care	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Gross Cost per Tonne	$167	$170	$173	$177	$180	$184	$187	$191	$195	$199	$202	$206
Revenue per Tonne Disposed Based on Current Tipping Fee	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Net Cost per Tonne	$167	$170	$173	$177	$180	$184	$187	$191	$195	$198	$202	$206