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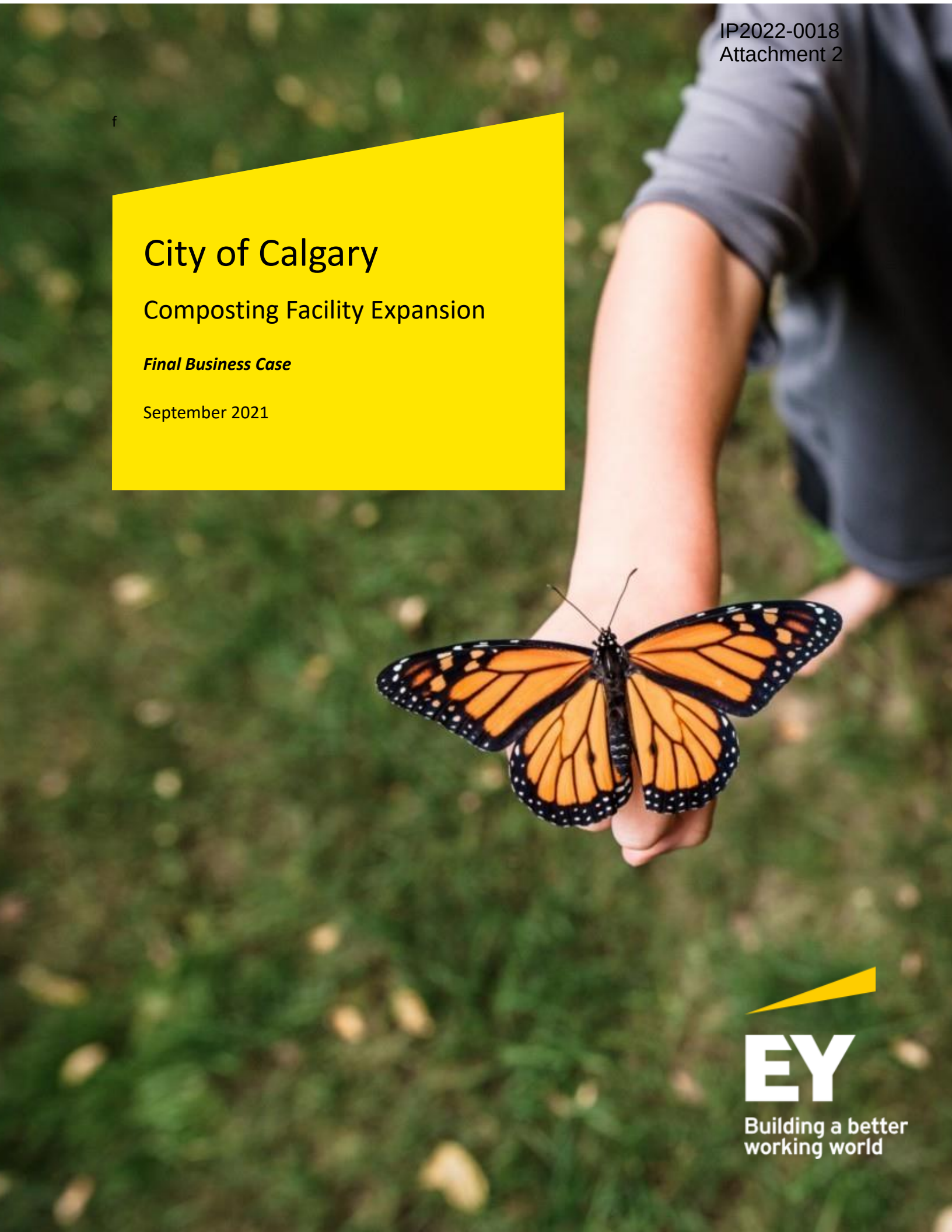
City of Calgary

Composting Facility Expansion

Final Business Case

September 2021



Building a better working world

Notice

Ernst & Young Orenda Corporate Finance Inc. ("EY") has been engaged by The City of Calgary ("The City"), to assist in the development of a business case (the "Business Case" or the "Report") for The City's Composting Facility Expansion project (the "Project").

This Business Case was prepared on The City's instruction, solely for the purposes of The City. It should not be relied upon by any other party, for any other purpose. In preparing this draft Business Case, EY relied upon unaudited statistical, operational and financial data and information from a variety of sources, as well as discussions and consultations with The City and numerous other stakeholders (collectively, the "Supporting Information"). Any differences between the work summarized in this Report and that set forth under the project agreement reflect modifications that were made at The City's request or discussed with The City during the course of the engagement. EY reserves the right to revise any analyses, observations or comments referred to in this Business Case, if additional supporting information becomes available to us subsequent to the release of this Business Case.

EY has assumed the Supporting Information to be accurate, complete and appropriate for purposes of the Business Case. EY did not audit or independently verify the accuracy or completeness of the Supporting Information. An examination or review of financial forecasts and projections, as outlined in the Chartered Professional Accountants Handbook, has not been performed on the supporting information. Accordingly, EY expresses no opinion or other forms of assurance in respect of the supporting information and does not accept any responsibility for errors or omissions, or any loss or damage as a result of any persons relying on this Business Case for any purpose other than that for which it has been prepared.

The Business Case may not have considered issues relevant to any third parties. Any use such third parties may choose to make of the Business Case is entirely at their own risk and we shall have no responsibility whatsoever in relation to any such use, and to the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than The City for our work, for this report or for the opinions formed.

Our Business Case to The City is in part based on inquiries of, and discussions with market participants who have experience in Source Separated Organics ("SSO") processing, as well as development and delivery of associated infrastructure. EY has not undertaken any form of investigation, audit, substantiation or verification procedures for the information, data and documentation provided to us. We have not sought to verify the accuracy of the data or the information provided. Where only anecdotal evidence is available due to limitations with access to underlying contracts and supplementary data, this is clearly stated.

No obligation is assumed by EY to revise this Business Case.

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Executive Summary

Ernst & Young Orenda Corporate Finance Inc. ("EY") was retained by The City of Calgary ("The City") to undertake a business case assessment of the proposed options for the Calgary Composting Facility Expansion project (the "Project").

This business case (the "Business Case" or the "Report") documents the outputs of the evaluation and comparison of options based on available information as provided by The City, market sounding participants, desktop research and lessons learned from precedent comparable projects in Western Canada.

Background and Context

In 2017, The City began their 'Green Cart program' which collects food and yard waste from single-family homes. Waste & Recycling Services ("WRS") manages collection from ratepayers, and after transporting to a City-owned and privately operated composting facility, located at the Shepard Waste Management Facility, Source-Separated Organics ("SSO") are processed through an in-vessel composting process.

The Green Cart program directly supports The City's waste-diversion target of 70% diversion by 2025. This program enables Calgarians to manage their waste responsibly and reduces The City's greenhouse gas emissions. There are numerous other benefits that address the economic, social, environmental, and cultural needs of a growing city aligned with Municipal, Provincial and Federal priorities. To ensure The City realizes its full potential as a global city, it is crucial to invest in infrastructure that serves its citizens. Calgary is expected to grow to two million people over the next 60 years which is an important consideration when planning for future generations.

Today, demand for The City's Green Cart Program is growing - continually exceeding The City's processing capacity. Each year since the program began, The City has collected material in excess of the original design capacity of the facility. As a result, there is a need to gain additional food and yard waste processing capacity to be able to process the additional material collected. The City is seeking to determine how to best manage this expansion. The two (2) options The City is considering in order to solve the capacity constraints are defined as follows:

OPTION 1: EXPANSION	OPTION 2: OUTSOURCING
Under this option, The City would expand the existing composting facility of The City to be able to process the excess amount of material and gain up to an additional 60,000 tonnes per year processing capacity with The City financing the expansion. Under this option, the City expects to apply horizontal plug flow anaerobic digestion ("HPFAD" or "AD") technology.	Outsourcing material in excess of original design capacity of the existing facility (i.e., over 100,000 tonnes) to private facility operators that can process the additional material. Under this option, The City expects private operators to use a composting facility or AD technology to process the organic material.

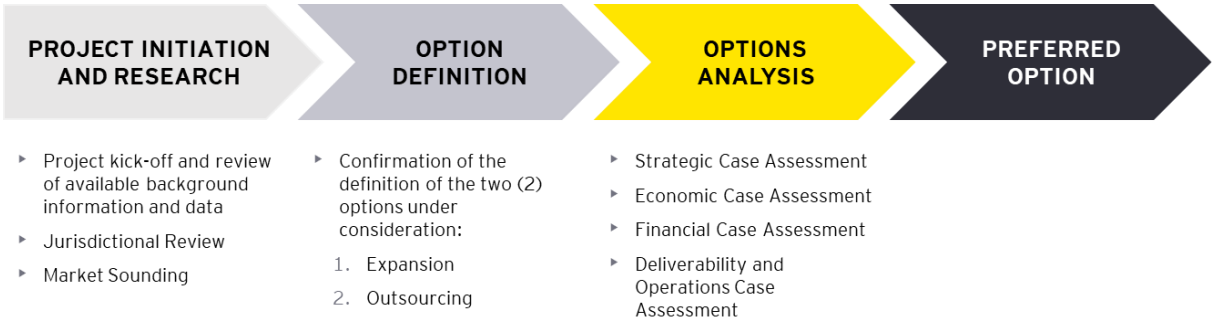
Option 2 has been further refined into two (2) sub-options:

- Option 2A ("Outsourcing with Composting") is outsourcing the materials to a private processing facility that will process all organic waste through a composting facility outside city limits.
- Option 2B ("Outsourcing with AD") is outsourcing the materials to a private processing facility within The City of Calgary that will process materials using AD technology, which is consistent with The City's expansion strategy.

Following completion of the conceptual design work by Jacobs Engineering Group Inc. ("Jacobs"), this Business Case has been prepared to determine the most appropriate option for The City.

The following process was undertaken to develop the Business Case and identification of the preferred option:

Figure 1: Approach to Business Case Development



As per the outcomes of the Business Case, the expansion option was identified as the preferred option to process excess SSO using anaerobic digestion, capable of generating renewable natural gas ("RNG"), at the existing site.

Through expansion, The City will create a long-term solution for organics processing that aligns with The City's environmental and sustainability goals as well as the waste management strategies while still providing value for money for ratepayers.

Market Sounding

As per feedback from seven (7) private sector waste processing organizations/companies, the following high-level lessons were derived from the market sounding with respect to the potential outsourcing option:

- There is insufficient capacity in the regional Calgary market to accommodate processing the excess material that The City is currently collecting. Market sounding participants suggested that The City could outsource between 10,000 to 20,000 tonnes per year immediately with multiple providers, however these providers would be outside of City limits. This would require additional logistics to transport materials to the providers' facilities or alternatively, a new transfer station could be built within City limits to facilitate waste collection and distribution to processors outside of The City. This information was sourced from market sounding participants and was not further verified for accuracy.
- Market players cited interest in expanding or building facilities to accommodate The City's excess SSO. The City could anticipate construction completion over the next one (1) to three (3) years on multiple facilities, however, available capacity at these sites may be limited in the near term due to existing/established contracts. The financial model reflects a conservative estimate for the construction period (i.e., three (3) years) in alignment with this feedback.
- To more quickly respond to current demand, other municipalities have engaged with and contracted organic materials out to multiple private sector organizations while their facility is being built or expanded.

Strategic Case Assessment

The extent to which each option aligns with both regional policies and The City's broader policy goals were explored to support investment decision making. The strategic case assessment was based on a review of the following City of Calgary strategic policies and plans:

- 2020 Municipal Development Plan ("MDP")
- Climate Resilience Strategy
- Calgary in the New Economy Strategy
- Resilient Calgary Strategy
- Social Wellbeing Policy
- Rethink to Thrive Strategy
- Economic Resilience Task Force

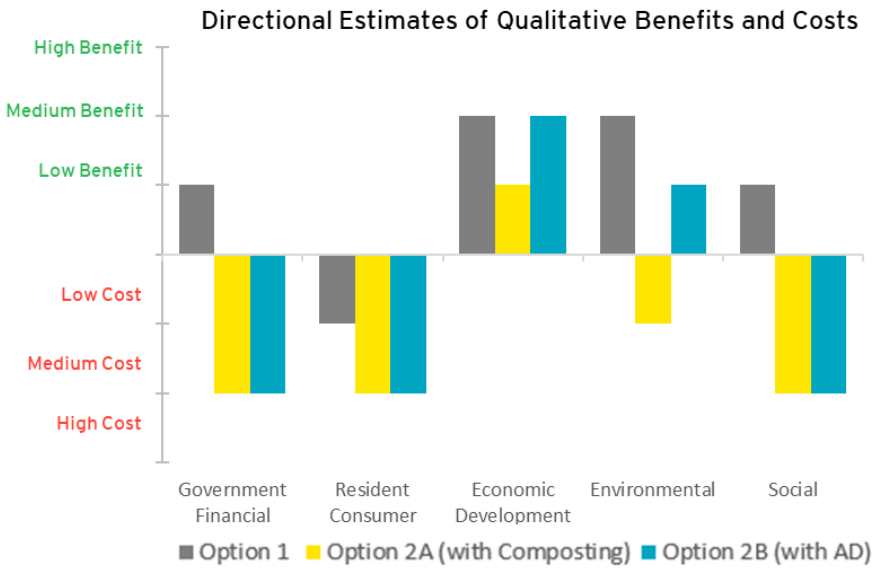
In assessing option 2A and 2B against strategic plans and policies, it was noted that there was no significant difference between the outsourcing options. Overall, both the expansion and outsourcing options provide a high degree of alignment with The City's strategic policies and plans.

Economic Case Assessment

The Economic Case Assessment was undertaken to identify the option that best delivers public value to society, including wider, economic, social, and environmental effects. In undertaking this assessment, EY conducted a Cost Benefit Analysis ("CBA") of each of the options. The options were assessed across five (5) benefit accounts: Government Financial Account, Resident Consumer Account, Economic Development Account, Environmental Account and Social Account.

The figure below provides an overview of the outputs of the CBA. The Government Financial Account was assessed quantitatively as well as qualitatively, whilst the remaining accounts were assessed qualitatively based on publicly available information. From a qualitative perspective, expansion (option 1) performed the strongest overall, outperforming outsourcing across all accounts, with the exception of the Economic Development Account where it performed similarly to the outsourcing with AD option (option 2B).

Figure 2: CBA Outputs Summary



From a quantitative perspective, option 1 (expansion) presents a lower economic cost to The City ($87m - $103m) relative to option 2A ($111m - $134m) and option 2B ($127m - $153m). This is primarily due to potential revenue unlocked for The City from sale of RNG under the expansion option and higher operational efficiency.

Table 1: Qualitative CBA Outputs

Key Quantitative Inputs and Outputs of the Government Financial Account (in $millions)			
Costs ($ NPV)	**Option 1- Expansion**	**Option 2A - Outsourcing with Composting**	**Option 2B - Outsourcing with AD**
Operating Costs	($51 - $67)	($44 - $58)	($71 - $93)
Financing Costs	($26 - $33)	($28 - $37)	($34 - $44)
Capital Costs	($38 - $40)	($40 - $42)	($48 - $51)
Total Cost	($116 - $140)	($113 - $137)	($154- $188)
Benefits			
Revenue	$29 - $37	$2 - $3	$27 - $35
Discount Rate	**Percentage**		
Social Discount Rate	6% - 8%		
Outputs	**Net Present Value**		
Net Benefit (Cost)	($87 - $103)	($111 - $134)	($127 - $153)

Investing in waste management is a public good and investing in the expansion of SSO processing capacity for The City will generate benefits for all members of society through enhanced environmental, economic, and societal outcomes.

Financial Case Assessment

A separate quantitative assessment was undertaken on the two (2) options (expansion and outsourcing), which involved developing the key assumptions underlying the analysis (including underlying costs, financial and economic assumptions, etc.).

The preliminary financial results were determined by estimating the net present value ("NPV") for each of the Project options. NPV considers the cash flows of the individual Project options as well as the timing of those cash flows, thereby recognizing the "time value of money". Future cash-flows (such as operating costs and loan repayments) are more greatly "discounted" the further into the future the cash-flows occur. In order to carry out the financial analysis, a comprehensive profile of the costs under each option was compiled. A financial model was developed for each option (options 1, 2A and 2B) and reflects the unique cash flows for each.

A summary of the results for each of the Project options, and the resulting NPV, is provided in the table below. All values in the table are listed in NPV terms as per leading practice for a comparative financial analysis. Construction, operating and major maintenance costs and other inputs used in the calculations are detailed in Section 6. The preliminary financial results are based on key assumptions underlying the analysis. Sensitivity analyses have been undertaken to review the impact of changes to certain key assumptions (see Section 6.9).

Table 2: Summary of Financial Case Assessment Outputs

Net Present Value – Financial Case Assessment - Summary Results			
Costs ($m)	**Option 1- Expansion**	**Option 2A - Outsourcing with Composting**	**Option 2B - Outsourcing with AD**
Operating Costs	(149.71)	(128.39)	(208.15)
Financing Costs	(52.58)	(60.71)	(72.76)
Capital Costs	(46.48)	(48.74)	(58.48)
Net Project Costs	(248.78)	(237.84)	(339.40)
Capital Funding Sources	46.48	48.83	58.48
Revenue	56.41	4.15	53.85
Total Project Costs*	(145.88)	(184.86)	(227.06)
Difference to Option 1		**(38.98)**	**(81.17)**
NPV Rate per Tonne (60,000 tonnes)	**(97.26)**	**(123.24)**	**(151.37)**

**** Table values may not add precisely to the totals due to rounding.***

Based on the financial analysis results, the expansion of the existing facility (Option 1) is expected to deliver better value to The City. Expected savings for expansion are 21%, or $38.98m (NPV), compared to option 2A (outsourcing with composting) and 36%, or $81.17m (NPV), compared to option 2B (outsourcing with AD).

Deliverability and Operations Case Assessment

The deliverability and operations case qualitatively assessed the two (2) options (option 2 includes two (2) sub-options, as described above) against factors and risks related to delivery and operations from The City's perspective. Risks were identified and adapted from information provided by The City, industry templates and projects of a similar size, scope, or asset class. Each risk was qualitatively assessed to determine the likelihood of the identified risks occurring and potential impact of these events, should they occur. In conducting the risk assessment, it was noted that the risk to The City under the outsourcing options would not vary based on the selection of option 2A (outsourcing with composting) or 2B (outsourcing with AD).

Based on the results of the qualitative risk assessment in the table below, the expansion option provides a marginally lower risk amongst the Project options, with fewer high impact risks, however both options have similar risk profiles.

Table 3: Summary of Deliverability and Operations Qualitative Risk Assessment

Qualitative Risk	Option 1 Expansion		Option 2 Outsourcing	
Risk	**Prob**	**Impact**	**Prob**	**Impact**
Strategic Risks	Low	Medium	Low	High
Permitting	Low	Low	Low	Medium
Design and Construction Risks	Low	Medium	Low	Low
Operational Risks	Medium	Medium	Medium	Medium
Technology Related Risks	Medium	Medium	Low	Medium
Other Risks	Low	Low	Medium	Medium

Preferred Option

Based on the outcomes of the above-noted assessments, the expansion option has been identified as the optimal option for The City to process excess SSO material. As per feedback from market participants, the private sector in the regional Calgary market is unable to process the 60,000 tonnes required by The City with their existing facilities. With The City's forecasts for SSO processing amounts increasing over time, the expansion option provides an opportunity for The City to create and maintain control over additional processing capacity.

In terms of the strategic fit of expansion, the assessment indicates that option 1 (expansion) provides a high degree of alignment with The City's strategic policies and plans. The economic benefit of expansion is also assessed as superior to outsourcing opportunities across a range of accounts.

On a financial basis, the expansion option requires a higher upfront investment by The City when compared to the outsourcing options, but it delivers better value to The City over the long-term. Under option 2 (outsourcing), the private sector finances the construction of a new facility and The City only incurs an operating cost, thereby reducing the upfront investment from The City.

Based on the results of the analyses, the most significant differentiator in the assessment was the higher potential for revenue from the sale of renewable natural gas ("RNG") under the expansion option as compared to the outsourcing option 2A (outsourcing with composting), as well as the capital costs of building both a transfer station and processing facility. The most significant cost difference for option 2B (outsourcing with AD) is the additional annual operating cost to process digestate compost following AD.

Overall, the assessments conducted indicate that a facility expansion is a better strategic, economic, and financial fit for The City and will drive better value for The City.

1 Introduction

Ernst & Young Orenda Corporate Finance Inc. ("EY") was retained by the City of Calgary ("The City") to undertake a business case assessment of the proposed options for the Calgary Composting Facility Expansion project (the "Project"). This business case (the "Business Case" or the "Report") documents the evaluation and comparison of the two (2) identified options under consideration based on industry best practices in investment analysis and cost benefit assessment:

- Expansion of the current facility to process excess capacity; or
- Outsourcing processing of excess capacity to the private sector.

The Report aims to assist a reader in understanding the benefits, costs and considerations of both options and identifies the preferred option for The City to manage its excess organics.

The existing Calgary Composting facility was developed under a public-private partnership ("P3") agreement. The scope of this agreement included a 10-year operations, maintenance, and rehabilitation contract. The information, assumptions and analyses in this Business Case were developed on a standalone basis. It is understood that there could be opportunities for future synergies with the P3 agreement. These synergies are currently unknown and could be further considered post-decision and during negotiations.

1.1 Background and Context

The City introduced the 'Green Cart Food and Yard Waste program' in July 2017 in order to divert organic material from the landfill as a critical step to achieve Council's target of 70% waste diversion by 2025. The program began operations in 2017 to collect food and yard waste from single-family residential homes and process the organics at a City-owned composting facility located at the Shepard Waste Management Facility.

Figure 3: Aerial View of City of Calgary Composting Facility, Indoor and Outdoor Storaae

The City's Municipal Development Plan ("MDP") is a strategic policy document that guides Calgary's growth and city building. Sustainability has always been a part of The City's planning. The Project will contribute to realizing these objectives, including but not limited to the following:

- The City will continue to enable Calgarians to manage their waste responsibly, with a focus on reduction, reuse, and diversion (recycling and composting).
- Reduce waste and improve waste management and resource recovery.

In advance of rolling out the program, The City developed a Composting Facility to process food and yard waste through a 10-year P3 agreement with a consortium of companies with experience in the design, construction, and

operation of composting facilities. The open procurement resulted in a facility capable of processing 100,000 tonnes per year of food and yard waste and 45,500 tonnes per year of biosolids.

The single-family residential green cart program in Calgary has been extremely successful since launching in 2017. The program has received tremendous support from residents as the collected material has exceeded forecasted tonnages since the early onset of the program. This in turn has exceeded the capacity of the Composting Facility and has developed the need to gain additional food and yard waste process capacity to continue diverting organic waste from landfills. As shown in the table below, The City has exceeded capacity at the Composting Facility in 2018 to process food and yard waste defined as Source-Separated Organics ("SSO").

Figure 4: Calgary Composting Facility - Green Cart Receiving Area

Table 4: The City's SSO Tonnage Volumes (Forecasted and Actuals)

Forecasted and actual SSO tonnage amounts per year					
Year	**2017**	**2018**	**2019**	**2020**	**2021**
Forecasted Volume (tonnes)	25,700	86,900	88,300	89,500	90,700
Received Volume (tonnes)	37,700	112,500	121,900	133,000	-

The City is seeking to determine how to best manage these expanded amounts. The forecasted SSO tonnage in excess of the existing capacity of 100,000 tonnes per year (as estimated by The City) is shown in the table below.

Table 5: Forecast for Future Excess SSO Tonnage Volumes

Six (6) year forecast for excess SSO tonnage volumes per year						
Year	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Forecasted Volume (tonnes)	28,000	30,000	32,000	43,000	46,000	49,000

In March 2020, The City issued a Request for Information ("RFI") to market to determine if there were new technologies available in the market that could be used to gain capacity at the Composting Facility. Jacobs Engineering Group Inc. ("Jacobs") was retained to assist The City to review and evaluate the responses against a pass/fail criteria analysis. Five (5) alternatives passed the analysis, which resulted in Jacobs developing conceptual designs of each to illustrate how they could be integrated into the Composting Facility. These options were further evaluated through the *Value Management Study* conducted in 2020 to identify and evaluate the most suitable process technology option. As part of the Study, a Class 4 capital and operations & maintenance cost estimate was developed for each of the 5 options. Industry experts in the fields of indoor / outdoor composting and anaerobic digestion ("AD") and City staff reviewed the alternatives, proposed improvements and cost savings to each

alternative, and determined which alternative provided the most value to The City based on a performance / cost calculation of each alternative. The Value Management Study determined that horizontal plug flow anaerobic digestion was the preferred technology for the expansion option.

For further due diligence, The City evaluated the expansion option against a second option of contracting with the private market to process excess capacity.

1.2 Project Options

Following the Value Management Study, this Business Case provides an analysis and comparison of the two (2) identified options based on strategic alignment to The City's policies, economic benefits, financial assessment, and the deliverability and operability of each option.

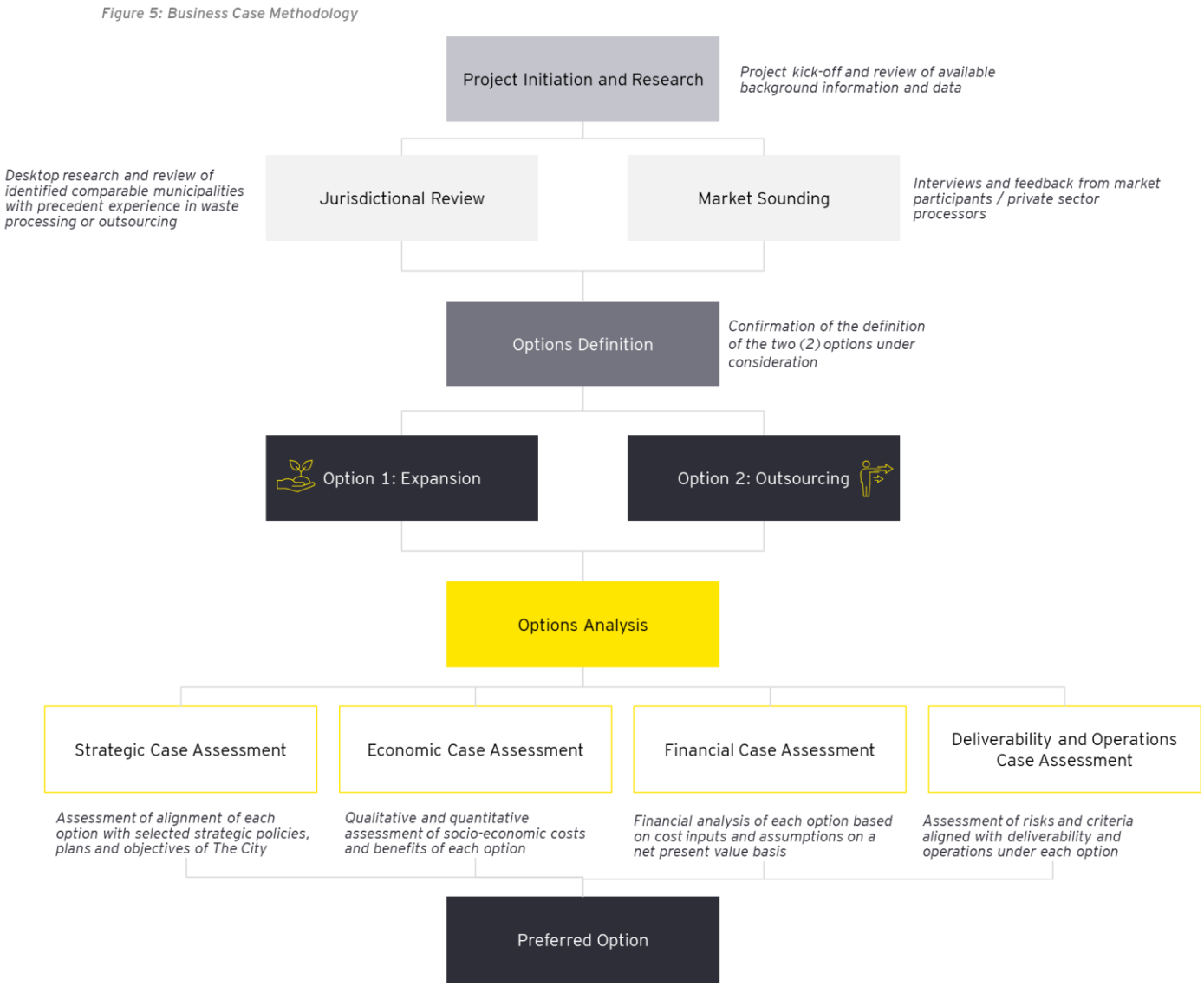
The two (2) options The City is considering in order to solve the capacity constraints are defined as follows:

- **Option 1 – Expansion:** Under this option, The City would expand the existing Composting Facility located at the Shepard Waste Management Facility, to be able to process the excess amount of material up to an additional 60,000 tonnes per year. Under this option, The City expects to use AD technology that will be owned by The City and initially operated by the current private sector partner, AIM Environmental Group.
- **Option 2 - Outsourcing:** Outsource material in excess of original design capacity of the existing facility (i.e., over 100,000 tonnes) to private facility operators that can process the additional organics material. The outsourcing option assumes the facility is capable of processing 60,000 tonnes per year. This option is further broken down into two (2) alternative solutions.
    - **Option 2A (outsourcing with composting):** Outsource material to a private processing facility that will generate compost from all organic waste. The proposed processing facility is anticipated to be located outside of City limits, therefore requiring a transfer station within The City, and hauling of materials from the transfer station to the processing facility.
    - **Option 2B (outsourcing with AD):** Outsource to a private processing facility that will process materials using AD technology, which is aligned with The City's intended approach as defined in Option 1. The processing facility is anticipated to be located within City bounds, eliminating the need for a transfer station, and transporting materials.

1.3 Approach and Methodology

The development of the Business Case is foundational for The City to determine its best option and will set a clear direction for how to manage the excess material collected. EY's methodology for the development of the Business Case is provided in the figure below:

Figure 5: Business Case Methodology



1.3.1 Project Initiation and Research

A kickoff meeting was held with members of The City's Project team on May 12, 2021. The objectives of this session were as follows:

- To address the current status of the Project and understand work carried out to date; and
- To discuss EY's proposed work plan, refine, and agree on scope and timing given the status of the Project.

In this phase of the Project, The City provided relevant documentation, which was reviewed by the EY Team. EY undertook a review of the available information and used The City's and the Consultant Engineer's work to date and data on the Project (as applicable).

In assessing the provided information and assessing the viability of the two (2) options, EY conducted a market sounding of private sector processing capacity and rates, and a jurisdictional review of transactions regarding contracting excess material.

Jurisdictional review

The objectives of the jurisdictional review were to identify other municipalities that have an agreement in place with private sector for excess waste. Where possible, EY conducted a review of available agreements with private contractors and sought some rationale as to why jurisdictions might select expansion over outsourcing options (or vice versa).

The intention of the jurisdictional review was to identify criteria or factors for the selection of preferred options in comparable jurisdiction, and to source potential lessons learned which may be applicable to The City in the future.

Further details on the jurisdictional review approach and key findings are provided in Section 2 of this Business Case.

Market Sounding

The market sounding process was undertaken to source information and assess the capability and appetite of the market to meet The City's processing needs through private sector processing capacity. EY conducted a series of interviews with identified market sector participants with the following objectives:

- Identify current processing capacity, current tonnage processed and processing rates in The City and regional areas; and
- Assess viability of processing additional tonnage to meet the future demands of Calgary.

Further details on the market sounding approach and key findings are provided in Section 3 of this Business Case.

1.3.2 Options Development

The EY Team confirmed the definition of the two (2) options under consideration based on further review of inputs and information from The City, and feedback obtained from market soundings and jurisdictional review.

In developing the options, the EY Team confirmed The City's assumptions and other considerations required for the analyses, including identifying potential limitations related to assessment of the two (2) options.

1.3.3 Options Analysis

In developing the Business Case, the EY Team undertook four (4) different analyses to determine a preferred option and recommendations with respect to The City's need to process excess capacity. The two (2) options under consideration were comparatively assessed to determine the most viable and effective option in alignment with The City's goals and objectives.

The following subsections provide an overview of the analyses undertaken to develop the Business Case, including:

Table 6: Analyses Undertaken in Completing the Business Case

Business Case Options Analyses	
Strategic Case Assessment	► Assessed the alignment of each option with The City's identified objectives, strategies and policies related to the Project ► Review of municipal plans, strategic plans and policies that were noted as applicable ► Assessment of how each option aligns with The City's strategies, goals, and objectives ► Identification of potential qualitative and quantitative benefits (where applicable) that support The City's strategies, goals, and objectives ► Further details on the strategic case assessment approach and outcomes are provided in Section 4 of this Business Case.
Economic Case Assessment	► Identified and assessed qualitative and quantitative socio-economic benefits for each option ► Assess the degree of socio-economic benefits including but not limited to employment, environmental, greenhouse gases, transportation, and local usage ► Identify each benefit to assess its value for each option ► Compare the Net Present Value ("NPV") of Project Cost and Benefits to determine ratio for each option (where appropriate) ► Further details on the economic case assessment approach and outcomes are provided in Section 5 of this Business Case.
Financial Case Assessment	► EY developed the financial model aligned with other complex waste sector infrastructure projects, reflecting best practices for structure and transparency, and having been previously independently reviewed. ► The model was tailored to reflect the requirements of this Business Case which included capital, financing, operations, and maintenance assumptions for both options, along with the variability in material quantity, gas generations amounts, gas revenue amounts, and third-party tipping fees assumptions. ► Inputs for the financial model were developed based on cost estimate information developed by Jacobs and other documents identified by The City. Additional information used in conducting the assessment was based on findings from the market sounding and jurisdictional review. The information sourced during market sounding interviews was not verified for accuracy. ► The financial model also incorporated scenarios to test sensitivity analysis related to aspects such as SSO processing amounts, the location of the private processing facility, financing rates and other variable elements. ► Inputs and assumptions used in the model were validated with The City's Project team and developed in alignment with market feedback received during the market sounding sessions and EY's experience on precedent projects. ► In addition, another factor of this assessment included a qualitative risk assessment to identify potential risks related to Project development and delivery. The assessment included consideration of the potential likelihood and impact on The City, should the risk occur.

Business Case Options Analyses	
	► Further details on the financial case assessment approach and outcomes are provided in Section 6 of this Business Case.
Deliverability and Operations Case Assessment	► EY conducted a qualitative analysis of factors and considerations aligned with the deliverability and operations of each of the two (2) options under consideration. ► Each of the options were assessed based on their respective alignment with the identified criteria (i.e., deliverability and operations factors). ► The outcomes of this assessment highlight the option which provides The City with the greatest operational flexibility, while considering factors related to Project development and delivery. ► Further details on the qualitative deliverability and operations approach and outcomes are provided in Section 7 of this Business Case.

1.4 Objectives of the Business Case

This Business Case provides an overview of the assessment of both potential options for consideration related to processing excess SSO capacity in The City. The collective outputs of the assessments were comparatively assessed to identify the preferred option in alignment with The City's needs, objectives, and future goals.

1.5 Limitations of the Business Case

In developing the Business Case, the EY Team conducted reviews, analyses, market sounding interviews, and financial modelling. The City provided relevant documentation, which was used by the EY Team. EY also undertook research based on publicly available information. The feedback sourced from market soundings and publicly available information and findings resulting of the jurisdictional review were not further validated for accuracy. The findings presented in this Business Case represent the information available at the time of submission to The City and may be subject to change based on updated information.

2. Jurisdictional Review

The purpose of this section of the Business Case is to summarize the jurisdictions or municipalities with contractual agreements in place with the private sector for the processing of residential organic waste. EY conducted a jurisdictional review to provide The City with a better understanding of the rationale and information used to determine if outsourcing was selected as a solution in other jurisdictions. The following subsections provide an overview of the jurisdictions included in this review, and key findings resulting from a review of publicly available information.

2.1 Selection of Jurisdictions

A total of 17 jurisdictions (Appendix A: Long-List of Jurisdictions Reviewed) were selected and reviewed to source high level information and lessons learned associated with decision making related to excess capacity. Five (5) jurisdictions were selected for a detailed review, including:

Table 7: Description of Jurisdictions included in Review

Jurisdiction	Description and Rationale for Selection
Airdrie, Alberta	► The City of Airdrie was included in the jurisdictional review due to its close geographical proximity to The City and its use of outsourcing to process SSO with local private sector partners. ► The City of Airdrie introduced their curbside green cart program in early 2014 upon successful completion of a pilot project. The collection and processing of organic waste was outsourced in early 2014 for a five (5) year term. Upon contract expiration, a new contract was re-tendered with a five (5) year term. In both occasions, GFL Environment Inc. was selected as the preferred service provider. As part of both contracts, it is the responsibility of the service provider to select an approved processing facility.
Ottawa, Ontario	► The City of Ottawa represents an example of a public entity issuing a competitive Request for Proposal (“RFP”) process for the development of a new privately owned facility to meet demands. ► In 2007, the City of Ottawa approached the private sector to provide solutions to address the implementation of a city-wide organics waste collection. A competitive procurement was issued to process up to 100,000 tonnes per year of SSO. ► By 2008, the City of Ottawa achieved its goal to divert 60% of residential waste from landfills through the introduction of processing organic waste and fulfill their commitment in order to receive an $8.5 million grant from the Federation of Canadian Municipalities Green Municipal Enabling Fund which supports SSO program implementation. ► An outsourcing approach was selected due to the dynamic nature of the waste industry and the emergence of new processing technologies which were considered to benefit Ottawa’s overall waste management strategy. ► The service agreement was awarded to Orgaworld (now known as Convertus) in early 2008 and construction of a new composting facility began in April 2009. This agreement has a term of 20-years and stipulates providing 80,000 tonnes of organics per year on a put or pay basis.

Jurisdiction	Description and Rationale for Selection
	► The contractual relationship has been publicly questioned due to contract requirements which include annual 'put-or-pay' thresholds.
Regional District of Nanaimo, British Columbia	► The Regional District of Nanaimo was included in the jurisdictional review as it represents a municipality in a neighbouring Western Canada province, and is an example of sole sourced outsourcing to process SSO. ► The district has historically required capacity for 15,000 – 20,000 tonnes of organic materials each year. It is anticipated that the addition of four in-vessel composting tunnels and odour abatement technologies will increase processing capacity up to 40,000 tonnes per year. ► In 2018, the district awarded Circular Waste British Columbia Inc. (now known as Convertus) a 20-year contract with a planned plant expansion and upgrade to increase the facility size and processing quality to support up to 90% diversion from landfill. ► Processing was outsourced in Nanaimo to leverage the capacity, experience, and expertise of the private sector. A long-term contract was awarded to ensure security and value for citizens. ► As part of the agreement, any excess capacity at the facility can be fulfilled by accepting organic waste from surrounding municipalities to leverage economies of scale and reduce the burden on systems in other municipalities.
Region of Niagara, Ontario	► The Region of Niagara represents a municipality that is currently in negotiations with a private sector processer to increase capacity to meet future SSO processing demands. ► The region introduced SSO collection in 2003 as part of a green bin program which collects food waste and, leaf and yard material. Since 2009, Walker Environmental Group has processed the organics under a contract over a 20-year term scheduled to expire on March 31, 2029. ► The agreement includes a minimum commitment of 29,700 tonnes to a maximum of 39,700 tonnes per year of which 5,700 must be bulking material as the facility is capable of processing 34,000 tonnes. ► The Region of Niagara is currently assessing its future capacity as they are forecasting 42,000 tonnes per year beginning in 2021. This assessment includes the review of the possible options to procure additional capacity at an alternate facility, build its own processing facility, or enter into negotiations with Walker Environmental Group to expand their processing facility. ► On April 13, 2021, the Public Works Committee approved the recommendation to enter into negotiations with Walker Environmental Group for the expansion of the Walker facility.
Toronto, Ontario	► The City of Toronto operates two city-owned organics processing facilities with private operators: Disco Road Organics Processing Facility and Dufferin Organics Processing Facility processing 75,000 and 55,000 tonnes per year, respectively through anaerobic digestion. ► The City of Toronto also contracts out approximately 45,000 tonnes per year of organic waste to private processors. Most recently (February 2021) an RFP to process up to 45,000 tonnes per year (through two separate suppliers) was issued to the market for a three-year term with a possible one-year extension to replace expiring contracts. This contract is anticipated to support the City of Toronto with processing excess materials until a new city-owned facility is completed ($141 million estimated capital expenditure with commissioning anticipated in 2028).

For each of above noted jurisdictions, a comprehensive review was conducted, including

- Strategic planning and decision making;
- Procurement model; and
- Service agreement model (where available).

The following sections provide an overview of key themes, considerations, lessons learned and key findings. The findings were based on publicly available information sourced in the desktop review.

2.2 Summary of Key Findings

The following subsections highlight key findings resulting from the desktop review and research on the shortlisted jurisdictions.

2.2.1 Strategic Planning and Decision Making

While reviewing jurisdictions, a mix of priorities and challenges were identified. Examples of the priorities and challenges related to strategic planning and decision making are detailed below for the municipalities of Ottawa, Niagara and Toronto.

City of Ottawa

The City of Ottawa entered into agreement with Convertus (formerly known as Orgaworld) in 2008 to build a privately-owned facility and process up to 100,000 tonnes per year of organic waste with a commitment to supply a minimum of 80,000 tonnes per year for a 20-year term. The recommendation to conduct a competitive procurement was founded on the following considerations and based on their overall waste management strategy which was brought forward to Council on March 15, 2007:

- Implementation of a suite of waste management approaches to ensure ability to meet the growing demands of the city and decrease landfill capacity.
- Emergence of new technologies for alternative solid waste management methods, waste reduction, energy from waste, and mixed waste processing technologies.
- The requirements for the Federation of Canadian Municipalities Green Municipal Enabling Fund ($8.5 million) that required a commitment to a citywide organics program by May 30, 2007.
- Divert 60% of residential waste by the end of 2008 from landfills to support their strategic goals.

City administration recommended proceeding with a competitive procurement for the implementation of an SSO program as it could meet the timelines for the grant and allow the market to present innovative solutions. An RFP was issued shortly after (March 2007) with the proposed facility being in service by April 2010.

In reporting from the City of Ottawa, it was indicated that there has been years of legal disputes between the City of Ottawa and Convertus related to processing of specific types of inputs (i.e., leaf and yard waste). In 2018, the City of Ottawa expanded its contract with Convertus. The renegotiated contract would end all ongoing legal action between the two (2) parties. It would also see the 80,000 tonnes “put-or-pay” provision, which the City considered unreasonable in review, reduced to 75,000 tonnes.

Region of Niagara

Region of Niagara staff recommended that the Region enter into negotiations with the current service provider, Walker Environmental Group, for the expansion of its current organic waste processing facility. This expansion was required as it is estimated that the Region of Niagara will be generating 42,000 tonnes of SSO per year by the end of 2021. This is an additional 8,000 tonnes of organic waste per year above the current capacity of the

facility. The recommendation was supported by an analysis reviewing the following three (3) options to address the excess capacity:

- **Procure additional capacity at an alternate facility:** This option considered both the processing and hauling costs, along with the use of a transfer station as the facilities would be generally located outside the region. Through a market assessment of processing facilities, the price to process organics was found to be in the range of $110 per tonne to $130 per tonne. A haul rate was determined to be $20 per tonne and the construction of a transfer facility would need to be added. The challenges of procuring additional capacity at a reasonable price was due to the low tonnage and processing facilities within a reasonable distance.
- **Build own SSO processing facility:** The Region of Niagara could build their own facility but would require roughly 2.5 to 3 years to receive approvals from the Ministry of Environment, Conservation and Parks, secure capital funding, and design and build a facility. Additionally, an operator would be required to process the material. A challenge identified for this option was the continued need to process of excess SSO during the time period required to build the facility.
- **Negotiate with current provider to increase facility capacity:** Negotiations with Walker Environmental Group would seek to determine a suitable arrangement to expand the existing facility to accept an additional 8,000 tonnes per year. Negotiations would be conducted on the basis of the 'Procurement By-Law No. 02-2016' that permits negotiations for the purpose of extending an existing contract when deemed more effective.

On April 13, 2021, the Region of Niagara Public Works Committee approved the authorization for staff to enter into negotiations with Walker Environmental Group. No anticipated timeline for the negotiation is publicly available at this time.

City of Toronto

The City of Toronto has two (2) organic processing facilities, located at Disco Road and Dufferin, that have the capacity to process 130,000 tonnes of organic waste per year. To compliment these two facilities, in February 2021, the City of Toronto issued public tenders to request additional services for processing up to 45,000 tonnes per year split into two (2) contracts. This limits the risk of private sector facilities not meeting environmental requirements if processing over capacity.

The City of Toronto has outsourced private sector processing to meet growing demands as it continues to advance its *'Long-Term Waste Management Strategy'*. As part of this strategy, the City of Toronto has forecasted the need for a third anaerobic digestion facility similar to the Disco Road facility in 10 to 15 years that could process up to 75,000 tonnes per year. In order to meet the immediate demands, they elected to process the excess capacity using the private sector as there is currently insufficient quantity of organics to support investment in a City-owned facility.

2.2.2 Procurement Process

There was limited publicly available information related to the procurement process for expansion or outsourcing to achieve additional processing capacity. Available information has been summarized for the City of Airdrie, Regional District of Nanaimo and City of Toronto.

City of Airdrie

In May 2014, the City of Airdrie introduced a curbside organic waste collection program to single-family residents. The organic waste collection program was introduced after the successful completion of a pilot project.

An RFP issued on December 20, 2013 requested interested parties submit a proposal to provide fully automated collection, hauling and processing services for city-owned curbside organic carts for a 5-year term and up to 10,000 tonnes per year. The RFP closed on February 18, 2014 and was awarded shortly thereafter to GFL Environment Inc.

The contractual agreement required the contractor to collect and transport all organic and residential yard waste to a processing facility that met all applicable and regulatory requirements in Alberta. The City of Airdrie issued a new RFP in 2019 to provide similar services for a five (5) year term that was awarded to GFL Environment Inc.

Table 8: Details of City of Airdrie Procurement Process

Details of City of Airdrie Procurement Process		
Procurement Phases	Request for Proposals to select preferred bidder	
Schedule	RFP Issuance: December 20, 2013 Response Deadline: January 15, 2014 Contract Award: February 18, 2014	
Scope of Services	To provide all necessary manpower, equipment and resources required to provide fully automated collection, hauling and processing services for City owned curbside organic carts set out by single family dwellings on a weekly and bi-weekly schedule (weekly basis from May to September and a bi-weekly basis from October to April).	
Evaluation Criteria	Criteria	Weighting
	► Conformance in meeting the primary objectives of RFP	10%
	► Proposed service levels	15%
	► Past performance, references and vendor reliability	10%
	► Total bid price to meet requirements	55%
	► Implementation and termination plan	10%

Regional District of Nanaimo

The Regional District of Nanaimo released a Notice of Intent to Award Contract for the Organic Waste Processing Contract to Circular Waste British Columbia Inc. (“CWBC”) on April 27, 2018. CWBC was a joint venture comprised of Convent Capital, Waste Treatment Technologies and Nanaimo Organic Waste. The award of a direct 20-year contract was the result of negotiations with the joint venture requesting a contract extension to meet the capacity demands and upgrade the facility at an estimated cost of $3.5 million. The direct award was supported by the following reasons:

- Requirement for a contractor that has capacity, experience and expertise to accept and process at least 15,000 tonnes of organic material per year.
- Requirement for a contractor that is fully licensed and permitted by the Ministry of Environment and all applicable local authorities.

- Provision of storage and processing technology that is considered to be "best in class", including undertaking acceptance and processing of food waste in an air-controlled, odour mitigating environment.
- Increase organics diversion to meet the Solid Waste Management Plan's goal of 90% diversion.
- Need for a contractor that is uniquely positioned to meet requirements and will provide long-term security of services and represents good value and quality for taxpayers.

City of Toronto

The City of Toronto recently issued an RFP for organic waste processing to complement the existing processing capacity at two City of Toronto owned facilities. The RFP was issued to select two (2) suppliers that could each process 20,000 to 25,000 tonnes of organic waste per year. The contract issued was for a three (3) year term with the option to extend the agreement for one (1) year. The contracts were awarded to Cornerstone Renewables and StormFisher Environmental on May 5, 2021 to process 25,000 and 20,000 tonnes per year respectively. Service to process the organic waste begins in June 2021 with prior contracts expiring May 2021.

Table 9: Details of City of Toronto Procurement Process

Details of City of Toronto Procurement Process		
Procurement Phases	Request for Proposals to select two (2) preferred bidders	
Schedule	RFP Issuance: February 1, 2021 Response Deadline: March 3, 2021 Contract Award: April 30, 2021	
Scope of Services	Organic material processing services for two contracts with two (2) separate suppliers for a total of up to 45,000 tonnes per year (20,000 and 25,000 tonnes per contract). The City will supply organic material, provide haulage services if each facility is located less than 161 km from Toronto.	
Evaluation Criteria	Criteria	Weighting
	► Stage 1 – Mandatory Requirements	Pass/Fail
	► Stage 2 – Evaluated Proposal Content	
	► Supplier profile	6%
	► Experience and qualification	14%
	► Proposed staff and team	5%
	► Proposed System/Solution	20%
	► Work Plan and deliverable	20%
	► Circular Economy Company Profile	15%
	► Stage 3 – Cost of Services Pricing	20%

2.2.3 Service Agreement Models

Contracts in the City of Toronto, the City of Ottawa, and the Regional District of Nanaimo are currently active. The contract length for the City of Toronto is three (3) years with the option to extend for one (1) year. The City of Ottawa and Regional District of Nanaimo have both issued 20-year contracts. The City of Airdrie is currently re-routing their organic materials to a GFL Environmental Inc. facility in the City of Calgary. The Region of Niagara is currently in negotiations to expand the Walker Environmental Group's facility. Key elements related to the City of Airdrie and the City of Toronto service agreements are highlighted in the following subsections.

City of Airdrie

The scope of work in the City of Airdrie's RFP (*RFP# R386-2013-KM; Fully Automated Curbside Organics Program for Collection, Hauling and Organics Processing Services - January 2014*) included providing all necessary manpower, equipment and resources required to provide fully automated collection, hauling and processing services for city-owned curbside organic carts set out by single family dwellings on a weekly and bi-weekly schedule (weekly basis from May to September and a bi-weekly basis from October to April). City of Airdrie Council reports reflect a positive sentiment regarding their organics program and the roll-out of the Cart Wizard program in 2018 and 2019.

Clauses included in the service agreement referenced an award of such contract shall not prevent the City of Airdrie from entering into an agreement with any other person or company for the collection, removal, and processing of organics accumulated at residential dwellings. There is a clause noting that equipment shall meet current safety and environmental regulations.

Historical waste weights for the first three (3) years were provided in metric tonnes ("MT") as follows:

- 2010: 6,985 MT
- 2011: 7,516 MT
- 2012: 8,288 MT

The following insurance requirements were included:

- Commercial General Liability ($5 million to $10 million)
- Owned Automobile Liability Insurance ($2 million to $5 million)
- "All-Risk" Property

The service agreement was awarded to GFL Environmental Inc. in 2014. This agreement included the requirement of organic processing, albeit the agreement did not stipulate the location of the facility. GFL Environment Inc. had selected Thorlakson Nature's Call as a partner for the processing of organics. Thorlakson Nature's Call had been forced to close the facility, as stipulated by Rocky View County, as they were operating without the appropriate permits in June 2019. Thorlakson Nature's Call was required to meet conditions that included air quality and odour assessment and install an air quality management system to address the odour and meet the requirements of the development permit. The deadline was January 31, 2019 which was not met but continued to operate without proper permitting until June 2019 when they were shutdown by the Rocky View County. The Alberta Environment and Parks Ministry has since issued a $1.5 million penalty and is currently in litigations.

GFL Environmental Inc. has since shifted it organics processing at its owned facilities. Two (2) facilities in separate locations have been used for carrying out the contractually required processing; one (1) facility in Strathmore followed by one (1) in the City of Calgary. This change occurred in response to a decision to shut down GFL Environmental Inc.'s Strathmore location by Strathmore City Council. Hauling long distances has been voiced as a concern to the City of Airdrie due to fossil fuel consumption and associated emissions such as greenhouse gases ("GHGs"). Both the Thorlakson Nature's Call and the GFL Environmental Inc. facility in Strathmore have had challenges with meeting the provincial environmental regulations.

City of Toronto

The scope of work in the City of Toronto's RFP (*Part 2 – Form of Agreement, RFP No. Dec 2804646264*) included supplying organic material, providing haulage services if the facility is less than 161 km from Toronto, and payment terms for organic material processing services. The supplier is responsible for marketing the end product for 'beneficial use' which is a defined term in the RFP. There was a non-exclusivity clause stating that a supplier shall not be guaranteed exclusivity. Dispute resolution is outlined and includes the use of a 'Rectification Notice'. There is a section in the RFP providing information on the goals of the City of Toronto Social Procurement Program which have been developed to drive inclusive economic growth in Toronto.

The City of Toronto is responsible for the following:

- Removing organic material loads that are rejected by the supplier(s) once loaded onto a city transfer vehicle
- Paying the amount of $0.22/km MT for the rejected whole or partial load
- Operating, and maintaining the transfer stations' loading facilities
- Providing measured weight information using weigh scale records

The RFP specified that the facility must be enclosed and equipped with an odour control and treatment system to contain odours and prevent fugitive emissions. It is also required to treat collected odorous air to reduce odour concentration and enhance dispersion of treated air in order to prevent off-site odour impacts.

Details on the awarded tonnage (Minimum Annual Guarantee Tonnage) are as follows:

- Supplier 1: 25,000 (Performance Security (Letter of Credit Requirement): $825,000); Average tonnes per day, 5 days per week: 100 (Variance +/- 35)
- Supplier 2: 20,000 (Performance Security (Letter of Credit Requirement): $660,000); Average tonnes per day, 5 days per week: 80 (Variance +/- 35)

Note: The City of Toronto guarantees to supply a minimum of 70% of the above awarded tonnage.

The following insurance requirements were included:

- Commercial General Liability ($5 million)
- Pollution legal liability insurance ($2 million per occurrence)
- Automobile Liability Insurance ($5 million)

Appendices of the service agreement included 'Transfer Station Information' and 'Photos of Typical Organic Material'.

2.3 Summary of Key Themes and Lessons Learned

The following sections highlight key themes and lessons learned resulting from the desktop review and research on the shortlisted jurisdictions.

2.3.1 Strategic Planning and Decision Making

The majority of jurisdictions included in the detailed review have outsourced organic waste processing as an immediate solution to meet their waste management goals and requirements to receive funding approval as both capacity and infrastructure exist in their respective local markets. Municipalities such as the City of Toronto and Regional District of Nanaimo have access to established private sector waste processing infrastructure and market capacity, which impacted strategic planning and decision making related to outsourcing.

The timeline to meet the goals or qualify for grants has impacted the decision as outsourcing appears to be the timeliest approach to introducing an organic collection program when sufficient capacity is available locally. In some cases, the private sector has supported public sector owned facilities to meet the growing demands and divert organic waste from landfills.

2.3.2 Procurement Process

Jurisdictions appear to have selected preferred procurement process by considering the availability of local organic processing services and market capacity. In some cases, jurisdictions have sole sourced the processing services as there is limited local processing capacity. The majority of jurisdictions appear to issue an RFP with general turnaround of two to three months for a response.

Jurisdictions have balanced the requirements and evaluation criteria with experience and the ability to meet environmental regulations as the reliability and performance of suppliers is evaluated. The organic processing industry has been challenged with meeting environmental regulations as facilities are stretched to overcapacity and generating excessive odour. Consideration to maximum tonnes per year and per month of organic waste processing should be included in procurement in order for suppliers to design facility to meet demands.

2.3.3 Service Agreement Models

The majority of municipal service agreements available and reviewed as part of the detail review of the five (5) jurisdictions included supplier owned facilities, specified term lengths and a defined range of organic materials to be processed. A few facilities are currently in operation and one municipality is in active negotiations. Other contracts have since been extended. All service agreements were non-exclusive.

In the procurement documents, municipalities included minimum tonnage and average tonnes per day along with estimated variances. Hauling services costs were included in the agreement and were adjusted annually. Historical information related to nature and quantity of organic materials were provided.

2.3.4 Lesson Learned

The jurisdictional review included a detailed review of five (5) jurisdictions that each selected a unique approach to outsourcing organic processing. The variation of approaches provides a better understanding of the risks and lessons learned that should be incorporated in the potential outsourcing option. The following high-level lessons were derived from the jurisdictional review for the procurement model with respect to the potential outsourcing option:

- The state of the regional market, including availability of established market participants (i.e., existing facilities), current processing capacity and potential private sector capacity expansion in the region should be considered when determining the preferred procurement model.
- Outsourcing organics is seen as an immediate solution to meeting the growing capacity demands if capacity is available. Consider the length of the agreement to reflect the degree of investment required from the private sector.
- Allowance for multiple agreements with multiple parties (two or more) to reduce the risk of over capacity to a supplier that may impact the environmental obligations.
- Allowance for market innovation for various technologies and outputs as to not limit the market on the various technologies currently used.
- Allowance to increase or decrease maximum and minimum processing capacity to allow for fluctuation in actual and forecasted organic waste tonnage.
- Provide flexibility for changes in the allowable organic material to be processed.

The City of Calgary should consider the above noted factors and considerations if implementing the outsourcing option (option 2).

3. Market Sounding

The purpose of this section of the Business Case is to summarize the informal input received from companies in both the local and national waste and primarily organics market in response to the potential to outsource the processing of excess capacity of SSO collected by The City.

EY used the following approach to plan and execute the market sounding:

1. Identified, in collaboration with The City, an appropriate list of companies with sector experience. A total of eight (8) interviews were completed between May and August 2021 (see Appendix B for the list of participants).
2. Prepared a market sounding briefing document which provides Project background, an overview of the options under consideration, a timeline of the report to City Council, and interview questions. The document was circulated to participants prior to the interview.
3. Interviewed participants via video conference calls using the market sounding briefing document to ensure consistency. These meetings were attended by representatives of EY and the respective participant companies. Discussions lasted approximately 60 minutes each. EY asked follow-up questions as appropriate and participants were invited to provide additional input relevant to the Project.

3.1 Summary of Market Sounding Key Findings

In general, market sounding participants indicated a strong interest in the Project and a potential partnership opportunity with The City, however, it was determined that there is limited capacity in the regional market, and no facility, or combination of facilities, are currently able to process the additional amount of organics The City is looking to process. As per feedback from market sounding participants, it was suggested there is approximately 10,000 to 20,000 tonnes of available annual processing capacity in the current market, however these providers would be outside of City limits. This would require additional logistics to transport materials to the providers' facilities or alternatively, a new transfer station could be built within City limits to facilitate waste collection and distribution to processors outside of The City. The estimate of current private sector market capacity was provided by market sounding participants and was not further verified. This finding has been applied throughout this Business Case as an assumption for the assessment of options

Further findings and feedback from market sounding participants are summarized as key themes in the table below.

Table 10: Summary of Key Findings from Market Sounding Interviews

Key Theme	Commentary
Experience	► There is varied large scale organics processing experience in the Alberta market. This experience ranges depending on the organization, however, several participants noted experience working with municipalities. ► Generally, regional market experience includes processing of co-mingled food and yard waste.
Contract	► There is interest from the market to pursue a contract with The City, and participants noted a range of contractual preferences related to contract length, capacity, terms, etc. ► Participants indicated a general preference for smaller processing contracts (e.g., 10,000 – 20,000 tonnes per year) over longer terms (i.e., five (5) years or longer). Providing a minimum guaranteed tonnage helps with financing.

Key Theme	Commentary
	► A few participants noted they would be interested in a long-term contract with The City resulting in a new privately-owned and financed facility. ► Preference for a performance-based contract as opposed to prescriptive one allows for innovation and opportunity to provide the best solution for both The City and the private sector.
Capacity	► Based on market sounding participant feedback, there is limited processing capacity available in the regional market. Those that are building facilities noted that there are already contracts in place and noted that they have limited ability to take on additional SSO. ► Participants suggested that The City may consider the use of multiple contracts to meet the excess capacity processing requirements. ► However, it was indicated that there was not sufficient capacity in the regional market to process the excess amounts The City is looking to process, in existing facilities. ► Participants suggested that in order to increase market capacity, private sector investment will likely be required (i.e., expansion or development of new facilities). This would apply to facilities not owned or operated by The City. ► Two (2) participants are currently in the process of constructing new facilities (one pending financial close in June 2021 and the other anticipating construction completion by spring 2022). It is important to note that potential construction or expansion of private sector facilities are often tied to commitments or contracts, i.e., the additional capacity may already be committed to a specific party. In addition, if there is additional capacity at these new construction or expansion facilities, there may be an option with existing contracted parties to use the additional capacity. ► Most participants have been considering investment in the Alberta market which may increase capacity in local markets (e.g., Rocky View County, Canmore, Calgary, and Edmonton). As indicated above, private sector investment in the development or expansion of waste processing facilities is typically tied to established contracts or commitments, which may limit the capacity available to The City. ► Participants highlighted the need to consider seasonality and other events (i.e., capacity in the market to process yard waste is different from the capacity to process other SSO materials) with respect to SSO amounts. Available market capacity might change depending on seasonality; however, this potential additional capacity is difficult to predict.
Contamination	► Both the nature of and quantity of contamination (e.g., expected to be approximately 5% to 10%) are key considerations for the market. ► Participants highlighted the importance of providing detailed contamination information in procurement documents. The contaminate that raised the most concern was glass. ► There is potential for penalties or excess charges to be applied on contaminated feedstock.
Rate	► Participants noted estimated processing rates ranging from $55 to $155 per tonne. These processing rates varied dependent on the size, experience and availability. They also varied based on the quantity of contamination. ► Tipping fees were anticipated to improve with longer term contracts and a committed minimum tonnage. A few participants noted that they would offer preferential tipping fees to The City with guaranteed tonnage. ► One (1) participant is planning to begin construction of a new facility this year (2021) and provided a processing rate estimate of $40 to $50 per tonne and noted that there may be an additional fee for transportation if required (maximum $20 per tonne). While the quoted processing rate appears low, this is an uncommitted rate and an outlier to other rates quoted, and therefore not included in the financial modelling.

Key Theme	Commentary
Technology	► There are a variety of technologies available in the market. Participants expressed a preference for flexibility in technology as opposed to a prescriptive technology for processing.
Regulations	► The market raised concerns regarding new environmental regulations (i.e., control of odours emanating from facilities) which have led to shutdowns in the Alberta market. Participants are anticipating changes from the Ministry of the Environment and Parks before the end of the year that may include more stringent regulations. ► The market is aware of municipal approvals, by-laws and zoning requirements.
Transportation	► Participants were open to different transportation options including hauling organics to their facility from The City's existing facility or building a transfer station within The City's boundaries. It was noted, however, that transfer costs would likely be built into suppliers per tonne price. ► Hauling fee estimates were consistently estimated at around $20 per tonne. ► One (1) participant specifically noted that they are not interested in transporting organics, only processing.
Other	► A few participants referenced their participation in the ongoing works of the 'Compost Council of Canada' (e.g., roll-out of compostable packaging). ► All participants anticipate growth in the market including expansion to include materials from the industrial, commercial, and institutional ("ICI") sector in addition to The City's current SSO.

Overall, participants were appreciative of the opportunity to contribute to the market sounding exercise and expressed interest in updates related to the Project following City Council's decision in December 2021. A few participants expressed they would be open to answering further questions from The City as the Project continues to progress. The majority of participants expressed interest in participating in a future competitive procurements for municipal contracts for either the expansion (as technology provider or operator) or the outsourcing option and suggested a minimum of six (6) to eight (8) weeks for an RFP response.

3.2 Summary of Market Sounding Lessons Learned

Generally, market sounding participants expressed interest in potential partnerships with The City. The following high-level lessons were derived from the market sounding with respect to the potential outsourcing option:

- There is insufficient capacity in the regional Calgary market currently to accommodate processing of the excess amounts currently being collected by The City.
- Based on currently available information, there is insufficient capacity in the market to process forecasted excess capacity requirements of The City without construction of a new private facility
- Market sounding participants estimated that The City could outsource up to 20,000 tonnes per year immediately with multiple contracts with multiple providers. This estimate was not further verified for accuracy.
- There is market interest in expanding or building facilities to accommodate The City's excess SSO.
- The City could anticipate construction completion over the next one (1) to three (3) years on multiple facilities, however, available capacity at these sites may be limited in the near term due to existing/established contracts. The financial model reflects a conservative estimate for the construction period (i.e., three (3) years).
- To respond quicker to current demand, other municipalities have engaged with and contracted organizations while their facility is being built or expanded, if capacity is available.

- Participants articulated the importance of a circular economy which included:
    - Maximizing the useful life of resources;
    - Reducing reliance on non-renewable resources;
    - Reducing the carbon footprint and limiting environmental impacts;
    - Regenerating natural systems; and
    - Enhancing social outcomes and local economic development.

Example: The City of Toronto's Green Bin program demonstrates their commitment to the circular economy through its investments in facilities, contracts and resident education that keep organic material out of landfill and convert it into nutrient-rich end products.

4. Strategic Case Assessment

The purpose of this section of the Business Case is to assess the extent to which each option supports The City's policy goals, strategies and planning documents as outlined in The City's Statement of Requirement ("SOR") and by The City's representatives. In articulating areas of alignment and misalignment, the Strategic Case will identify material benefits and costs under each option for further quantitative and qualitative assessment in the Economic Case.

EY used the following approach to assess how each option supports The City's goals:

1. Reviewed The City's Municipal Development Plan, strategic plans and policies.
2. Drafted high-level descriptions of The City's Municipal Development Plan, strategic plans and policies.
3. Identified benefits that support the municipality's strategies, goals and objectives.
4. Reviewed draft benefits during a workshop with The City and incorporated feedback (Note: The identified benefits are also used in Section 5).
5. Identified the document's alignment with each of the two (2) options.
6. Assessed how each option is supported by the municipality's strategies, goals and objectives.
7. Shared preliminary outputs with The City for review and commentary.
8. Incorporated The City's commentary into the Business Case.

4.1 Overview of Strategic Plans, Policies and Objectives

The following strategic documents were reviewed in conducting the strategic case assessment.

Table 11: Overview of Strategic Plans, Policies and Documents included in Strategic Case Assessment

Strategic Document / Policy	Description
2020 Municipal Development Plan ("MDP")	The MDP is a strategic policy document that guides Calgary's growth and city-building. Sustainability is highlighted as a key objective for The City in the MDP. This document presents planning and development policy statements that align with current and future waste diversion targets for The City.
Climate Resilience Strategy	The Climate Resilience Strategy is a strategic document organized into three sections: ► The Climate Resilience Strategy provides the main direction for The City. ► The Climate Mitigation Action Plan identifies the role and actions of The City to reduce emissions and enable a low carbon economy. It includes five (5) themes: buildings and energy systems, land use and transportation, consumption and waste, natural infrastructure, and leadership. ► The Climate Adaptation Action Plan identifies risks and vulnerabilities and involves an iterative process of risk assessment. It includes five (5) themes: people, infrastructure, natural infrastructure, water management, and governance. These objectives tie directly to the outcomes of this Business Case, and the selection of the optimal option for processing excess capacity, including infrastructure development and waste management.

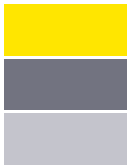
Strategic Document / Policy	Description
Calgary in the New Economy Strategy	The Calgary in the New Economy Strategy is a living document that sets direction and establishes priorities for The City, while evolving to adapt to changing times. It includes three (3) core values for consideration, options should be inclusive, entrepreneurial, and enhance community spirit, and three (3) principles for consideration in decision making (decisions are data driven, stakeholder led, and aspirational).
Resilient Calgary Strategy	The Resilient Calgary Strategy explores the following four (4) pillars along with actions that highlight the collaborative interests of resilience work and goals: ► Pillar 1: The Future of Calgary's Economy ► Pillar 2: Inclusive Futures ► Pillar 3: The Future of Calgary's Natural Infrastructure ► Pillar 4: Future Ready Infrastructure These pillars are considered in order to assess the two (2) options.
Social Wellbeing Policy	The Social Wellbeing Policy outlines policy statements and procedures for how The City's services can contribute to achieving quality of life and increased Civic Participation for all Calgarians. The two (2) options are assessed by their degree of alignment with selected relevant policies and procedures highlighted in this section.
Rethink to Thrive Strategy	The Rethink to Thrive Strategy provides focus to administration related matters and outlines how City of Calgary employees will work together to support the delivery of the City Manager goals and Council's direction. It includes four (4) objectives and five (5) strategies with corresponding actions which were considered in assessing the options.
Economic Resilience Task Force	The Economic Resilience Task Force ("ERTF") document provides recommendations and advice to the COVID-19 Corporate Governance Committee regarding assistance that The City could provide to mitigate the impacts COVID-19 has had on the economy and The City's finances. This strategic document was included in the review to assess the potential economic impacts of COVID-19 on the two (2) options. Effective August 1, 2020, the ERTF transitioned from short-term strategies related to COVID-19 to medium and long-term strategies to address broader resilience. This Project aligns with the ERTF goal of generating a pipeline of economic resilience and will require financial decision making for a long-term project.

4.2 Strategic Case Assessment Approach

This assessment was undertaken to summarize the degree of alignment to each identified option with The City's selected strategic policies, plans and objectives.

The degree of alignment was assessed on a scale of a high, medium or low with respect to each of the documents noted in Section 4.1.

Figure 6: Strategic Case Ranking Scale - Degree of Alignment



Yellow represents a high degree of alignment.

Dark Grey represents some/medium degree of alignment.

Light Grey represents low to no degree of alignment.

4.3 Option 1 Strategic Case Assessment

A summary of the strategic case assessment of the expansion option is provided in the table below. The expansion option was assessed in alignment with the strategic policies, plans and objectives of The City.

Table 12: Option 1 (Expansion) Strategic Case Assessment

Option 1 - Expansion: Strategic Case Assessment		
Document	**Rank**	**Findings**
Municipal Development Plan	High	► Option 1 supports The City's implementation of a food action plan. ► Expansion would attract/implement government funding as a City-owned asset. ► Ability to preserve open space, agricultural land, & natural beauty as the expansion would be built on an existing site and would not require greenfield lands. ► The City is directly able to reduce waste and improve waste management and resource recovery.
Climate Resilience Strategy & Action Plan	High	► Demonstrate The City's leadership in the construction, operations, and maintenance of City-owned buildings, facilities, and infrastructure, as The City would retain control over these aspects of the expansion facility. ► Waste reduction and waste management is a core service that The City is responsible for providing to citizens. Under Option 1, The City retains control over waste management, including control over facility operations and processing methods in alignment with emissions/energy systems targets.

Option 1 - Expansion: Strategic Case Assessment

Document	Rank	Findings
		► Expansion aligns with The City's objectives to improve current fleet and/or facility by minimizing GHG emissions (see Corporate Energy Plan: 2016-2026). For example, The City may pursue a Canadian Clean Fuel Standards pathway in partnership with another business unit to offset their natural gas use through use of cleaner renewable natural gas ("RNG"). ► Investment in anerobic digestion and production of RNG will help enhance energy resilience of The City and shift the economy towards a circular economy.
Calgary in the New Economy Strategy	Med	► Allows The City to embrace innovation and technology, and continue to diversify into high-growth sectors, including energy security and environmental sustainability. Investment in AD and production of RNG will help attract highly skilled labour and supporting businesses. ► AD is a relatively new technology in Canada but with a high potential to create a renewable natural resource which will lower overall GHG emissions and potentially replace existing fossil fuel sources. ► Investment in City-owned infrastructure helps enhance economic prosperity by providing a reliable revenue stream and GHG reductions to The City. ► The City creates by-products such as renewable natural gas and high-quality compost for the local economy.
Resilient Calgary Strategy	Med	► Alignment with The City's objective of intentional investment in infrastructure to support resilient technological advances, weather events, and chronic aging of assets. Investment in anerobic digestion and production of RNG will help enhance energy resilience of The City and shift the economy towards a circular economy. ► Investment in City-owned asset means additional capacity is secured for its residents, and there is no risk of The City being outbid in its pursuit of processing capacity in the private market. This serves to enhance the resilience of its waste management system.
Social Wellbeing Policy	High	► The City will 'lead-by-example' by moving towards a circular economy, demonstrating its commitment to sustainable development and renewable energy sources. This would be supplemented with incremental educational benefits associated with the introduction of anerobic digestion technology to The City.
Rethink to Thrive Strategy	High	► Expansion can enhance value for money to residents through more efficient processing of SSO and aligns with The City's objectives to deliver major capital projects. ► Ability to improve The City's reputation with respect to waste management and diversion programs. The expansion shows further commitment to the green cart program and alignment with its objectives. ► Demonstrates The City's proactive planning to manage changes in demographics and citizen expectations, including increases to forecasted processing capacity needs. ► Alignment with The City's objective to increase their overall waste management capacity and to be better able to respond to decisions by other orders of government (both provincial and federal).

Option 1 - Expansion: Strategic Case Assessment

Document	Rank	Findings
Economic Resilience Task Force	Med	► The City would retain financial risk. The expansion would be financed entirely by The City or in part by other levels of government. ► The City's investment in the expansion may ensure better value from The City's assets and would support local job creation. ► Alignment with investment in infrastructure that supports 'green' goals such as reduction of greenhouse gas emissions.

Based on the review of the strategic plans, policies and objectives, the following potential benefits and costs have been identified with respect to the expansion option.

- **Cost stability / volatility:** expansion provides a degree of long-term cost stability under the current P3 contract and aligns with The City's longer term strategic and financial planning goals. Expansion is also better aligned because The City does not base investment decisions on project returns or profit metrics.
- **Reputational impact:** no service delivery disruption is anticipated. Investment in expansion may increase the cost of services to citizens.
- **Job creation:** opportunity to design, construct, maintain, and operate the facility and therefore creates local jobs.
- **Revenue impact:** create an additional revenue stream for The City (sale of RNG). Composting by-products would be sold; however, revenues are small in comparison to the sale of RNG (less than 10%) and would be retained by the facility operator as is the case in the current facility.
- **Lack of redundancy:** demand issue created should the facility be taken offline. The City would need to divert materials to the private sector and would likely pay a premium price.
- **Downtime landfill diversion:** materials diverted to landfill create adverse environmental outcomes for The City.
- **Adverse amenity impacts:** by increasing processing capacity, odour and noise impacts may also increase which impacts citizen amenity and quality of life.
- **Renewable energy education:** investment in anaerobic digestion creates an opportunity for The City to educate citizens on renewable energy, sustainable development and a circular economy.
- **Energy resilience:** opportunity to increase and diversify domestic energy production in The City through converting organic feedstocks to RNG
- **GHG reduction:** reduce carbon dioxide and methane emissions in the atmosphere through the generation and use of RNG. GHG is reduced as a result of waste diversion and the displacement of fossil natural gas.
- **Circular economy support:** helps to accelerate The City's move towards a circular economy by using RNG as a potential source of electricity, heat, and fuel. This in turn reduces The City's overall carbon footprint and enhances energy resilience.
- **Air quality improvement:** opportunity to reduce GHG as materials won't require transfer services and could consider replacement of diesel in transportation fleets with compressed natural gas .
- **Agriculture sector support:** transform feedstock into by-products such as renewable natural gas and high-quality compost for the local economy.

4.4 Option 2 Strategic Case Assessment

A summary of the strategic case assessment of the outsourcing option is provided in the table below. The outsourcing option was assessed in alignment with the strategic policies, plans and objectives of The City. The below findings are consistent between both option 2A (outsourcing with composting) and option 2B (outsourcing with AD). In some instances, option 2B may be slightly more favourable than option 2A based on the technology used.

Table 13: Option 2 (Outsourcing) Strategic Case Assessment

Option 2 - Outsourcing: Strategic Case Assessment		
Document	**Rank**	**Findings**
Municipal Development Plan	Med	► Option 2 aligns with The City's goal to connect people, goods and services locally, regionally and globally by accessing a network of experienced waste management contractors. ► Supports potential tonnage variances associated with The City's 'Residential Green Cart Program'. ► Outsourcing will attract private sector investment in the local economy and could attract private sector development opportunities (i.e., development of expansion of private sector processing facilities). However, as indicated in market sounding discussions, some service providers may be located outside of the boundaries of The City, and potential development and investment may occur outside of The City.
Climate Resilience Strategy & Action Plan	High	► The City can demonstrate leadership by supporting local contractors and innovation by leveraging the private market to forward its resiliency agenda. ► The City could work with contractors to educate and support Calgarians to divert organic waste away from landfills (e.g., create a video of what happens after materials are collected and the by-products created). ► Engagement with the private market provides an opportunity to access innovative technologies not presently deployed by The City within its waste management system, thereby creating the potential for operational and cost efficiencies and knowledge transfer. ► The City could develop robust performance regimes in contract terms that ensure emissions are monitored and measured in alignment with The City's objectives.
Calgary in the New Economy Strategy	High	► Allows The City to establish relationships with innovative companies to help diversify high-growth sectors and become a leading business to business innovation hub. ► Allows for a fast response to adapt and expand facilities and/or contracts to support accelerated urbanization, as The City is a cost-effective location for any business from start-ups to multinational corporations.
Resilient Calgary Strategy	High	► Option 2 allows for a more even operating budget from year-to-year for The City. Option 2 does not require an immediate upfront capital investment from The City and as such, annual payments are more consistent, increasing only for additional tonnage

Option 2 - Outsourcing: Strategic Case Assessment

Document	Rank	Findings
		amounts. It is noted that some of the capital costs borne by private sector in the outsourcing option would be included in processing fees charged to The City. ► Allows for potential improved service value and efficient delivery of major capital projects, along with potential risk transfer of design, construction, finance, operation and maintenance. ► Supports the growing prominence of a regional governance model by accessing capacity outside of The City (i.e., grow and attract business).
Social Wellbeing Policy	High	► Through procurement, The City can ensure appropriate partnerships are established in alignment with the principles in this policy.
Rethink to Thrive Strategy	Med	► Option 2 allows for a more even operating budget from year-to-year for The City. Option 2 does not require an upfront capital investment from The City and as such, annual payments are more consistent, increasing only for additional tonnage amounts. The private sector would invest the upfront costs for the development and construction of a transfer station and processing facility in order to manage The City's excess SSO. ► Allows The City to be a champion for business success and apply a business-friendly lens to planning and service delivery. ► Allows for The City to 'Rethink' service delivery through the exploration of outsourcing and to create a Calgary that is more resilient in the face of stresses and shocks.
Economic Resilience Task Force	High	► Any capital requirements under Option 2 would be financed by the private sector. ► Ability to use municipal procurement as a tool to support economic resilience and drive innovation in the market. ► The City could assess the extent to which City owned capital infrastructure is underperforming. Outsourcing may help unlock "idle" capital (that would not be applied to develop the expansion facility) to deliver additional benefits. ► Attract private sector investment and capitalize on opportunities to create jobs and provide infrastructure investment opportunities that support The City's 'green' goals.

Based on the review of the strategic plans, policies and objectives, the following potential benefits and costs have been identified with respect to the outsourcing option.

- **Cost stability / volatility:** third-party contractors may bid to win the contract creating value for money. Despite this, capital expenditure and the cost of capital are anticipated to be higher under the outsourcing option. It is also possible that processing rates may increase at the time of contract renewal which would ultimately result in increased cost of services to citizens.
- **Reputational impact:** investment in capital expansion by the private sector will be required which may increase the cost of services to citizens (e.g., new facility, transfer station, and/or hauling services). No service delivery disruption is anticipated. While The City does not have control over the operation of

the private sector facility, there is the potential for a negative reputational impact tied to the performance of the private sector operator, specifically related to potential noise or odour impacts to facility neighbours.

- **Job creation:** jobs to design, construct, maintain, and operate a new transfer facility, a new processing facility, and/or upgrades to an existing facility would be created. Further jobs are created to transfer and/or haul materials within and outside of The City.
- **Added redundancy:** helps build capacity within the region and builds greater redundancy. This would help reduce the risk of environmental outcomes and additional costs associated with dumping materials at landfills.
- **Adverse amenity impacts:** potential development of a transfer station on greenfield lands or a new facility that creates new amenity impacts (i.e., odour and noise).
- **Innovation:** the private sector proposed that they may be able to provide innovations not possible in The City's current facility, which may result in waste being processed more efficiently.
- **Flexibility:** opportunity to improve flexibility through a reduce term and commitment when compared to the existing P3 contract. However, there is limited appetite in the market for shorter term (1-2 year) contracts (i.e., greater than five years).
- **Benefits may flow outside The City limit:** opportunity cost associated with processing materials outside The City (i.e., job creation and investment in another municipality).
- **Transportation costs:** likely increased travel time which translates to higher overall GHG emissions.
- **Regulatory compliance breach:** failure to comply with regulatory standards may result in the closure of a private sector facility.

Note: All noted benefits and costs will be further addressed in the Economic Case Assessment (Section 5).

4.5 Summary of Strategic Case Assessment

The extent to which each option aligns with both regional policies and The City's broader policy goals were explored to support investment decision making. The table below provides a summary of the preliminary outcomes of the assessment.

Table 14: Summary of Comparative Strategic Case Assessment

Strategic Document / Policy	Option 1 - Expansion	Option 2 - Outsourcing
2020 Municipal Development Plan	High	Medium
Climate Resilience Strategy	High	High
Calgary in the New Economy Strategy	Medium	High
Resilient Calgary Strategy	Medium	High
Social Wellbeing Policy	High	High
Rethink to Thrive Strategy	High	Medium
Economic Resilience Task Force	Medium	High
Overall Alignment with Strategic / Policy Objectives	**High**	**High**

In conducting the strategic case assessment, it was noted that both outsourcing options (option 2A and option 2B) align with The City's strategic / policy objectives.

Overall, both the expansion and outsourcing options provide a high degree of alignment with The City's strategic policies and plans. **Option 2 (outsourcing)** aligns slightly more favourably with the policies and strategic plans selected.

- Option 1 (expansion) had a high degree of alignment with four (4) out of seven (7) of the documents.
- Option 2 (outsourcing) had a high degree of alignment with five (5) out of seven (7) of the documents.

5. Economic Case Assessment

The purpose of this section of the Business Case is to identify the option that best delivers public value to society, including wider social and environmental effects. In undertaking this assessment, EY conducted a Cost Benefit Analysis ("CBA") of each of the options.

5.1 Economic Case Assessment Approach

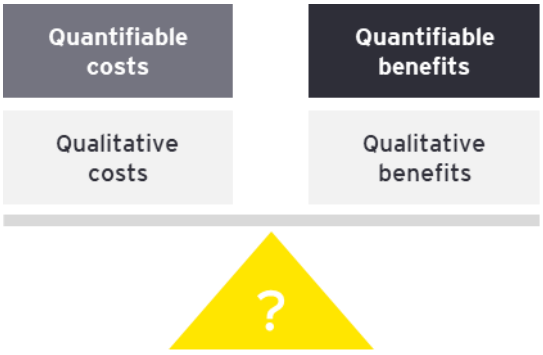
A CBA is a commonly used evaluation framework that examines the advantages and disadvantages of an investment or policy decision by assessing its costs and benefits from the perspective of society. This societal perspective is what differentiates a CBA from a purely financial analysis, which focusses on the net financial impact to The City's cash flows.

- \+ Benefits are positive outputs or consequences which are desired or for which individuals are willing to pay.
- \- Costs are negative inputs or consequences for which individuals would have to be compensated, including the consideration of alternate uses of required funds, often referred to as the opportunity cost.

A CBA aims to identify benefits and costs that could impact a decision, including opportunity costs incurred. A CBA is complex, involving converting (where possible) a project's costs and benefits into dollar terms (i.e., "monetized"). This can be difficult, as it looks to monetize both market values and non-market values (i.e., those values that are not transacted in the economy).

In an ideal world, where there are no limitations to information available, and all costs and benefits would be presented in monetary terms. However, this is often not possible because there are significant challenges with obtaining the required information, along with time constraints. The benefits and costs from projects, such as this one, are often intangible, thereby making them difficult to measure in monetary terms.

Figure 7: Considerations of a cost-benefit analysis



This CBA presents both quantitative economic costs and benefits, and a qualitative discussion of other costs and benefits that could impact the conclusion of the analysis. Both were considered when forming a conclusion.

The next few sections outline an approach which was applied while conducting the assessment.

5.1.1 Defining the Geographical Area of Assessment

It was important to define the geographic boundary from which to consider the costs and benefits. This is because the size and scope of costs and benefits that may arise from each of the options will vary depending on the lens (geographic boundary) applied.

It was determined that the costs and benefits assessed in this analysis will be those that pertain to residents receiving 'Green Cart' services from The City. It is understood that all residents within single family homes up to four (4) units inside the municipal boundaries of The City, as long as they are not part of an apartment or condominium complex, are entitled to these services. Therefore, the initial geographical boundary of this CBA was defined by the municipal boundaries of The City. This boundary was subsequently extended by 50 km to account for benefits and costs that may accrue to the private sector under an outsourcing solution. The rationale for the extension was that there would be a very small probability of a processing facility being built within city limits, and 49 km represents the one-way distance to the Strathmore and High River areas of Alberta, where key market sounding participants are based.

5.1.2 Definition of Benefit Categories

It was determined that the most appropriate framework for this CBA was the Multiple Account Evaluation ("MAE") framework. The MAE framework is based on the Multiple Account Evaluation Guidelines developed by British Columbia's Crown Corporations Secretariat. The key reasons the MAE framework was applied are as follows:

- Its precedent use in the past CBA reports undertaken for The City, most notably in the recent '*Cost-Benefit Analysis of the Calgary 2026 Draft Hosting Plan Concept*'.
- The flexibility to evaluate decisions across several factors using a mix of quantitative and qualitative considerations.
- The wide use of the MAE approach, including the recommendation for its use by several Canadian provinces. The Alberta government, for example, has detailed a guideline for applying the MAE framework to assist in the decision-making process for transportation planning projects.

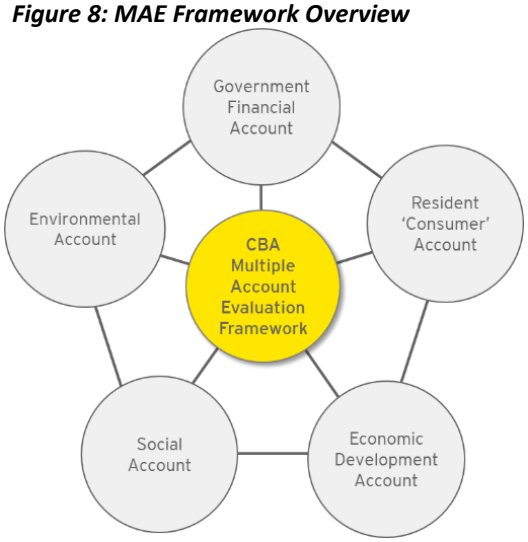
The MAE framework maintains the essence of a standard CBA with a few key distinctions.

It explicitly includes costs and benefits that are quantified, as well as qualitative factors in its evaluation approach, recognizing that several factors cannot or may be difficult to quantify.

Even when impacts can be quantified, they are not aggregated or added across accounts. In the MAE framework the different evaluation categories are assessed as distinct accounts as grouping them together can misrepresent results and ignores the nuances within each account.

When using a MAE framework, a CBA does not produce a single conclusion, but rather a conclusion for each evaluation account. The way readers interpret and weigh the relative importance of the account outputs will be influenced by their values, interests, and beliefs.

Figure 8: MAE Framework Overview



The five (5) distinctive evaluation accounts have been used in our analysis. These accounts are presented in Figure 8 and are further defined in Table 15.

Table 15: Economic Case Evaluation Accounts

Account	Description
Government Financial Account	Assesses the net change in financial position for The City and reflects the net financial cost or benefit to its citizens.
Resident 'Consumer' Account	Assesses the benefits the residents of The City will derive and negative consequences they may suffer from each of the options.
Economic Development Account	Assesses the range of economic impacts occurring as a result of investment in each of the options.
Environmental Account	Assesses the environmental impacts associated with each of the options.
Social Account	Assesses the social impacts of investment in each of the options.

5.1.3 Identification of Costs and Benefits

EY compiled a list of potential costs and benefits associated with each option based on a variety of background documents provided by The City and via the strategic case assessment process. This process relied on:

- The EY Team's global experience in undertaking CBA for a wide range of waste-related projects and other infrastructure projects across different asset classes.
- A review of The City's and the Consultant Engineer's work to date and data on the Project (as applicable).
- Outputs from the strategic case assessment developed as part of this Business Case (see Section 4 for further details).
- Collaborative discussions with The City.

The list of potential costs and benefits was refined through a collaborative workshop with The City on May 28, 2021, based on what was deemed relevant to The City's strategic objectives, and then sorted into what was quantifiable and what would be discussed qualitatively based on the data available.

5.1.4 Approach to Quantitative Analysis

For costs and benefits that could be quantified, EY developed a 25-year forecast from 2021 to 2046, in line with the financial case forecast, and discounted values using a social discount rate ranging from 6% to 8% to calculate net present value ("NPV"). The social discount rates are typically higher than financial discount rates as it considers a broader range of social, environmental and economic opportunity costs. The social discount rates used for this engagement are based on the CBA undertaken for Calgary's Olympic Hosting Plan. Keeping in line with standard practice, the CBA projections do not account for inflation and are calculated in nominal dollars, and does not account for transfer payments, such as taxes and subsidies, as they represent a transfer of costs or benefits within the economy rather than net new costs and benefits.

5.1.5 Approach to the Qualitative Analysis

To allow assessment of qualitative costs and benefits across options within each of the five (5) MAE accounts, EY developed a scoring metric to help determine the order of magnitude of a potential cost or benefit. The order of magnitude score of a cost or benefit was determined by (i) the scale of impact and (ii) the likelihood of impact. The matrix in the table below provides an overview of how qualitative options were assessed.

Table 16: Qualitative Scoring Framework

		Level of Impact		
		Low Impact	**Medium Impact**	**High Impact**
		Minimal shift in financial and operational performance or service levels	Shift in financial and operational performance or service levels	Significant shift in financial and operational performance or service levels
Likelihood of Impact	Low Probability (< 25%)	Low	Low	Low
	Medium Probability (25% to 75%)	Low	Medium	Medium
	High Probability (> 75%)	Low	Medium	High

Low Impact, Medium Impact and High Impact were scored as 1, 2 and 3 respectively for economic benefits, and -1, -2 and -3 respectively for economic costs. Low Probability, Medium Probability and High Probability were scored as 1, 2 and 3 respectively. The Level of Impact score and Likelihood of Impact score were then multiplied for the total score for each economic benefit or economic cost, within a range of -9 and 9. Scores within this range were categorized as follows:

Table 17: Level of Impact Scoring Rubric

Total Score	
-7 to -9	High Cost
-4 to -6	Medium Cost
-1 to -3	Low Cost
1 to 3	Low Benefit
4 to 6	Medium Benefit
7 to 9	High Benefit

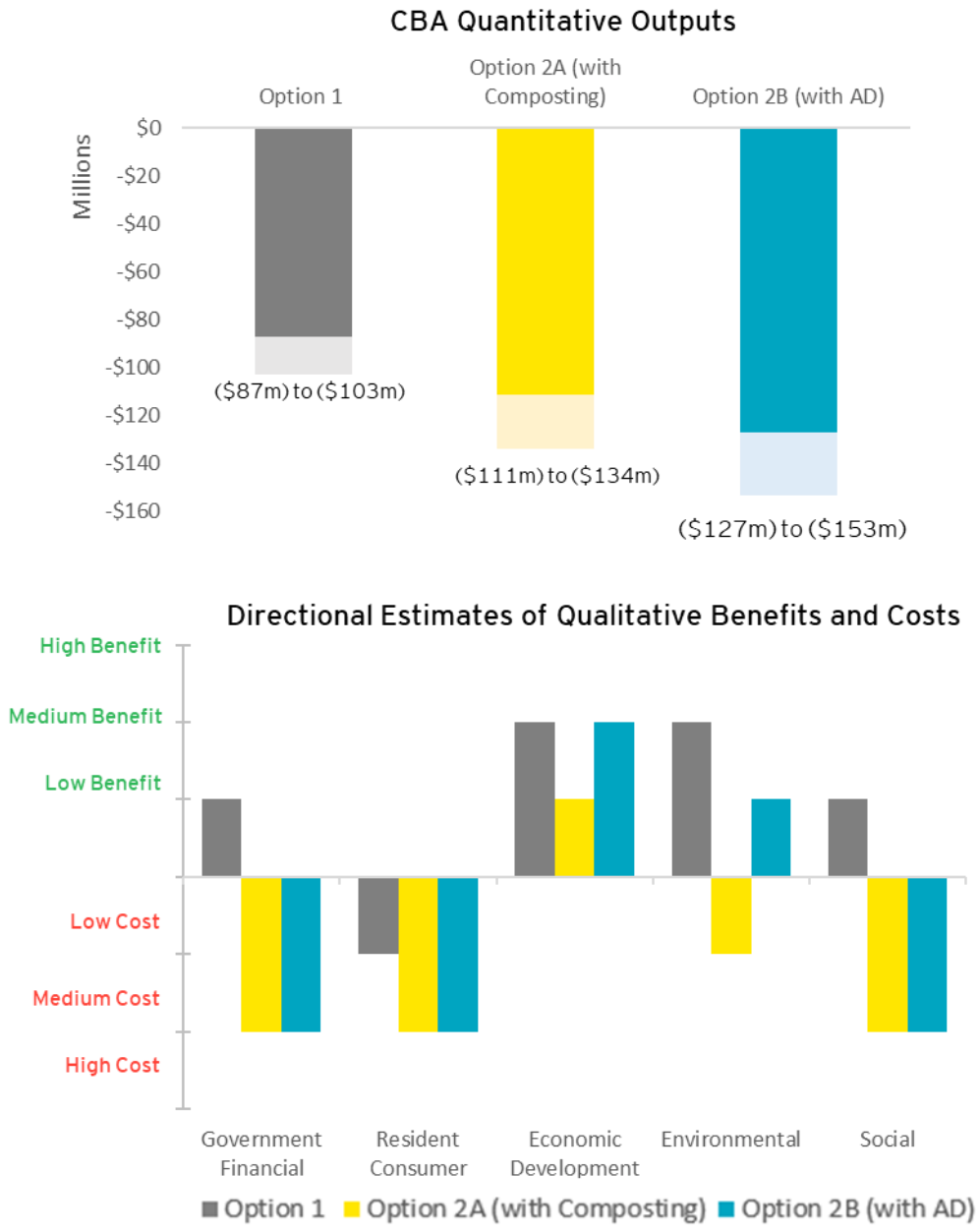
For example, an economic benefit of high impact (score of 3) but low probability (score of 1) would be deemed to be a low economic benefit (3 x 1 = 3). An economic cost of high impact (-3) and medium probability (2) would be deemed to be a medium economic cost (-3 x 2 = -6). The net score of an option under each MAE Account is developed by taking the average score of all economic benefits and costs. While this data cannot be quantified due to limited data, it provides The City with directional and order of magnitude impact for the purposes of investment decision making.

Analysis presented in the following section represent the outputs of EY's quantitative analysis and qualitative analysis based on prior work undertaken by The City, stakeholder analysis, market soundings, and EY's internal experience.

5.2 Economic Case Assessment

The figure below provides an overview of the outputs of the CBA. The Government Financial Account was assessed quantitatively as well as qualitatively, whilst the remaining accounts were assessed qualitatively due to data limitations.

Figure 9 – CBA Outputs Summary



Investing in waste management is a public good and investing in SSO capacity for The City will generate benefits for all members of society through enhanced environmental, economic and societal outcomes.

When performing a CBA on an investment in a public good, it is expected the Government Financial Account will be negative. Based on this CBA, this is true of the Government Financial Account for both options. The financial costs exceed the financial benefits in the range of $87 million to $103 million for the expansion option, $111m to $134m for option 2A and $127m to $153m for option 2B (all amounts are in 2021 NPV terms). Ranges calculated represent upper and lower bound estimates based on 6% and 8% social discount rates and are not subject to inflation, differing from the financial case assessment (refer to Section 6.6). The key differentiator between option 1 and option 2A is the RNG by-product revenue stream unlocked under the expansion option (option 1), which helps reduce the net cost burden on The City. The key differentiators between option 1 and option 2B is the additional annual operating cost of processing digestate compost following the AD process and new odour controlled building and processing systems.

A breakdown of the estimates are included in the table below.

Table 18: Key Quantitative Inputs and Outputs to the Government Financial Account

Key Quantitative Inputs and Outputs of the Government Financial Account (in $millions)			
Costs ($ NPV)	**Option 1 Expansion**	**Option 2A Outsourcing with Composting**	**Option 2B Outsourcing with AD**
Operating Costs	($51 - $67)	($44 - $58)	($71 - $93)
Financing Costs	($26 - $33)	($28 - $37)	($34 - $44)
Capital Costs	($38 - $40)	($40 - $42)	($48 - $51)
Total Cost	($116 - $140)	($113 - $137)	($154 - $188)
Benefits			
Revenue	$29 - $37	$2 - $3	$27 - $35
Discount Rate	**Percentage**		
Social Discount Rate	6% - 8%		
Outputs	**Net Present Value**		
Net Benefit (Cost)	($87 - $103)	($111 - $134)	($127 - $153)

There are other benefits across each of the evaluation accounts which may offset the financial costs of both options. While the benefits and costs associated with the other accounts (and some benefits and costs within the Government Financial Account) were not quantified, EY has provided qualitative directional estimates. A summary of qualitative scores and the qualitative benefits and costs under each of the five (5) evaluation accounts is presented in the table below.

Table 19: Qualitative Economic Assessment Summary

MAE Account	Option 1 – Expansion	Option 2A – Outsourcing with Composting	Option 2B – Outsourcing with AD	Best Performing Option
Government Financial Account	Low Benefit	Medium Cost	Medium Cost	Option 1 - Expansion
Resident 'Consumer' Account	Low Cost	Medium Cost	Medium Cost	Option 1 - Expansion
Economic Development Account	Medium Benefit	Low Benefit	Medium Benefit	Option 1 – Expansion and Option 2B – Outsourcing with AD
Environmental Account	Medium Benefit	Low Cost	Low Benefit	Option 1 - Expansion
Social Account	Low Benefit	Medium Cost	Medium Cost	Option 1 - Expansion

For the purposes of this Business Case, an equal weighting was applied to each of the evaluation accounts. The following sub-sections present the assessment of the costs and benefits associated with the five (5) evaluation accounts.

5.2.1 Government Financial Account

Table 20: Government Account Summary

Account Summary - Government Financial Account		
Description This account assesses the net change in financial position for The City and reflects the net cost or benefit to its citizens. **Overall assessment** Based on the quantitative analysis undertaken, both options represent a net cost to The City, which is to be expected with major investment in public goods, however the expansion option presents a lower cost burden to The City relative to the outsourcing option. Based on the evaluation of qualitative benefits and costs, the expansion option presents a net benefit due to the cost stability offered whilst the outsourcing option presents a net cost due to risks associated with facility downtime and cost volatility.		
Option 1 – Expansion	**Option 2A – Outsourcing with Composting**	**Option 2B – Outsourcing with AD**
Quantitatively Assessed + Revenue generation - Capital, operating, maintenance/lifecycle cost	**Quantitatively Assessed** + Revenue generation - Capital, operating, maintenance/lifecycle cost	**Quantitatively Assessed** + Revenue generation - Capital, operating, maintenance/lifecycle cost
Net Impact (NPV): Net Cost of $87m - $103m	**Net Impact (NPV):** Net Cost of $111m – $134m	**Net Impact (NPV):** Net Cost of $127m – $153m
Qualitatively Assessed + Processing efficiency + Cost stability - Reputational impact	**Qualitatively Assessed** - Processing inefficiency - Reputational impact - Revenue loss from competition - Cost volatility	**Qualitatively Assessed** - Processing inefficiency - Reputational impact - Revenue loss from competition - Cost volatility
Net Impact: Net Economic Benefit (Low)	**Net Impact:** Net Economic Cost (Medium)	**Net Impact:** Net Economic Cost (Medium)

Government Financial Account Benefits of Option 1 (Expansion)

Revenue Generation

Investment in AD under the expansion option is anticipated to unlock an additional revenue stream for The City. Through its end market analysis, The City has confirmed there is market appetite for the RNG produced by AD and expects to be able to receive a competitive rate per gigajoule ("GJ") for the RNG that will be produced. A breakdown of the anticipated revenue from sale of RNG is contained in the table above and is anticipated to be approximately $29 million to $37 million over the forecast period in 2021 NPV terms based on information provided by The City.

Processing Efficiency

The expansion option (option 1) presents a lower net operating cost per tonne due to the introduction of AD revenue which offsets costs. Based on modelling and information provided by The City, the per tonnage processing cost of the expansion is expected to be half that of the private market in 2021 NPV terms ($35 to $45 for the expansion option versus $51 to $74 for the outsourcing option). The difference in per-tonnage processing

costs is represented by the difference between total operating cost under the expansion and outsourcing options.

Furthermore, the expansion option would be facilitated under an existing P3 contract. The risk transfer, performance regime and accompanying payment mechanism integrated into the existing P3 contract under expansion option is unlikely to be replicated under a standard contractor agreement with a third-party operator, and therefore the incentivization of operational efficiency and innovation is also unlikely to be replicated, but not impossible. To that end, innovation remains a potential benefit under option 2, albeit with a low likelihood of occurring. Given operating efficiency has been quantitatively captured under operating costs, this economic cost was precluded from EY's qualitative scoring evaluation.

Cost Stability

Investment in the existing facility under the P3 contract provides a degree of long-term cost stability to The City, as incremental risk of tonnage and operational cost volatility associated with the excess waste will be transferred to private sector operator. While The City may incur a break or amendment fee for modifying the existing project agreement in place, this could potentially be removed via negotiation if changes to the existing contract were in the interests of both parties. While investment in HFPAD has potential to expose The City to energy demand fluctuations, this has been mitigated through end-market analysis undertaken by The City evidencing sufficient demand, and potential for The City to engage in an off-take contract with a suitable utility provider. The cost stability afforded by the existing P3 long-term contract is expected to have a medium level of impact on The City, as it allows a degree of confidence in longer term strategic and financial planning which may unlock additional efficiency benefits down the line, and a high probability of occurring.

Relevant Government Financial Account Costs of Option 1

Capital, Operating, Maintenance and Lifecycle Costs

A breakdown of the capital, operating and maintenance and lifecycle costs that The City would incur under the expansion option is summarized in Table 18, and further detailed in under the financial case in Section 6. Based on analysis of inputs, it is anticipated that the total gross cost, in NPV, of the expansion option (not including revenue) would range from $116 million - $140 million.

Reputational Impact

The risk of disruption to The City's organic waste management system under the expansion option is anticipated to be limited to transfer, haulage and processing, all of which are downstream of collection services. Therefore, there is no reputational cost in relation to service level disruption anticipated under either option. Investment in the expansion is however anticipated to increase the cost of waste management services to the average household, albeit to a lesser extent than outsourcing.

Research on reputation or reputation management in the public sector, and in particular, local government, is difficult to find as few have made the connection between reputation and the benefits to the public sector, therefore a qualitative approach has been applied. Ryan (2007)[1] assesses the qualitative dimensions of local government reputation using a private sector framework, which among other areas considers the impact of products and services on reputation. Translated to a government setting, Ryan forwards value for money as one of the key aspects of reputation development within the product and service dimension for local government. The increased cost to average households anticipated under the expansion option reflects investment which will not directly affect collection services, and therefore perceived value for money, and by extension reputation, is

[1] Ryan, Barbara, *How can the corporate sector concepts of 'reputation' and 'trust' be used by local government? A study to establish a model of reputation management for local government.* Asia Pacific Public Relations Journal, 8. pp. 37-75. ISSN 1440-4389 (https://eprints.usq.edu.au/5250/)

likely to be adversely affected. Given the increase in cost to the average household is lower in expansion relative to outsourcing, the impact of the economic cost is assumed to be low, however with a high probability of occurring.

Relevant Government Financial Account Benefits of Option 2 (Outsourcing)

Revenue Generation

Under option 2A, revenue could be generated from the sale of compost produced through the third-party composting facility, and potential cost savings from using the existing market capacity in the interim period to process waste that is above The City's current capacity. It should however be noted that revenue would most likely remain with the private processor, and any benefit would likely come in the form of reduced fees payable by The City provided third-party operators pass on revenue benefits as opposed to absorbing it. It should be noted that market capacity has not been verified and is based on market sounding feedback. Revenue from sale of compost is anticipated to be minor (roughly $270,000 per year in real (2021) dollars).

Revenue under option 2B it is anticipated to be material due to sale of RNG and by-products from third party anaerobic digestion. While the commercial arrangement between The City and a future operator remains to be confirmed, for the purposes of this analysis it is assumed that The City could either receive a portion of revenue generated by the third-party operator, or the revenue would be used by the operator to offset operating costs charged to The City. Furthermore, it is assumed that the analysis undertaken by The City to confirm market appetite for RNG is agnostic of supplier, therefore RNG produced by a third-party operator is likely to have sufficient demand.

Relevant Government Financial Account Cost of Option 2 (Outsourcing)

Capital, Operating, Maintenance and Lifecycle Costs

A breakdown of the capital, operating and maintenance and lifecycle costs that The City would incur under the outsourcing option is summarized in Table 18. and further detailed in the financial case in Section 6. Based on financial analysis of inputs provided by The City, it is anticipated that the total gross cost (not including revenue) in NPV dollars of option 2A would range from $113 million to $137 million, and $154 million to $188 million for option 2B.

Processing Inefficiency

The outsourcing option will likely perform less efficiently from a time and cost perspective due to a lack of economies of scale and the contracting framework within which it would operate. Market sounding feedback suggested that there remains limited capacity with the private market to take on the excess material for the existing facility. A third-party operator is unlikely to match the economies of scale of the existing facility and expansion, the largest of its kind in Canada, which along with the need to potentially purchase land and obtain approvals, will inevitably drive up the per tonnage processing cost. The additional systems and building footprints are already in place within the current facility and would be an additional cost requirement for option 2A and option 2B. With respect to option 2B in particular, it is anticipated that a key differentiator between option 1 and option 2B will be additional annual operating cost of processing (i.e., composting) digestate following the AD process due to a lack of existing infrastructure available to compost digestate. These incremental costs for the private sector represent not only a reduction in operational efficiency under the outsourcing options, but also, the greater distances SSO would need to be transported for processing.

Furthermore, for the expansion option there will be updates to the existing P3 agreement in order to include operations, as opposed to the outsourcing option, which would likely be facilitated under a traditional contractor agreement. The risk transfer, performance regime and accompanying payment mechanism integrated into the existing P3 contract under the expansion option is unlikely to be replicated under standard contractor agreement,

and therefore the incentivization of operational efficiency and innovation is also unlikely to be replicated. Given operating efficiency has been quantitatively captured under operating costs, this economic cost was precluded from the qualitative scoring evaluation.

Reputational Impact

Similar to the expansion option, it is understood that there will be no disruption to The City's organics collection service, and therefore no associated reputational impact, however residents will likely experience a greater increase in fees relative to expansion to pay for the additional investment required for processing excess waste.

The increased cost to average households anticipated under the outsourcing option reflects investment which will not directly affect collection services, and therefore perceived value for money, and by extension reputation, is likely to be adversely affected. Given the increase in cost to the average household is higher in outsourcing relative to expansion, the impact of the economic cost is assumed to be medium with a high probability of occurring.

Furthermore, based on the market sounding, participants suggested that there was limited capacity currently within the market to accommodate The City's excess waste, and that increased market capacity would require capital investment. Under the outsourcing option, it remains unclear which site would accommodate The City's excess waste and the level of investment required. At a minimum, under the outsourcing option investment in a new transfer station and long-distance haulage of SSO would be required. If the selected third-party operator did not have sufficient capacity, then further capital investment in their facility would also be required. The combination of long-haul trucks moving through previously uncharted routes, along with construction of a transfer station and potential capital investment in a third-party processing plant stand to disrupt communities within the city and create adverse reputational impacts. Given the increase in cost to the average household and the likely amenity impacts to surrounding communities due to anticipated construction of the transfer station and third-party processing facility, the impact of the economic cost is assumed to be medium, with a high probability of occurring.

Cost Volatility

There is a small risk under the outsourcing option that third-party contractors under-bid to win the contract, and then propose above market increases to per-tonnage processing rates during contract renewal when there is less competition and alternatives available to The City due to committed investment in the transfer station. This could cause The City's SSO processing costs to grow at a greater than average rate, thereby eroding value for money to Calgarians. The impact of the economic cost is assumed to be medium, with a medium probability of occurring. This score is based on EY's observations in the waste sector market, where operators have sought to 'corner the market' when municipalities do not have viable alternative options and charge above average rates in the past.

5.2.2 Resident Consumer Account

Table 21: Summary of Resident Consumer Account Assessment

Account Summary - Resident Consumer Account		
Description This account assesses the benefits the residents of Calgary will experience and negative consequences they may suffer from investment in either option. **Overall assessment** Based on the analysis undertaken, both options represent a net cost to residents, as a result of service charge increases required to fund investment in either option. The incremental increase in the expansion option is comparatively less than the outsourcing option, due to the relatively lower capital investment need, which translates to a marginally lower economic cost.		
Option 1 – Expansion	**Option 2A – Outsourcing with Composting**	**Option 2B – Outsourcing with AD**
Qualitatively Assessed ▪ Service charge increase	**Qualitatively Assessed** ▪ Service charge increase	**Qualitatively Assessed** ▪ Service charge increase
Net Impact: Net Economic Cost (Low)	**Net Impact:** Net Economic Cost (Medium)	**Net Impact:** Net Economic Cost (Medium)

Relevant Resident Consumer Account Benefits of Option 1 (Expansion)

No benefit identified under the expansion option.

Relevant Resident Consumer Account Costs of Option 1 (Expansion)

Service Charge Increase

While the assessment in Section 0 focuses on the reputational implication of increases to service charges to residents, this section focuses on the economic cost borne by residents specifically. Based on the economic modelling conducted, the additional cost to the per household Green Cart Program fee per annum under expansion is anticipated to be less than the outsourcing option. In order to avoid double counting the cost incurred by households with the cost incurred by The City under the Government Financial Account, this economic cost has been assessed qualitatively, and it is assumed that the impact of this cost will be low, with a high probability of occurring. The low impact of this economic cost assumes that the increase to Green Cart Program fees presents a minor deviation from the existing fee.

Relevant Resident Consumer Account Benefits of Option 2 (Outsourcing)

No benefit identified under the outsourcing option.

Relevant Resident Consumer Account Costs of Option 2 (Outsourcing)

Service Charge Increase

Based on the economic modelling, under the expansion option, the additional cost to the per household Green Cart Program fee per annum is anticipated to be greater than the expansion option. Similar to the expansion option, in order to avoid double counting the cost incurred households with the cost incurred by The City under the Government Financial Account, this economic cost has been assessed qualitatively, and it is assumed that the

impact of this cost will be medium, with a high probability of occurring. The medium impact of this economic cost is based on the assumption that the increase to service charges under the outsourcing option presents a higher potential deviation from the existing service charge relative to the expansion option.

5.2.3 Economic Development Account

Table 22: Summary of Economic Development Account Assessment

Account Summary - Economic Development Account		
Description The account assesses the economic impacts to the broader Calgary economy that may result from investment in either option. **Overall assessment** Based on the analysis undertaken, both options represent a net economic benefit to the City of Calgary, as a result of job creation and enhanced economic resiliency. Option 1 presents a higher benefit to The City relative to option 2A) due to benefits unlocked through investment in AD, whilst presents a similar level of benefit to option 2B. This is because Option 2B presents similar AD-related benefits, builds redundancy in The City's waste management system, however, presents a risk that benefits flow outside of The City based on location		
Option 1 – Expansion	**Option 2A – Outsourcing with Composting**	**Option 2B – Outsourcing with AD**
Qualitatively Assessed + Job creation + Revenue diversification + Energy resilience - Lack of redundancy	**Qualitatively Assessed** + Job creation + Added redundancy - Benefits flow outside of The City	**Qualitatively Assessed** + Job creation + Revenue diversification + Added redundancy - Benefits flow outside of The City
Net Impact: Net Economic Benefit (Medium)	**Net Impact:** Net Economic Benefit (Low)	**Net Impact:** Net Economic Benefit (Medium)

Relevant Economic Development Account Benefits of Option 1 (Expansion)

Job Creation

The expansion will bring several economic benefits to The City and the broader Province. The City, along with its private sector operator is projecting almost $10 million will be put towards employing workers needed in Alberta to design and manage the project. According to The City's private sector operator, this translates to 50 full-time jobs ranging from skilled trades, management and engineering in Calgary for the two (2) year construction period, and an additional five (5) to seven (7) full time jobs to operate and maintain the expanded facility. The operation and maintenance of the AD facility creates highly skilled jobs in Calgary which may not otherwise be created if the RNG was not created locally within the city. This is considered a high impact economic benefit with a medium probability of occurring. The rationale behind a high score on impact and medium score on probability is to account for the creation of net new jobs in The City, and potential attraction of out of city skilled workers who may contribute to the overall economy and tax base.

Revenue Diversification

The expansion enables the sale of RNG as a net new revenue source to The City which will help offset operating costs. This would contribute towards cost stability, instill greater confidence and certainty on long term financial planning projections for the waste management business, and potentially reduce future escalation pressure on Green Cart Program fees.

Furthermore, The City has confirmed market appetite for the RNG that will be produced, with several options available. At the time of writing, The City is evaluating the Canadian Clean Fuel Standards pathway or considering entering into an agreement with a utility company via an off-take contract. This is considered a high impact economic benefit due to its contribution and strategic alignment towards Calgary's goal of enhancing economic resiliency, with a high probability of occurring.

Energy Resilience

Biogas feedstocks for RNG are generated continuously from a variety of sources (which means high availability rates), therefore the use of RNG increases and diversifies domestic energy production for the province and available energy sources for The City. This would help insulate The City from external market forces in the energy sector. This is considered a medium impact economic benefit with medium probability of occurring.

Relevant Economic Development Account Costs of Option 1 (Expansion)

Lack of Redundancy

Development of additional capacity within the existing facility does not mitigate against the risk of major disruption to The City's waste management operations should the facility be taken offline for a duration of time due to 'shock' events or failure to comply with environmental regulation. Should the facility be taken offline, The City would need to divert SSO to third-party contractors at a premium price, and send remaining SSO to the landfill, which would create several adverse environmental outcomes for The City. This is considered a medium impact economic cost with a low probability of occurring.

Relevant Economic Development Account Benefits of Option 2 (Outsourcing)

Job Creation

Option 2 (outsourcing) is likely to drive the creation of jobs for the design, construction, operation and maintenance of a new transfer facility and any capital investment required to upgrade private-sector processing capacity. While The City has not undertaken a detailed study of the magnitude with respect to job creation and local business stimulus under the outsourcing option, the findings of the expansion option can be used as a proxy to understand the magnitude of benefits one could expect. For the purposes of this analysis, it is assumed that a similar number of jobs (50-full time jobs) will be created across the construction of a new transfer facility (in the event the operator is located outside of city limits) and required private investment in expanding processing capacity to accommodate The City's excess waste. The City's existing facility currently employs 27 full-time positions to process 100,000 tonnes of SSO, giving a ratio of one employee per 3,700 tonnes processed. Using this ratio, a rough order estimate of eight full-time staff for the operation and maintenance of the additional capacity required within the private sector can be established. This provides a total of 50 full-time jobs created during construction and eight full-time jobs created for operation and maintenance for the outsourcing option. Furthermore, according to the Jacobs Transfer Station Operations cost estimate, a further four field staff jobs is anticipated to be created to operate the transfer station. Furthermore, with respect to option 2B in particular, use of AD technology to process waste via a third-party operator may create net new highly-skilled jobs in Calgary. This is considered a medium impact economic benefit with high probability of occurring. The reason for the medium impact score even through more jobs are created relative to expansion is due to the high likelihood that job creation benefits will flow outside of the city, as per feedback received from market sounding (see below section).

Revenue Diversification (Option 2B Only)

Option 2B has potential to enable the sale of RNG as a net new revenue source to The City of help offset operating costs. While the commercial arrangement between The City and a future operator remains to be confirmed, the revenue could be used by the operator to offset operating costs or tipping fees charged to The City.

Added Redundancy

A key economic benefit of the outsourcing option is that it will help build capacity within the Province's waste processing system, either via increased composting capacity or AD capacity, which in turn can build greater redundancy. Development of processing capacity within the region will allow greater capacity to partially divert The City's waste should the existing facility be taken offline due to operational or regulatory issues. This would help reduce environmental costs associated with dumping SSO into a landfill, however premium rates would still be paid by The City to divert waste to third-party operators. This is considered a high impact economic benefit with low probability of occurring.

Relevant Economic Development Account Costs of Option 2 (Outsourcing)

Benefits Flow Outside of City

Based on market sounding feedback, there is a likelihood that the third-party operator would process The City's excess waste outside of the city limits. This presents a potential opportunity cost to The City, as job creation and support of local businesses as part of required capital investment and operation may flow outside of the city to another municipality. For example, should a third-party operator from municipalities outside of Calgary be selected to process the excess waste, many of the economic development benefits will flow through to the other municipality rather than the City of Calgary. This is considered a high impact economic cost, with a medium probability of occurring. The impact of this economic cost has already been factored into the scoring of the job creation economic benefit under the outsourcing option, therefore this economic cost was not assessed to avoid double counting.

5.2.4 Environmental Account

Table 23: Summary of Environmental Account Assessment

Account Summary - Environmental Account		
Description This account assesses the environmental impacts from construction, infrastructure use, and increased transportation-activity related to investment in either option. **Overall assessment** Based on the analysis undertaken, option 1 represent the greatest net benefit to The City, based on several environmental benefits unlocked through investment in AD technology and the subsequent use of RNG within the broader economy. Whilst option 2B also presents similar AD technology related benefits, option 2B, along with option 2A, presents several costs to The City, due to the environmental impact of increased journey times to transport SSO for processing and the material risk of regulatory breaches resulting in facilities being taken offline and waste being diverted to landfill.		
Option 1 – Expansion	**Option 2A – Outsourcing with Composting**	**Option 2B – Outsourcing with AD**
Qualitatively Assessed + GHG reduction + Circular economy support + Air quality improvement - Downtime landfill diversion	**Qualitatively Assessed** + Innovation - Transportation costs - Regulatory compliance breach	**Qualitatively Assessed** + Innovation + GHG reduction + Circular economy support - Transportation costs - Regulatory compliance breach
Net Impact: Net Economic Benefit (Medium)	**Net Impact:** Net Economic Cost (Low)	**Net Impact:** Net Economic Benefit (Low)

Relevant Environmental Account Benefits of Option 1 (Expansion)

GHG Reduction

The generation and use of RNG reduces the emission of carbon dioxide (CO_2) and methane (CH_4) into the atmosphere in two (2) ways – diversion of waste which would otherwise have been sent to the landfill to the HPFAD, and through displacement of natural gas with RNG in the distribution network. Based on work commissioned by The City, the GHG reductions anticipated as a result of the diversion of waste and displacement of natural gas is anticipated to be approximately 72,000 tonnes of $C0_2$ per year. This is considered a medium impact economic benefit with high probability of occurring.

Circular Economy Support

The expansion could help The City accelerate its move towards a circular economy by extending the use of RNG as a source of local electricity, heating, cooking, processing and as fuel for transportation. This would not only reduce the overall carbon footprint of residents and Calgary as a whole, but also help enhance the energy resilience. Uptake of RNG is dependent on The City's ability to market the product and the anticipated uptake, both of which are expected to be strong. This is considered a medium impact economic benefit with high probability of occurring.

Air Quality Improvement

RNG, following additional compression to CNG, can be used to fuel medium and heavy-duty transportation fleets as a cleaner alternative to diesel, which would lead to significant improvements to air quality across Calgary. CNG engines reduce nitrous oxides by up to 90% relative to diesel fueled engines and can reduce GHG emissions by up to 20% relative to diesel engines. This is considered a medium impact economic benefit with high probability of occurring.

Relevant Environmental Account Costs of Option 1 (Expansion)

Downtime Landfill Diversion

Should the facility be taken offline for a duration of time due to 'shock' events or failure to comply with environmental regulation, The City would need to divert SSO to the landfill, which would create several adverse environmental outcomes for The City that are typical of landfills. Such outcomes include surface water contamination, ground water contamination, bad smell or odour, release of greenhouse gases (increased fugitive GHG emissions), accidental hazard caused by fire, slope instability, loss of vegetation and soil contamination.[2] Landfilling organics also lowers The City's diversion rate and ultimately decreases the life expectancy of the landfill. It should however be noted that The City has invested in the past to mitigate against these impacts, therefore this economic cost is anticipated to have a low impact with a low probability of occurring.

Relevant Environmental Account Benefits of Option 2 (Outsourcing)

Innovation

As noted in the Government Financial Account section of this analysis, without clear identification of who the third-party processing contractor would be under the outsourcing option, it remains difficult to make a like-for-like comparison on benefits or costs resulting from their approach to processing SSO. Nevertheless, it remains reasonable to assume the possibility that the private sector could provide innovations not otherwise implemented by the expansion option, which could result in the excess waste being processed more efficiently, and in turn

[2] Ryan, Barbara, *How can the corporate sector concepts of 'reputation' and 'trust' be used by local government? A study to establish a model of reputation management for local government.* Asia Pacific Public Relations Journal, 8. pp. 37-75. ISSN 1440-4389 (https://eprints.usq.edu.au/5250/)

reducing the overall environmental impact. This is considered a low impact economic benefit with low probability of occurring.

GHG Reduction (Option 2B Only)

Similar to option 1, use of AD technology as part of option 2B will potentially increase the uptake of RNG and reduce GHGs in the Province. This is considered a medium impact economic benefit with high probability of occurring.

Circular Economy Support (Option 2B Only)

Use of RNG under option 2B as a source of local electricity, heating, cooking, processing and as fuel for transportation will allow The City to move closer towards its circular economy objectives. This would not only reduce the overall carbon footprint of residents and Calgary as a whole, but also help enhance the energy resilience. Similar to option 1, uptake of RNG is dependent on the third-party operator's ability to market the product and the anticipated uptake, both of which are expected to be strong. This is considered a medium impact economic benefit with high probability of occurring.

Relevant Environmental Account Costs of Option 2 (Outsourcing)

Transportation Costs

One trade-off with outsourcing excess waste will be the additional travel time added to the SSO processing process if third-party contractors will be required to haul the excess waste from a transfer station to their processing facility outside of City limits. Assuming the transfer facility is built near the existing Composting Facility, market sounding participants had facilities located approximately 25km away (representing a 50km roundtrip). The additional journey time translates to higher GHG emissions produced per tonnage of SSO processed. This is considered a medium impact economic cost with medium probability of occurring.

Regulatory Compliance Breach

Facility closure due to a failure to comply with regulatory standards remains a material risk within the private sector, as flagged by participants in the market sounding. Should the chosen contractor close down for a duration of time due to a failure to comply with environmental regulation, The City would need to divert SSO to the landfill, which would have several environmental impacts noted earlier in this section, such as surface water contamination, ground water contamination, bad smell or odour, release of greenhouse gases, accidental hazard caused by fire, slope instability, loss of vegetation, soil contamination, lower diversion rate, and reduced landfill life expectancy. This is considered a medium impact economic cost with low probability of occurring.

5.2.5 Social Account

Table 24: Summary of Social Account Assessment

Account Summary - Social Account		
Description The account assesses the social effects of the investing in either option. **Overall assessment** The expansion presents a net social benefit to The City due to the energy education opportunities derived from investment in HPFAD, and flow on benefits for further waste diversion and shift towards a circular economy. Outsourcing may present a net social cost to The City primarily due to potential investment in a new transfer station if a new facility was built outside city limits, and potential investment in processing capacity, all of which may adversely affect the quality of life and amenity of surrounding communities.		
Option 1 – Expansion	**Option 2A – Outsourcing with Composting**	**Option 2B – Outsourcing with AD**
Qualitatively Assessed + Renewable energy education - Adverse amenity impacts	**Qualitatively Assessed** - Adverse amenity impacts	**Qualitatively Assessed** - Adverse amenity impacts
Net Impact: Net Economic Benefit (Low)	**Net Impact:** Net Economic Cost (Medium)	**Net Impact:** Net Economic Cost (Medium)

Relevant Social Account Benefits of Option 1 (Expansion)

Renewable Energy Education

Investment in anerobic digestion presents a unique opportunity to bring further incremental education around renewable energy, sustainable development and the circular economy to residents of Calgary and demonstrate to citizens how The City is 'leading by example'. Establishment of tours, educational brochures and marketing can all work to educate residents on process of converting waste to RNG and contribute towards behavioural change that supports a circular economy and decreased waste production. Tangible benefits of education include a reduction in waste contamination, an increase in waste diversion and greater consumption of RNG within the community. This is considered a low impact economic benefit with high probability of occurring.

Relevant Social Account Costs of Option 1 (Expansion)

Adverse Amenity Impacts

Increased processing capacity at the existing facility may increase existing odour and noise impacts on surrounding land uses, presently considered to be minor, which may adversely affect amenity and quality of life. Given that the existing facility is located on industrial land, this is considered a low impact economic cost with low probability of occurring.

Relevant Social Account Benefits of Option 2 (Outsourcing)

No social account benefits were identified for the outsourcing option.

Relevant Social Account Costs of Option 2 (Outsourcing)

Adverse Amenity Impacts

If the operator third-party operator will process waste outside of city limits, development of a transfer station and a processing facility on greenfield land may create net new amenity impacts in the form of noise and odour which may adversely impact quality of life for surrounding communities. This is considered a medium impact economic cost with medium probability of occurring.

5.3 Summary of Economic Case Assessment Outputs

The table below summarizes the outputs of the qualitative economic case assessment. The expansion provides a higher degree of potential benefits to the City.

Table 25: Summary of Qualitative Costs and Benefits

Summary of Qualitative Economic Case Assessment	
Option 1 – Expansion	**Option 2 – Outsourcing**
Government Financial Account	
Benefit: Provides operational efficiency benefits from a time and cost perspective due to economies of scale and the more incentives-driven contracting framework within which it would operate. **Benefit:** Enables cost stability through a combination of long-term contracting and risk transfer within the existing P3 framework, to enable long-term strategic and budgetary planning with a degree of confidence, improving value for money outcomes to the taxpayer. **Cost:** Increased cost burden on residents to help fund the expansion option will likely have an adverse reputational impact on The City, however the impact is likely to be less than the outsourcing option due to the lower funding requirement.	**Benefit:** Provides revenue generation opportunity to offset operating costs and tipping fees from the sale of compost generated through the third-party composting facility, and cost savings from using the existing market capacity in the interim period to process waste that is above The City's current capacity. **Cost:** The outsourcing option will likely perform less efficiently from a time and cost perspective due to a lack of economies of scale and limited capacity within the existing market, and the traditional contracting framework within which it would operate that does not incentivize innovation and efficiency. **Cost:** The risk of new regulation, failure to comply with existing regulation, and operational and financial mismanagement removing processing capacity without notice due to the third-party operator closing down is a material risk expressed by the market and The City and represents a potential cost to The City under the outsourcing option. **Cost:** Increased cost burden on residents to help fund the outsourcing option will likely have an adverse reputational impact on The City, and the impact is likely to be greater than under the expansion option due to the higher upfront funding requirement. **Cost:** Small risk that third-party operators under-bid to win the contract, and then propose above market increases during contract renewals when there is less competition, which would cause The City's SSO processing costs to grow at a greater than average rate and erode value for money.
Net Impact: Net Economic Benefit (Low)	**Net Impact Option 2A:** Net Economic Cost (Medium) **Net Impact Option 2B:** Net Economic Cost (Medium)
Resident Consumer Account	
Cost: Based on EY's modelling, required capital investment in expansion is anticipated to translate to an increase to Green Cart Program fees per household per annum , however this	**Cost:** Based on EY's modelling, required capital investment in outsourcing is anticipated to translate to an increase to Green Cart Program fees per household per annum, and this

Summary of Qualitative Economic Case Assessment	
Option 1 – Expansion	**Option 2 – Outsourcing**
increase is anticipated to be less than that required under the outsourcing option.	increase is anticipated to be greater than that required under the expansion option.
Net Impact: Net Economic Cost (Low)	**Net Impact Option 2A:** Net Economic Cost (Medium) **Net Impact Option 2B:** Net Economic Cost (Medium)
Economic Development Account	
Benefit: Option 1 (expansion) is anticipated to create 50 full time jobs during the construction period and a further five (5) to seven (7) full time jobs during the operational period of the facility. **Benefit:** Option 1 (expansion) enables the sale of RNG as a net new revenue source to The City's waste management business which will help offset operating costs. **Benefit:** The use of RNG will increase and diversify domestic energy production in the province and the range of energy options for The City, thereby enhancing its resiliency. **Cost:** Development of additional capacity within the existing facility does not mitigate against the risk of major disruption to The City's waste management operations should the facility be taken offline for a duration of time due to 'shock' events or failure to comply with environmental regulation. To that end while the expansion option builds redundancy in The City's energy network, it does not build redundancy in the waste management network.	**Benefit:** Anticipated to create 50 full time jobs during the construction period and a further 8 full time jobs during the operational period of the facility. **Benefit (Option 2B only):** Potential for revenue generated by third-party to offset operating cost or reduce tipping fees. **Benefit:** Helps build capacity within the Province's organics processing system, which in turn builds greater redundancy. Development of processing capacity within the region will allow greater capacity to divert The City's waste should the existing facility be taken offline due to operational or regulatory issues. **Cost:** Potential opportunity cost to The City, as job creation and support of local businesses as part of required capital investment and operation may flow outside of The City to another municipality.
Net Impact: Net Economic Benefit (Medium)	**Net Impact Option 2A:** Net Economic Benefit (Low) **Net Impact Option 2B:** Net Economic Benefit (Medium)
Environmental Account	
Benefit: GHG reductions from diversion of waste and displacement of natural gas is anticipated to be approximately 72,000 tonnes carbon dioxide equivalents per year via diversion of waste which would otherwise have been sent to the landfill, and through displacement of natural gas with RNG in the distribution network. **Benefit:** Reduction in The City's overall carbon footprint through accelerated shift towards circular economy, by extending the use of RNG as a source of local electricity, heating, cooking, processing and as fuel for transportation. **Benefit:** RNG, following additional compression to Compressed Natural Gas ("CNG"), can be used to fuel medium and heavy-duty transportation fleets as a cleaner alternative to diesel, which would lead to significant improvements to air quality across Calgary, especially if The	**Benefit:** Potential benefit of private sector providing innovations not otherwise implemented by expansion option, which could result in the excess waste being processed more efficiently, and in turn reducing the overall environmental impact. **Benefit (Option 2B Only):** GHG reductions from diversion of waste and displacement of natural gas through use of AD technology is anticipated to reduce GHG emissions within the Province. **Benefit (Option 2B Only):** Reduction in City GHG emissions and carbon footprint through accelerated shift towards circular economy, by extending the use of RNG as a source of local electricity, heating, cooking, processing and as fuel for transportation. **Cost:** Should the facility be taken offline for a duration of time due to 'shock' events or failure to comply with

Summary of Qualitative Economic Case Assessment	
Option 1 – Expansion	**Option 2 – Outsourcing**
City's pursuit of a Canadian Clean Fuel Standards pathway, to displace the use of fossil natural gas, is successful. **Cost:** Should the facility be taken offline for a duration of time due to 'shock' events or failure to comply with environmental regulation, The City would need to divert SSO to the landfill due to a lack of capacity in private sector, which would create several adverse environmental outcomes for the City such as surface water contamination, bad smell or odour, release of greenhouse gases, accidental hazard caused by fire, slope instability, loss of vegetation, soil contamination, lower diversion rate, and reduced landfill life expectancy.	environmental regulation, The City would need to divert SSO to the landfill due to a lack of capacity in private sector, which would create several adverse environmental outcomes typically related to landfills such as surface water contamination, bad smell or odour, release of greenhouse gases, accidental hazard caused by fire, slope instability, loss of vegetation, soil contamination, , lower diversion rate, and reduced landfill life expectancy. It should be noted that The City has invested in its landfills in recent years to mitigate against these impacts.
Net Impact: Net Economic Benefit (Medium)	**Net Impact Option 2A:** Net Economic Cost (Low)
	Net Impact Option 2B: Net Economic Benefit (Low)
Social Account	
Benefit: Investment in AD presents a unique opportunity to bring further education around renewable energy, sustainable development and the circular economy to residents of Calgary. Tangible benefits of education include a reduction in waste contamination, an increase in waste diversion and greater awareness of RNG within the community. **Cost:** Increased processing capacity at the existing facility may compound existing odour and noise impacts on surrounding land uses, which may adversely affect amenity and quality of life. Given that the existing facility is located on industrial land, this is considered to be a minor cost.	**Cost:** Development of a transfer site on greenfield land, and further investment in processing capacity by the private sector may create net new amenity impacts in the form of noise and odour which may adversely impact quality of life for surrounding communities.
Net Impact: Net Economic Benefit (Low)	**Net Impact Option 2A:** Net Economic Cost (Medium)
	Net Impact Option 2B: Net Economic Cost (Medium)

6. Financial Case Assessment

This section summarizes the methodology, analysis and results of the quantitative analysis carried out on the options under consideration. The substantive output of the quantitative analysis is a comparison of the options in NPV terms. All outputs are provided in Canadian dollars.

6.1 Inputs, Assumptions and Timing

The subsections below detail the inputs, assumptions and timelines used to develop the financial model and conduct the comparative analysis of the options.

6.1.1 Preliminary Inputs and Assumptions

To develop the NPV for each option, costs have been outlined and escalated using applicable inflation rates and other assumptions which are further discussed in the following sections. The preliminary analysis includes a comprehensive comparison of the whole of life costs to process up to a maximum of 60,000 tonnes for each option.

For the purposes of the quantitative analysis, option 1 is an expansion of the existing facility to include AD (as discussed in the above sections). Option 2A is outsourcing excess amounts to a private sector composting facility outside of City limits. Option 2B is outsourcing excess amounts to a private sector facility that uses AD technology located within the City of Calgary.

Given that there is not currently sufficient capacity to process the expected amounts within the region, as noted during the market soundings, the financial analysis reflects the need for the private organic waste processer to build a new facility, or expand an existing facility, with an operating contract from The City. As such, all option 2 assumptions are reflective of the capital costs, operating costs, and revenues for a privately operated facility.

The modelled cash-flow profiles are adjusted for the time value of money by applying a discount rate in order to determine the NPV of each option. Detailed financial model assumptions are described in the sections below.

The capital, operating and major maintenance cost estimates used for the purposes of this analysis were provided by The City and prepared by Jacobs. Estimates provided are considered indicative and are categorized as Class 4 estimates.

While option 2A (outsourcing with composting) has been selected to conduct the financial analysis of the outsourcing opportunity (option 2), market sounding participants indicated that there are a range of potential solutions. A number of participants noted that they currently use AD and other technologies that could generate RNG revenues in addition to compost revenues. As such, option 2B (outsourcing with AD) is included in the financial analysis as an AD facility. The robustness of both options 2A and 2B (including costs and revenues) have been tested as part of the sensitivity analysis in Section 6.9.

6.1.2 Project Timelines

The financial model has been prepared using monthly cash flows for the construction period (36 months), quarterly loan repayments and annual cash flows over the operating and maintenance period (25 years) to reflect the full lifecycle of the Project (28 years). Each financial year was assumed to end on December 31, in line with The City's fiscal year. Due to differing cash flows for each option, the financial model calculates the estimated NPV of the options to allow for a comparison on a "like-for-like" basis.

The financial model start date used for the NPV calculations is the year approval for the Project is expected to be received. A consistent start date is used to ensure the NPV values can be accurately compared.

The construction start dates, duration and substantial completion dates are based on information in documents provided by The City. To ensure a "like-for-like" comparison of the options, a common timeline is assumed for both options.

The 25-year term for operations, maintenance and major maintenance works is representative of the general life of similar capital assets prior to substantial capital renewal works or technological obsolescence.

Table 26: Project Timeline

Milestone	Date	
	Option 1 - Expansion	Option 2 - Outsourcing
Model Start Date	1-Jan-21	1-Jan-21
Construction Start	1-May-22	1-May-22
Construction Duration (months)	36	36
Substantial Completion	30-Apr-25	30-Apr-25
Operations & Maintenance Term Start Date	1-May-25	1-May-25
Operations & Maintenance Term Duration (years)	25	25
Operations & Maintenance Term End Date	30-Apr-50	30-Apr-50

6.2 Capital Funding and Expenditure

Base cost estimates for the options were provided by The City and prepared by Jacobs. The cost estimates provided for the quantitative analysis were reported at an indicative cost level and may be subject to changes.

Design and construction costs included in the preliminary analysis were developed by separating construction costs into three (3) components – development (i.e., design) costs, direct construction costs and project administration costs. The cost estimates consider general requirements including labour, materials, equipment, overhead, utilities, clean-up, and other project requirements.

All design and construction costs have a contingency amount built in. As such, no additional cost or risk contingency has been included as a separate cost item. Risk is assumed to be quantified in part through the contingency amount included in capital expenditure. Risk is also assessed qualitatively in Section 7 below.

The base case capital cost estimate for the expansion option (option 1) is outlined in the table below.

Table 27: Option 1 – Estimated Expansion Construction Costs

Construction Costs ($k – Nominal)	Option 1 - Expansion
Development Costs	5,385.6
Direct Construction Costs	43,730.2
Capital Administration Costs	1,046.6
Total Construction Costs	50,162.4

Option 2A (outsourcing with composting) base case assumes that a new transfer station and a new processing facility will need to be built to process 60,000 tonnes of organic waste. The financial analysis includes the capital costs summarized below for the construction of a transfer station within The City's geographic boundaries and a processing facility outside of City limits. Both facilities will be purpose-built spaces to meet the needs of this Project.

The base case capital cost estimate for Option 2B (outsourcing with AD) is outlined in the table below. As the AD processing facility is anticipated to be located within City limits, the capital costs included are only for a processing facility as there is no need for an additional transfer station.

Table 28: Option 2 – Estimated Outsourcing Construction Costs

Construction Costs ($k – Nominal)	Option 2A – Outsourcing with Composting	Option 2B – Outsourcing with AD
Direct Construction Costs		
Construct Transfer Station	10,455.3	-
Land Acquisition - Transfer Station	1,304.8	-
Construct Processing Facility	39,659.1	61,483.5
Land Acquisition - Processing Facility	1,318.6	1,677.6
Total Construction Costs	52,737.9	63,161.1

All values in the table above are listed in nominal dollars. Nominal costs use real costs (stated in dollars at a specific point in time) and adjust for escalation NPV values are calculated based on the nominal cost inputs above and are discounted to account for the time value of money. Costs included throughout the Report will differ based on how they are listed.

6.3 Operating Funding and Expenditure

The costs included in this section are related to the Project operations for each option. Operating costs are annual amounts incurred over the operating period or contract term (i.e., 25 years). The base case assumes a maximum of 60,000 tonnes per year can be processed under either option. When amounts exceed 60,000 tonnes The City will need to consider additional solutions.

Operating costs are the fixed and variable costs to operate the AD expansion, the private processing facility or the transfer station (required for option 2A). The project operating administration costs are the amounts The City will incur for contract management and internal processes.

The estimated expansion operating costs are outlined below.

Table 29: Option – Estimated Expansion Operating Costs

Operating Costs ($k - Real)	Option 1 - Expansion
Annual Costs	5,729.9
Average Annual Costs ($Nominal)	7,999.4
Total Costs (25-year term) ($Nominal)	**199,985.3**

For the purposes of the outsourcing option 2A analysis, The City assumes that a transfer station will be built for this Project within City limits. The City trucks will pick up food and yard waste from single family homes and deliver it to the private sector transfer station. The private sector operator will then haul all organic waste collected to its new processing facility outside of the City.

For the outsourcing option 2B analysis, no transfer station is assumed. Therefore, operating costs are only required for the new processing facility. Option 2B does, however, include a composting cost for 45,000 tonnes of digestate to ensure the analysis is consistent with what a private partner would be required to complete. After processing material through the digestor, the digestate (the output from the AD process) must be composted. Market sounding participants have estimated compost processing costs at a rate between $55 and $155 per tonne. A rate of $55 per tonne would therefore be a conservative rate for analysis.

The following assumptions are also included in the outsourcing option analysis:

- **Location of Processing Facility:** While there are a number of potential locations for the new compost processing facility outside of Calgary, the location of a processing facility is assumed to be within a 49km radius around the City limits which forms the base assumption for transportation costs in the financial model. The location for the AD processing facility is assumed to be within City limits.
- **Operating costs:** The outsourcing options assumes that the rate charged to The City will allow the private sector to recover all of its operating costs.
- **Capital Costs:** The outsourcing option assumes that the rate charged to The City will allow the private sector to recover its capital costs.
- **Return on Investment:** The outsourcing option assumes that the rate charged to The City will allow the private sector to earn a return on its investment of approximately 12%.

The outsourcing option includes operating costs for the facility operator as well as The City. Both cost estimates are included in the table, below.

Table 30: Option 2 – Estimated Outsourcing Operating Costs

Operating Costs ($k – Real)	Option 2A – Outsourcing with Composting	Option 2B – Outsourcing with AD
Operating Costs	4,601.2	8,274.0
City Operating Administration Costs	52.4	52.4
Annual Costs ($Real)	4,653.6	8,326.4
Average Annual Costs ($Nominal)	6,405.75	11,340.5
Total Costs (25-year term) ($Nominal)	**160,137.2**	**283,511.5**

6.4 Maintenance Funding and Expenditure

In addition to operating costs, the model includes maintenance and major maintenance cost estimates. The distinction that is generally made between maintenance and major maintenance costs is as follows:

- Maintenance costs include amounts spent to help prevent the deterioration of infrastructure and ensure that it operates as required. These amounts are generally equal on an annual basis.
- Major maintenance costs are associated with planned replacement, renovation and refurbishment of building systems and equipment that have reached the end of their useful life. They are generally linked to specific elements (i.e., pre-processing, digestate composting).

Maintenance costs provided were estimated by Jacobs and are outlined in the table below.

Table 31: Major Maintenance Costs

Major Maintenance Costs ($k – Nominal)	Option 1 - Expansion	Option 2A – Outsourcing with Composting	Option 2B – Outsourcing with AD
5 Year Equipment Replacement	44.8	90.7	126.1
10 Year Equipment Replacement	5,091.7	17,347.0	9,173.1
20 Year Equipment Replacement	54.6	110.6	153.7
25 Year Equipment Replacement	48,534.8	35,503.4	54,555.6
Total (25-year term)	**53,725.8**	**53,051.8**	**64,008.5**

The table below summarizes the estimated total annual maintenance costs for each facility over a 25-year term.

Table 32: Total Maintenance Costs

Total Maintenance Costs ($k – Nominal)	Option 1 - Expansion	Option 2A – Outsourcing with Composting	Option 2B – Outsourcing with AD
Maintenance Costs	13,611,.7	n/a	n/a
Major Maintenance Costs	53,725.8	53,051.8	64,008.5
Total (25-year term)	**67,337.4**	**53,051.8**	**64,008.5**

All values in the tables above are listed in nominal dollars.

6.5 Revenue and Cost Savings

Benefits were accounted for as revenues or cost savings for both options. In option 1 (expansion), this includes City revenues from the sale of RNG and savings from reducing the waste processed through the existing facility's compost tunnel system and instead, utilizing the AD system's available capacity at the start of operations. Forecasts indicate that there are available cost savings for The City when there is excess capacity within the AD system (i.e., less than 160,000 tonnes forecasted across the system). These savings have been included in the financial model.

In option 2A, this includes revenue from the sale of compost generated through the composting facility. In option 2B, this includes revenue from the sale of RNG produced through the AD system. Cost savings in both options 2A and 2B (if advantageous) are from using the existing market capacity in the interim period to process waste that is above The City's current capacity, effectively reducing overtime costs at the existing facility (personnel overtime and equipment overuse).

Revenues and cost savings are as follows:

Table 33: Total Revenues and Cost Savings

Total Revenues and Cost Savings ($k – Nominal)	Option 1 - Expansion	Option 2A – Outsourcing with Composting	Option 2B – Outsourcing with AD
Revenue	87,670.6	6,259.7	84,909.0
Cost Savings	3,065.8	96.6	-
Total (25-year term)	**90,736.4**	**6,626.3**	**84,909.0**

Cost savings were evaluated in three (3) categories:

- Interim period (i.e., up to operational commencement of a new facility) outsourcing opportunities.
- Cost savings during operations resulting from reducing The City's existing facility operations to its intended capacity limit of 100,000 tonnes per year (realized under both options).
- Under option 1 (expansion), at operational commencement of the expansion, there is available capacity within the AD system. The operational plan for the new facility is to maximize the use of the 60,000 tonnes per year of AD capacity. This will result in expected cost savings for The City's existing facility operations that can be realized by processing less material through the compost tunnel system.

The table above includes the interim period outsourcing cost savings for 20,000 tonnes which the market has current capacity to process, as articulated by market sounding participants. The cost savings are incurred from 2022 – 2025 (i.e., prior to operational commencement of a new facility).

Cost savings during operations resulting from the Project will reduce The City's existing facility's processing amounts to below its designed capacity of 100,000 tonnes. The City's intent would be to maximize the use of a new AD facility as it has the ability to generate revenue and reduce the strain on the existing facility in the short-term. This will result in cost savings for both scenarios. These cost savings have been considered as part of the Business Case; however, they are not included in the financial model as their impact is the same for all options.

The savings under the expansion option from processing maximum tonnages through the AD expansion first with the remainder going through the existing facility have been provided by The City and are captured in the financial model as a projected reduction in variable costs (e.g., reduced utility consumption and payments to the private sector operator). As the forecasted tonnages increase year over year, the savings realized is reduced until the point both the AD system and the existing compost tunnel system are used at full capacity.

6.6 Economic and Financial Assumptions

The economic and financial assumptions used in the financial options analysis are shown below. In this section, it is important to consider the ongoing and residual effects of the COVID-19 pandemic. The sensitivities will address some of the potential effects by testing the robustness of each option by considering different rates and scenarios. There continues to be volatility in the financial markets, and the results should be considered accordingly.

6.6.1 Discount Rate

Cash flows in the financial model are assumed to occur at the end of the period in which they are incurred and are discounted accordingly. Discount rate assumptions are provided by The City for the expansion option and reflect the risk-free borrowing rate for the City for both options. The rate used is the May 15, 2021 Alberta Capital Finance Authority ("ACFA") indicative rate for a 25-year period.

6.6.2 Inflation Rate

The inflation rate assumptions used in the preliminary analysis are based on The City of Calgary's historical data for the Consumer Price Index ("CPI").

The general and construction inflation rate of 2.0% has been used in the base case of the analysis for both options. The average rate of 2.0% aligns with the current inflation rate and reflects the long-term average for Canada. The value is also within the Bank of Canada's inflation control target range of 1% to 3%.

Revenue inflation has been set at zero for both options per discussions with The City. Biogas revenue is based on a Power Purchase Agreement which will have a set rate with a unique, negotiated inflation rate, if any. As such, The City chose a conservative approach to forecast revenue.

6.7 Financial Cost Assumptions

The expansion option assumes a fully debt funded approach during construction. Under this option, the interest during construction is paid by The City throughout construction. The principal debt amount is then scheduled to be repaid over the 25-year operations term in semi-annual payments.

Under the outsourcing option, the capital costs are financed by the private operator. The model assumes that the private sector will fund construction by a combination of long-term debt provided by lenders and equity provided by the private operator. Long-term debt is modelled to be repaid over the 25-year operations term along with payments to satisfy equity returns. Debt and equity service payments during the concession term are complemented with monthly payments for operations and major maintenance activities.

The following table summarizes the financing assumptions used to develop the preliminary assessment. The assumptions, including sources and rationale, are outlined in the table below. Market data are reflective of recently closed transaction data including a project that has reached financial close through the COVID-19 environment.

Table 34: Financing Assumptions

Assumptions	Value	Source and Rationale
Option 1 - Expansion		
Bank: Long-Term Facility		
All in Rate	3.92%	The City & EY benchmarks
Option 2 - Outsourcing		
Gearing Rate	85.00%	Market Comparables
Bank: Long-Term Facility		
All in Rate	4.68%	The City & EY benchmarks
Upfront Fee	0.50%	EY benchmark – Based on precedent projects closed during COVID-19
Commitment Fee	0.54%	EY benchmark – Based on precedent projects closed during COVID-19
Equity		
Equity Return	12.00%	EY benchmark – Based on precedent projects closed during COVID-19
Letter of Credit Fee	2.00%	EY benchmark – Based on precedent projects closed during COVID-19

6.7.1 All-In Rate

The all-in rate is calculated as the sum of the base rate, the spread and the buffer.

The all-in rate for expansion is 3.92% and is inclusive of The City's interest rate contingency (base rate buffer).

The all-in rate used in the outsourcing option to calculate the private sector's cost of long-term borrowing in the preliminary project option analysis is 4.68%.

Variability in all-in rates is attributable to the risk profiles attributed to private sector borrowers and The City. Each unique borrower would have a varying degree of perceived risk that lenders factor into the credit spread when negotiating lending agreements. This difference in perceived risk profiles is evidenced in the higher credit spread for the private sector in option 2 (outsourcing).

Overall, the all-in rate of 4.68% used for the purposes of the outsourcing option analysis is reflective of market conditions and trends, is aligned with precedent projects and includes a conservative buffer to ensure the appropriateness of the rate.

6.7.2 Base Rate

The base rate for expansion is provided by The City and is reflective of the rate that the Province would borrow funds through a structured bank facility and then lend to The City for the Project, based on the proposed cash flows in the model.

The outsourcing option long-term debt base rate is provided by The City and is reflective of a structured bank facility expected to be secured by the private sector in option 2.

A sensitivity analysis is included in the Sensitivity Analysis section below that examines the impact of base rates increasing and decreasing by 100 basis points ("bps") option 2.

6.7.3 Rate Spread

The spread is the incremental cost of capital above the risk-free rate for long-term borrowing. Increasing market experience and comfort with project risks are reflected in the narrowing spreads seen in the market.

The City has included a rate spread on the expansion option and market precedent projects suggest the inclusion of a spread for the outsourcing option.

6.7.4 Base Rate Buffer

In addition to the rate spread, a conservative buffer of 0.5% was used for the long-term debt. The buffer is generally set anywhere between 0% and 0.5%. The higher buffer was added to provide a conservative estimate and to account for the recent volatility in the market.

6.7.5 Upfront and Commitment Fee

An upfront fee and commitment fee has been included in the outsourcing option to reflect the cost of financing for the private sector based on precedent projects across Canada.

The upfront fee is a one-time fee charged to the borrower of the loan.

The commitment fee is a rate that is applied to any undrawn, but committed, amounts borrowed. The rate charged is less than the interest rate and is charged because the lender has secured and set aside the financing for the borrower's project. The commitment fee is only applicable during the draw down period (i.e., the construction period) and is not applied during the loan repayment period.

6.8 Net Present Value Comparison

The NPV analysis involves a detailed quantitative investigation to establish which option provides the best value for The City. In accordance with generally accepted practice both in Canada and globally the methodology for the comparison has been based on discounted cash flow ("DCF") analysis. This involves establishing a period by period cash-flow profile for each of the options on a "like for like" basis (i.e., assuming consistent timeline, specifications, performance standards, etc.).

These cash-flow profiles are then adjusted for the time value of money by discounting them (using an appropriate discount rate) to provide an NPV for each option. The NPV is then adjusted for any other key differentials between the options. The NPV was calculated as the sum of the NPV of all the costs of each of the options during the design and construction phases, including all relevant financing costs, as well as the operating phase. The NPV of the project options were then compared to calculate the optimal solution for The City as follows:

Net Present Value Comparison = $NPV_{expansion} - NPV_{outsourcing}$

All values in this section are listed in NPV terms as per best practice.

6.8.1 NPV Results

A summary of each option's NPV is provided in the table below.

Table 35: Net Present Value Summary Results

Net Present Value – Financial Case Assessment - Summary Results			
Costs ($m)	**Option 1 – Expansion**	**Option 2A – Outsourcing with Composting**	**Option 2B – Outsourcing with AD**
Operating Costs	(149.71)	(128.39)	(208.15)
Financing Costs	(52.58)	(60.71)	(72.76)
Capital Costs	(46.48)	(48.74)	(58.48)
Net Project Costs	(248.78)	(237.84)	(339.40)
Capital Funding Sources	46.48	48.83	58.48
Revenue	56.41	4.15	53.85
Total Project Costs*	(145.88)	(184.86)	(227.06)
Difference to Option 1		**(38.98)**	**(81.17)**
NPV Rate per Tonne (60,000 tonnes)	**(97.26)**	**(123.24)**	**(151.37)**

** Table values may not add precisely to the totals due to rounding.*

Under the base case assumptions outlined in the Sections above, the expansion option is advantageous for The City and drives the better NPV regardless of if the private sector processing organic waste material using composting or AD technology. Expected savings for option 1 when compared to option 2A are 21%, or $38.98 million (NPV), and 36%, or $81.17 million (NPV), when compared to option 2B.

6.9 Sensitivity Analysis

A sensitivity analysis of the financial analysis results was undertaken in order to understand how key variables including the discount rate, inflation rate and other factors impact the NPVs achieved by the Project options. The results of the sensitivity analysis set out below demonstrate the preliminary analysis is robust to reasonable changes in key assumptions.

6.9.1 Capital Cost Sensitivity

The robustness of the financial analysis results against changes in capital costs was tested with the results shown below.

Table 36: Sensitivity of Results to Capital Costs

Capital Cost Sensitivity	NPV Cost Savings			
	Expansion vs Outsourcing (Option 2A)		Expansion vs. Outsourcing (Option 2B)	
Net Present Value ($m)	$m	%	$m	%
Increase expansion capital costs by 30%	(23.20)	12.6%	(65.40)	28.8%
Base case	(38.98)	21.1%	(81.17)	35.7%
Decrease expansion capital costs by 5%	(41.61)	22.5%	(83.80)	36.9%

Table 36 indicates that increasing the expansion capital costs by 30% reduces the net project cost savings to $23.20 million, or 13%, when compared to the outsourcing option. Under the scenario where expansion budgeted expenditures decrease, the expansion option drives greater cost savings for The City.

In comparing expansion and outsourcing with the application of AD technologies, the results indicate that a reduction in expansion capital costs will improve the cost savings for facility expansion and an increase in expansion cost would have the opposite impact.

6.9.2 Operating Cost Sensitivity

A sensitivity analysis was also conducted on the operating costs of both options to test the robustness of the analysis. The results are included in the table below.

Table 37: Sensitivity of Results to Operating Costs

Operating Cost Sensitivity	NPV Cost Savings			
	Expansion vs Outsourcing (Option 2A)		Expansion vs. Outsourcing (Option 2B)	
Net Present Value ($m)	$m	%	$m	%
Increase expansion operating costs by 10%	(23.75)	12.8%	(65.94)	29.0%
Base case	(38.98)	21.1%	(81.17)	35.7%
Increase outsourcing operating cost per tonne by 10%	(52.32)	26.4%	(101.99)	41.1%

The operating cost sensitivity for the expansion option compared to option 2A indicates that if expansion operating costs increase by 10%, all else the same, the cost savings to The City is reduced by approximately $15 million over the 25-year operating term. Similarly, if outsourcing costs decreased, the expansion costs savings would decrease.

Similarly, when comparing the expansion option and option 2B, an increase in expansion operating costs by 10% will reduce the realized project cost savings by approximately $15 million. Conversely, increasing the outsourcing operating costs by 10% increases the realized project cost savings by approximately $21 million, improving the relative financial benefit of the expansion case. Similar impacts will occur if expansion operating costs decreased.

6.9.3 Revenue Sensitivity

The financial analysis results were also tested for robustness by varying the revenue inputs for the expansion option. The results are below.

Table 38: Sensitivity of Results to Expansion Revenues (Option 2A)

RNG Production Sensitivity	NPV Cost Savings for Expansion vs Outsourcing (Option 2A)	
Net Present Value ($m)	**$m**	**%**
Expansion decrease in Rate by 25% per GJ	(24.28)	13.1%
Expansion decrease in RNG production by 25%	(24.88)	13.5%
Base case	(38.98)	21.1%

Table 39: Sensitivity of Results to Expansion Revenues (Option 2B)

RNG Production Sensitivity	NPV Cost Savings for Expansion vs Outsourcing (Option 2B)	
Net Present Value ($m)	**$m**	**%**
Decrease in RNG production by 25% - Expansion	(67.07)	29.5%
Decrease in Rate by 25% per GJ	(80.51)	35.7%
Base case	(81.17)	35.7%
Decrease in RNG production by 25% - Outsource	(94.64)	39.3%

The financial model estimates AD RNG revenue based on similar market comparable projects as provided by Jacobs. These estimates are based on the best available information at the time this Business Case was drafted and are believed to be conservative; however, the production and cost rates are not guaranteed. A sensitivity analysis has been conducted to evaluate the robustness of the base case results when subject to changes in revenue inputs.

The sensitivity analysis indicates that a decrease in RNG production or rates, significantly reduces the cost savings for expansion when compared with option 2A. If both a decrease in production by 25% and rates by 25% were to occur at the same time, the spread between options would decrease further. Conversely, any increase in production or rates would increase the cost savings for The City. It is noted, however, that once a rate is secured through a purchase agreement, the likelihood of rate fluctuation is low.

For the option 1 and option 2B comparison, the reduction in savings is limited as both options can be affected by the changes. As such, the outputs from the analysis are not materially changed as a result of RNG rate and production fluctuations.

Table 40: Sensitivity of Results to Outsourcing Revenues (Option 2A)

Outsourcing Revenue Sensitivity	NPV Cost Savings for Expansion vs Outsourcing (Option 2A)	
Net Present Value ($m)	**$m**	**%**
Outsourcing compost revenue increase by 25%	(37.94)	20.6%
Base case	(38.98)	21.1%

The sensitivity analysis indicates that the higher the revenues the private sector is able to generate from the sale of finished compost, or other sources, in the outsourcing option, the lower the benefit and cost savings are for the expansion option. That said, the fluctuations tested in this sensitivity analysis are not material.

The base case assumes that approximately 54,000 tonnes of compost can be sold at $5 per tonne. The sensitivity of increased revenues contemplates a 25% premium on composting rates which would result in increased revenues.

6.9.4 Discount Rate Sensitivity

The discount rate used for the options analysis is intended to reflect the rate of borrowing for The City (Province of Alberta indicative 25-year rate). As this rate continually fluctuates, a sensitivity analysis was conducted with the results summarized below. The changes in discount rates have been applied to both scenarios.

Table 41: Sensitivity of Results to Discount Rates

Discount Rate Sensitivity	NPV Cost Savings			
	Expansion vs Outsourcing (Option 2A)		Expansion vs. Outsourcing (Option 2B)	
Net Present Value ($m)	$m	%	$m	%
Increase discount rate by 0.5%	(36.33)	22.3%	(74.68)	35.8%
Base case	(38.98)	21.1%	(81.17)	35.7%
Decrease discount rate by 0.5%	(41.87)	20.9%	(88.37)	35.7%

The results indicate that the optimal solution for The City does not materially change with an increase or decrease in the discount rate of up to 0.5%. That said, a lower discount rate further improves the cost savings for the expansion option when compared against outsourcing due to the timing of cash flows.

6.9.5 Interest Rate Sensitivity

The purpose of the interest rate sensitivity is to understand the degree to which interest rates can impact on the results of the analysis.

Table 42: Sensitivity of Results to Interest Rates

Interest Rate Sensitivity	NPV Cost Savings			
	Expansion vs Outsourcing (Option 2A)		Expansion vs. Outsourcing (Option 2B)	
Net Present Value ($m)	$m	%	$m	%
Outsource credit spread decrease of 100 bps	(38.44)	20.9%	(80.53)	35.6%
Base case	(38.98)	21.1%	(81.17)	35.7%
Outsource credit spread increase of 100 bps	(39.52)	21.3%	(81.82)	35.9%

The results included in the table above indicate that the results are not materially sensitive to option 2A or option 2B interest rate fluctuations of up to 1%. If the outsourcing all-in rate increases, the cost savings for expansion are slightly higher because the cost of financing for the private sector has increased relative to the Province's rates. If outsourcing rates decrease, the expansion option cost savings are marginally reduced because the cost of financing is lower for the private sector.

6.9.6 Inflation Rate Sensitivity

A sensitivity analysis was run on the inflation rates included in the model to capture the uncertainty of the impact on costs of the COVID-19 pandemic and the level of precision included in the cost estimates provided by

Jacobs. Using a higher inflation rate results in additional total construction and operation costs for all scenarios. A lower, or no, inflation rate reduces total Project costs in the year in which they are incurred for all scenarios.

The table below summarizes the net cost savings when two options are compared. As costs continue to be subject to a discount rate, the timing of when costs are incurred impacts the values included in the table below (i.e., overall project costs may be lower due to a lower inflation rate, however the net cost savings between options may increase or decrease in dollars or percentages, irrespective of the project costs).

Overall, both scenarios included in the table below, indicate that reasonable fluctuations in inflation rates, will not materially change the spread (i.e., cost savings) between options.

Table 43: Sensitivity of Results to Inflation Rates

Inflation Rate Sensitivity	NPV Cost Savings			
	Expansion vs Outsourcing (Option 2A)		Expansion vs. Outsourcing (Option 2B)	
Net Present Value ($m)	$m	%	$m	%
Base case	(38.98)	21.1%	(81.17)	35.7%
Increase inflation rate by 1.0%	(43.60)	20.7%	(101.40)	39.2%
Decrease inflation rate to 0.0%	(45.66)	31.4%	(64.23)	39.2%

6.9.7 Construction Timing Sensitivity

Construction timing is a sensitivity run on the expansion option as there is an immediate need for additional processing capacity. The outsourcing option has the advantage of leveraging the 20,000 tonnes of processing capacity in the market effective immediately which is captured in the financial analysis as a cost saving in the event that it is advantageous for The City to do so. As such, it is important to test how the expansion option would be impacted if the construction timeline was reduced from the forecasted 36-month period or delayed.

Table 44: Sensitivity of Results to Construction Timing

Expansion Construction Timeline Sensitivity	NPV Cost Savings			
	Expansion vs Outsourcing (Option 2A)		Expansion vs. Outsourcing (Option 2B)	
Net Present Value ($m)	$m	%	$m	%
Expansion Construction Timeline Delayed by 2 months	(38.74)	21.0%	(80.94)	35.6%
Base case	(38.98)	21.1%	(81.17)	35.7%
Expansion Construction Timeline Decreased to 18 months	(40.98)	22.2%	(83.17)	36.6%

As indicated by the results in the table above, if the timeline is shortened to 18 months, the expansion option becomes more beneficial for The City from a financial investment position as cost savings increase. Further, there is qualitative benefits as excess amounts are able to be processed within capacity limits sooner than anticipated.

If there were construction delays of two (2) months in the expansion option, but not with outsourcing, the financial savings for The City would not materially change. A delay would result in some cost savings due to a greater discounting of costs which results in slightly greater cost savings, when compared to the base case. These cost savings are not, however, reflective of the additional costs that would be incurred at the existing facility if it is required to continue processing excess amounts of organic waste above its current capacity.

6.9.8 Financial Analysis Robustness

Based on the sensitivity tests conducted, the financial analysis appears sufficiently robust against the assumptions included in the financial model. The assumptions are based on The City's best available information and estimates and has been validated, where appropriate, through market feedback.

6.10 Summary of Financial Analysis Outcomes

The NPV cost per tonne has been calculated as:

- Option 1 (expansion): $97.26
- Option 2A (outsourcing with composting): $123.24
- Option 2B (outsourcing with AD): $151.37

In nominal amounts, the opening year (2025) tipping fee is calculated at $71.37, $168.95 and $182.21 per tonne for option 1, option 2A and option 2B, respectively. Market sounding participants provided an estimated range for processing tipping fees between $55 and $155 per tonne. Escalated to nominal amounts, the range is $59.53 and $167.78 per tonne. Therefore, the rates calculated as part of the financial analysis are generally aligned with market sounding participant estimates. Option 2 rates have been calculated as slightly higher than market sounding participant estimates due to a number of factors, including:

- Market participants had limited information available and provided estimates without conducting any analysis
- Market participants may not have included estimates for a return on investment resulting in a lower rate per tonne
- Participants may not have considered full construction of both a processing facility and transfer station, dependent on their current operations. The average tipping fee anticipated by participants with hauling experience was $20 per tonne to transport from a transfer station to a processing facility. Participants noted that tipping fee pricing would be negotiable on long-term contracts and a contract with minimum tonnages
- Option 2B (outsourcing with AD) costs were not specifically estimated by market sounding participants as the focus of discussions was a composting opportunity. Consideration for higher capital costs may have impacted the ranges provided.

Overall, the quantitative financial analysis indicates that the expansion option is expected to drive better value for The City over the outsourcing option in the base case. The analysis indicates a material saving over the outsourcing option, even with conservative assumptions, and is robust to most sensitivity analyses with the exceptions noted in Section 6.9.9.

While the expansion option requires higher upfront capital investment when compared to the outsourcing option, there are lower ongoing operating costs for expansion.

Given the existing and available information, the financial analysis results indicate that the expansion option provides better value for money for the procurement of the Project and better value to Calgarians.

7. Deliverability and Operations Case Assessment

The deliverability and operations case qualitatively assesses the options against factors and risks related to delivery and operations from The City's perspective. Each of the options were assessed with respect to the key considerations or challenges (e.g., resourcing, feedstock, flexibility, etc.) and risks related to the current and future SSO processing needs of The City.

The deliverability and operational considerations and risks to The City would not differ under options 2A and 2B. As such, the assessment was undertaken to compare the comparative impacts of option 1 (expansion) and option 2 (outsourcing).

7.1 Deliverability and Operations Case Qualitative Assessment Approach

The methodology used for the qualitative assessment of delivery and operational considerations is as follows:

- Identifying risks pertinent to the proposed Project, as well as to The City's strategic goals and objectives for the potential deliverability and operation of the proposed expansion or outsourcing opportunity. The risks included were adapted from information provided by The City, industry templates and projects of a similar size, scope or asset class. Risks were categorized as:
    - Strategic
    - Permitting
    - Design and Construction
    - Operational
    - Technology Related
    - Other
- Qualitative assessment of each risk to determine the likelihood of the identified risks occurring and potential impact of these events, should they occur. The probabilities were ranked as high, medium or low likelihood of occurrence and the impacts were ranked as high, medium or low impact on The City

Figure 10: Risk Assessment Approach

The probability and potential impact of risks associated with each option were assessed to determine the option with the lowest potential risk to The City. This information will be combined with other qualitative deliverability and operations factors to inform a decision on Project options.

7.2 Definition of Deliverability and Operations Risks

Identified risks are defined in the table below. The risks were identified based on the initial risk assessment undertaken by Jacobs, and further deliverability and operations factors and inputs based on precedent waste sector projects and based on EY's experience.

Table 45: Definition of Deliverability and Operations Risks

Risk #	Risk Name	Risk Description
Strategic Risks		
1	Optimal Long-Term Solution	Risk that the expansion or outsourcing options are not the most efficient long-term solutions and a more efficient or larger scale opportunity has not been considered.
Permitting and Approvals Risks		
2	Permitting	Risk that The City and the private partner is not able to secure permits in a timely manner, delaying design and construction or the issue of contracts.
Design and Construction Risks		
3	Construction Costs	Risk that construction costs will be higher due to necessity of immediate additional capacity, limited access to specialized trades, higher inflation or other factors.
Operational Risks		
4	Operating Costs	Risk that operating costs will be higher than anticipated due to higher tonnage amounts, additional administration costs, energy management challenges, higher inflation or other factors.
5	Tonnage Amounts	Risk that tonnage is higher than forecasted or exceeds 60,000 during the life of the asset (25 years) and amount forecasts will be inaccurate across the long-term.
6	Availability of New Capacity	Risk that the timing of construction for a new facility is delayed and The City incurs additional costs for processing excess capacity.
7	Facility Closure or Poor Performance	Risk that a facility is shut down or closed risking the delivery of Green Cart services to residents and increasing costs to The City.
8	Haulage and Transportation	Risk that transportation of materials from the transfer facility results in delays or additional costs to The City (e.g., weather related incidents, road blockages, catastrophic events)
Technology Related Risks		
9	Revenue	Risk that revenues are less than anticipated for The City, increasing costs to The City or end product output (i.e., compost) competition increases, reducing revenue at the existing facility.
10	Environmental	Risk that The City will not have control over environmental impacts, including odour compliance.
Other Risks		
11	Contract Management	Risk that the capacity of the existing team is insufficient to manage multiple contracts requiring additional staff. Risk contracts are not sufficiently managed resulting in poor contract performance, damages or legal costs.
12	Reputational	Risk that commitments and compliance requirements are not met by private partners negatively impacting The City's reputation by association.

7.3 Assessment of Deliverability and Operations Risks

The risks were assessed based on factors of probability and impact. Probability was defined as the likelihood of occurrence. The probability was ranked on a scale as follows:

- Low: The risk is unlikely to occur
- Medium: The risk could occur
- High: The risk is likely to occur

The potential impact was gauged as the potential financial and political impact on The City should the risk occur. The impact was ranked on the scale outlined below:

- Low: Minimal impact on The City
- Medium: Manageable impact on The City
- High: Severe impact on The City

Aligned with the financial model, the qualitative risk assessment assumed that both project options would have the same construction schedule and a 25-year operating period. It was also assumed that the option 2A (outsourcing with composting) would include a new facility outside of the City of Calgary while option 2B (outsourcing with AD) assumes a new facility within City limits.

7.4 Deliverability and Operations Risk Assessment Summary

Risks within each category and the categories themselves, were developed based on work conducted to date, market sounding feedback, information provided by The City (including qualitative risk analyses performed by Jacobs) and precedent projects.

The risks were assessed using the following methodology:

- Risk Identification: Ensuring a complete list of all risk categories
- Risk Likelihood: Estimating the likelihood (high, medium, low) of each risk occurring
- Risk Impact: Estimating the potential impact on The City (high, medium, low) of each risk, should it occur

The final qualitative risk matrix (table below) presents a “heat map” which provides a visual representation of the risks of greatest concern to The City for each option. The identified risks were defined and presented to The City in draft format (preliminary options assessment outputs) and subject to review and comments. Feedback from The City was incorporated in the final assessment of qualitative risks and in the identification of other factors for consideration. Detailed explanations and mitigation strategies are included in Appendix C.

Table 46: Qualitative Risk Matrix

Qualitative Risk		Option 1 Expansion		Option 2 Outsourcing	
No.	**Risk**	**Prob**	**Impact**	**Prob**	**Impact**
Strategic Risks					
1	Optimal Long-Term Solution	Low	Medium	Low	High
Permitting					
2	Permitting	Low	Low	Low	Medium
Design and Construction Risks					
3	Construction Costs	Low	Medium	Low	Low
Operational Risks					
4	Operating Costs	Low	Medium	Low	Low
5	Tonnage Amounts	High	High	High	Medium
6	Availability of New Capacity	Medium	Low	Medium	Medium
7	Facility Closure or Poor Performance	Low	Medium	Low	High
8	Haulage and Transportation	Low	Low	Low	Medium
Technology Related Risks					
9	Revenue	Medium	High	Low	Low
10	Environmental	Low	Low	Low	Medium
Other Risks					
11	Contract Management	Low	Low	Medium	Low
12	Reputational	Low	Low	Low	High

Based on the results of the qualitative risk assessment, the expansion option provides a marginally lower risk amongst the Project options, however both options have similar risk profiles.

7.5 Additional Deliverability and Operations Considerations

In addition to the qualitative risk assessment noted above, a few factors were noted for further consideration based on jurisdictional review and market sounding findings, and in discussion with The City. These items were not assessed, but rather represent items for further review or attention in implementation of the preferred option.

- **Ability of internal capacity to deliver:** In consideration of the options, The City should consider its internal capacity and capabilities, including resource availability and capacity to provide the long-term commitment to deliver the Project, i.e., processing excess capacity or management of contracts.
- **Flexibility to change:** It is expected that with changing demographics in The City, processing capacity needs, amounts and composition will change over time. It is also expected that there will be regulatory, policy or programmatic changes over time. The City should ensure that the selected option provides a degree of flexibility for nimble decision making and operational changes as required.
- **Operational commencement:** The City is currently processing excess capacity in the existing facility at additional operational cost. There is an immediate need for a solution to process excess capacity. The lead time and procurement period for the outsourcing option may be shorter, however, based on market sounding participant feedback, there is currently insufficient capacity in the regional Calgary market to process the proposed processing capacity requirement of up to an additional 60,000 tonnes per year. Additional capacity will need to be developed in the market through potential expansion or development projects. The analyses in this Business Case have assumed that both the expansion and outsourcing options would have similar time to operations.

8. Conclusions and Preferred Option

The table below summarizes the outcomes of the various assessments undertaken in developing this Business Case.

Table 47: Summary of Assessment Outputs

Assessment	Summary of Outputs
Jurisdictional Review	The jurisdictional review included a detailed review of five (5) jurisdictions that each selected a unique approach to outsourcing organic processing. The variation of approaches provides a better understanding of the risks and lessons learned that should be incorporated in the potential outsourcing option. The majority of jurisdictions included in the detailed review have outsourced organic waste processing as an immediate solution to meet their waste management goals and requirements to receive funding approval as both capacity and infrastructure exist in their respective local markets. The following high-level lessons were derived from the jurisdictional review for the procurement model with respect to the potential outsourcing option: ► Outsourcing organics is seen as an immediate solution to meeting the growing capacity demands. Consider the length of the agreement to reflect the degree of investment required from the private sector. ► Allowance for multiple agreements with multiple parties (two (2) or more) to reduce the risk of over capacity to a supplier that may impact the environmental obligations. ► Allowance for market innovation for various technologies and outputs as to not limit the market on the various technologies currently used. ► Allowance to increase or decrease maximum and minimum processing capacity to allow for fluctuation in actual and forecasted organic waste tonnage. ► Provide flexibility for changes in the allowable organic material to be processed. Lessons learned from other jurisdictions can be applied if the preferred option for the City of Calgary is outsourcing, including information related to procurement and agreement structuring.
Market Sounding	Generally, market sounding participants expressed interest in potential partnerships with The City. The following high-level lessons were derived from the market sounding with respect to the potential outsourcing option: ► Currently, there is not sufficient capacity in the regional market to accommodate processing the required 60,000 tonnes of material per year. ► Based on market sounding feedback provided, it is estimated that The City could anticipate outsourcing 10,000 to 20,000 tonnes per year immediately with multiple providers. These estimates were not further verified for accuracy. While capacity may be available, however, The City would need to follow its procurement policies to ensure potential suppliers meet specific requirements to be able to enter into a contract with The City. ► Market sounding participants indicated that there is interest in expanding or building facilities to accommodate The City's excess SSO. The City could anticipate construction for an outsourcing contract of 60,000 additional tonnes to be completed within one (1) to two (2) years of contract award. Further, market sounding participants indicated that there are some new construction and expansion projects planned for the next 24 months on multiple facilities, however, available capacity at these sites is likely to be limited to the near term due to existing/future contracts.

Assessment	Summary of Outputs
	► To more quickly respond to current demand, other municipalities have engaged with and contracted organizations to process SSO while their facility is being built or expanded, subject to available local capacity. ► Participants articulated the importance of a circular economy which included: ► Maximizing the useful life of resources; ► Reducing reliance on non-renewable resources; ► Reducing the carbon footprint and limiting environmental impacts; ► Regenerating natural systems; and ► Enhancing social outcomes and local economic development.
Strategic Case Assessment	Both options highly align with the strategic policies and objectives of The City as per the documents reviewed. Under the expansion option, The City could potentially realize additional benefits such as a positive reputational impact, cost stability, potential revenue sources, and support of the local and regional waste sector circular economy.
Economic Case Assessment	Investing in SSO capacity for The City will generate benefits for all residents through enhanced environmental, economic and societal outcomes. In conducting the cost benefit analysis (CBA), both quantitative (Government Financial Account) and qualitative factors were considered. Based on this CBA, the present value of the financial costs exceeded the financial benefits in the range of $87 million to $103 million for the expansion option, $111 million to $134 million for option 2A (outsourcing with composting), and $127 million to $153 million for option 2B (outsourcing with AD) (all values are in 2021 NPV terms). The key differentiator between the options is the RNG and by-product revenue stream unlocked under the expansion option through the application of HFPAD technology, which helps reduce the net cost burden on The City. The expansion option also benefits by not incurring additional transportation costs and by not having to construct a transfer facility. The expansion option also makes use of existing buildings and processing systems and eliminates the need for land purchase. In assessing qualitative measures related to the other MAE accounts, option 1 (expansion) provided a higher incremental benefit to The City.
Financial Case Assessment	Based on the financial analysis results, the expansion of the existing facility is expected to deliver better value to The City. Expected savings for option 1 (expansion) are 21%, or $38.98 million (NPV), compared to option 2A (outsourcing with composting) and 36%, or $81.17 million (NPV), compared to option 2B (outsourcing with AD).
Deliverability and Operations Case Assessment	As per the qualitative risk assessment, the expansion option provides a marginally lower risk amongst the Project options, with fewer high impact risks, however both options have similar risk profiles. In particular, the expansion option provides The City with greater control over operations (as a City-owned asset), and a high degree of flexibility with respect to potential changes in legislation/regulations, programmatic changes (i.e., Green Cart Program) and changing needs/uses for residents of The City.

8.1 Preferred Option

Based on the outcomes of the above-noted assessments, the expansion option has been identified as the optimal solution for The City to process excess SSO capacity. As per feedback from market participants, the private sector in the regional Calgary market is unable to process the 60,000 tonnes required by The City with their existing facilities. With The City's forecasts for SSO processing amounts increasing over time, the expansion option provides an opportunity for The City to create and maintain control over additional processing capacity.

In terms of the strategic fit of expansion, the assessment indicates that option 1 (expansion) provides a high degree of alignment with The City's strategic policies and plans. The economic benefit of expansion is also assessed as superior to outsourcing opportunities across a range of accounts.

On a financial basis, the expansion option requires a higher upfront investment by The City when compared to the outsourcing options, but it delivers better value to The City over the long-term. Under option 2 (outsourcing), the private sector finances the construction of a new facility and The City only incurs an operating cost, reducing the upfront investment from The City.

Based on the results of the analyses, the most significant differentiator in the assessment was the higher potential for revenue from the sale of RNG under the expansion option as compared to the outsourcing option 2A (outsourcing with composting), as well as the capital costs of building both a transfer station and processing facility. The most significant cost difference for option 2B (outsourcing with AD) is the additional annual operating cost to process digestate compost following AD.

Overall, the assessments conducted indicate that a facility expansion is a better strategic, economic, and financial fit for The City and will drive better value for The City.

Appendix A – Strategic Case Assessment

	JURISDICTION	PROCESSING FACILITY	OWNERSHIP	SSO CAPACITY (TONNES)	TECHNOLOGY
British Columbia	Surrey	Organics Biofuel Processing Facility	City Owned - DBOM	115,000	Anaerobic
	Metro Vancouver	Arrow Transportation Systems Inc – Unsure if Arrow processes or if a separate processor is used (i.e., a partnership)	Privately Owned -	36,000	--
	Pemberton	Pemberton Transfer Station – sent to Sea to Sky Soils	Privately Owned - Sea to Sky Soils	--	Gore Cover System
	Pitt Meadows	2016 – 2018: Harvest Fraser Richmond Organics – processing services (shut down due to emission and compliance issues with Metro Vancouver)	Privately Owned - Harvest Fraser Richmond Organics	3,000	--
	Nanaimo	Nanaimo Organic Waste (NOW) Facility	Privately Owned - Convertus	20,000 increasing to 40,000 upon completion of upgrades after securing 20-year contract	Tunneling: four in-vessel composting tunnels Upgraded air humidification and biofilter capacity for odour abatement
Alberta	Airdrie	Nutrient Recycling Center – Calgary	Privately Owned – GFL Environment	35,000	Unknown
	Edmonton	Organics Processing Facility	City Owned – Procurement Stage	100,000	Anaerobic
Saskatchewan	Regina	Pilot project began in September 2020 for 2,300 homes. Organics are compost at landfill.	--	Unknown	--

	JURISDICTION	PROCESSING FACILITY	OWNERSHIP	SSO CAPACITY (TONNES)	TECHNOLOGY
	Saskatoon	Organics Facility	Privately Owned – Loraas	~ 10,000	Aerobic
Ontario	Guelph	Organic Waste Processing Facility	City Owned - DBFOM	30,000	Aerobic
	London	Organic Composting Facility	Privately Owned - Convertus	150,000	Aerobic
	Ottawa	Organics Processing Facility	Privately Owned - Convertus	100,000	Aerobic
	Toronto	Disco Road Organics Processing Facility	City Owned	75,000	Anaerobic
		Dufferin Organics Processing Facility	City Owned - DBO	55,000	Anaerobic
		3rd Party Contracts - RFP issued February 2021 to process 45,000 tonnes	Privately Owned	67,000	--
		Planning phase for a 3rd facility to commission in 2028	City Owned ($130M)	--	Anaerobic
	Region of Durham	Mixed Waste Pre-sort and Anaerobic Digestion Facility (planning phase)	City Owned	110,000	Anaerobic
	Region of Niagara	Organic Composting Facility	Privately Owned - Walker Environmental Group	34,000	Aerobic
	Region of Peel	Anaerobic Digestion Facility (plan to replace existing facility)	City Owned - DBOM	120,000	Anaerobic
		Peel Integrated Waste Management Facility	City Owned	72,000	Aerobic
	Region of York	Bio-En Power Anaerobic Digestion Facility	Privately Owned	10,000	Anaerobic
		London Organic Composting Facility	Privately Owned - Convertus	80,000	Aerobic
		Moose Creek Soil Facility	Privately Owned – GFL Environmental	50,000	Aerobic
		Elmira Anaerobic Digestion Facility	Privately Owned – Cornerstone Renewables	10,000	Anaerobic

Appendix B – Market Sounding Participant Listing

	Company	Location	Participated	Date Interviewed
☒	Carbon Clean Energy	Calgary	✓	28-May-21
2	Cattleland AD	Strathmore		Unavailable
3	Cleanit Greenit Composting System	Edmonton		Declined
4	Collective Waste Solutions	Calgary		Declined; Hauling services only
5	Earth Waste Management	Calgary		Declined; Hauling services only
6	GFL Environmental (Bio-Can)	Strathmore	✓	28-May-21
7	Harvest Recycling	Calgary	✓	20-May-21
8	Highwood Organics Processing	High River	✓	19-May-21
9	Roseburn Ranches / EcoAg Initiatives	High River		No contact
10	Stoney Soil Products	Didsbury	✓	25-May-21
11	Walker Environmental	Calgary	✓	25-May-21
12	Waste Management (WM) Organic Recycling	Edmonton	✓	25-May-21
13	ATCO Group	Edmonton	ü	12-August-21

Appendix C – Project Risk Matrix

Qualitative Risk		Option 1: Expansion		Option 2: Outsourcing		Notes	Mitigation Strategies
No.	Risk	Prob	Impact	Prob	Impact		
Strategic Risks							
1	Optimal Long-Term Solution	Low	Medium	Low	High	Both options have been shortlisted as viable opportunities that can achieve The City's long-term need of processing household organics. As such, both options have a low probability of the risk occurring. The expansion option has a medium impact. If the AD cannot optimally meet The City's long-term need it is expected that The City, as the owner, can pivot the solution to meet the needs more effectively. The outsourcing option may be more limited in pivoting should the new facilities not be the most efficient long-term solution. A long-term fixed contract will result in greater impact to The City (i.e., more costs) if changes are required or the decision is proven to be suboptimal.	To support the longevity of the decision, The City is conducting a Business Case. This will support decision making and mitigate risks given the available information. To mitigate the risk impact when outsourcing, The City should discuss the development of a new processing facility outside of the bounds of The City, potentially in collaboration with regional areas/municipalities to ensure no policy or other changes will impact operations.
Permitting Risks							
2	Permitting	Low	Low	Low	Medium	The City will be responsible for supporting the permitting process for the expansion option. The probability of delays due to permitting is low as the AD equipment will be added to the existing plot of land. If the risk occurs, the impact is expected to be low and resolved by The City. The outsourcing option has a low probability of permitting challenges occurring, however if the risk is to occur, longer delays in construction and greater impacts are expected as The City will not have as much influence due to the facilities being outside of the City of Calgary.	To mitigate the risk of permitting delays, The City should consult with internal departments and surrounding cities where a new processing facility may be built to ensure all required information is provided and all requirements are met in advance of submission to reduce delays in construction and operations.
Design and Construction Risks							
3	Construction Costs	Low	Medium	Low	Low	The construction costs estimates are preliminary at the time of the development of this Business Case; however, estimates are expected to be refined through the design phase under either option resulting in a low probability of higher construction costs for both options. If construction costs were higher than anticipated for expansion, The City would be responsible to pay for the overruns. Therefore, the impact of this risk is moderate. The outsourcing option will include a fixed cost for tonnage which will include an amount for capital cost recovery. Depending on the outsource option contract timing, construction cost overruns would be absorbed by the private sector as the price per tonne would be fixed.	To mitigate the risk of cost overruns, cost estimates should be further refined during the planning phase. This should include consideration for contingency and escalation.
Operational Risks							
4	Operating Costs	Low	Medium	Low	Low	Give The City's experience with operating its current facility, there is a low probability that there would be higher operating costs than expected unless tonnage amounts were significantly higher (discussed under Risk #5) or there were additional administration or energy management costs. If, however, operating costs were higher than forecasted, The City would be responsible for the additional costs resulting in a medium impact. Under the outsourcing option, the contract would require a fixed price per tonne. Therefore, any operating cost increases would be absorbed by the private sector and result in a low impact to The City.	To mitigate the risk of cost overruns, cost estimates should be further refined during the planning phase. This should include consideration for contingency and escalation. Further, The City should consider the potential of embedding a fixed operating cost into the existing facility operating contract to mitigate the risk of higher operating costs.
5	Tonnage Amounts	High	High	High	Medium	Tonnage forecasts indicate amounts will exceed 60,000 tonnes in 2032. As such, there is a high probability that processing capacity may be exceeded under both options within the 25-year operating period.	To mitigate the risk of higher than forecasted waste amounts, The City should conduct an updated analysis for forecasts based on the availability of additional historic data. In

Qualitative Risk		Option 1: Expansion		Option 2: Outsourcing		Notes	Mitigation Strategies
No.	Risk	Prob	Impact	Prob	Impact		
Strategic Risks							
						If tonnage amounts were higher, the impact on the expansion option would be high. Operation hours would need to increase, equipment would have higher usage and potentially shorter useful lives, increasing operating costs to The City. If tonnage amounts were higher when outsourcing, the impact is expected to be medium. Market sounding participants noted that the private partner would likely have excess capacity available to process the additional tonnage which reduces the impact to medium. The private sector is, however, expected to set a rate per tonne which will include an amount for capital cost recovery. This means that there is a risk The City would be paying a higher rate for tonnes that exceed original forecasts of 60,000. This risk can be mitigated through a negotiated payment mechanism based on anticipated amounts.	addition, where possible, contractual agreements under both options should consider the potential incremental costs for processing additional tonnage amounts (in excess of proposed 60,000 tonne maximum). This would result in a better understanding of potential cost overruns in the operating phase.
6	Availability of New Capacity	Medium	Low	Medium	Medium	Both expansion and outsourcing options have similar construction timelines that have a medium probability of being delayed based on external factors. In the event that the availability of new capacity is delayed, the expansion option will be less costly as the existing facility can continue to process the additional amounts. If the outsourcing option is delayed, the operator at the existing facility may increase processing costs as they are not included in the contract.	To mitigate the risk of delays, The City may be able to sign a contract under the outsourcing option that guarantees processing of waste starting at a specified date. If a new facility is not complete, this would require the partner to contract out to an existing facility with capacity or establish alternate solutions.
7	Facility Closure or Poor Performance	Low	Medium	Low	High	The risk of the facility being shut down or closed whether within or outside of the operator's control is low for both options. The impact, however, is higher when outsourcing because The City would need to set up alternative measures to support the removal of organic waste from households.	To reduce the risk of facility closure or poor performance, The City should conduct a thorough due diligence process, including reference checks, to ensure the longevity, experience and performance of a partner. Further, a payment mechanism could be implemented as part of the contract to incentivize strong performance. Lastly, a take back clause could give The City the security required should issues arise that jeopardize safety or wellbeing.
8	Haulage and Transport	Low	Low	Low	Medium	The risk of haulage or transportation issues is low for both scenarios. Some events, such as weather-related incidents, are expected. The impact if the risk occurs will be more significant on the outsourcing options due to the potential longer distance between households and the processing facility.	To reduce risks related to haulage or transportation, emergency alternative solutions should be developed for instances where The City or its partners are unable to access transfer stations or processing facilities. This could include the use of The City's facilities or another entity within city bounds.
Technology Related Risks							
9	Revenue	Medium	High	Low	Low	The risk that revenues are less than anticipated for The City are moderate for expansion. A reduction in revenues would increase the net project costs to The City over the life of the asset. Therefore, the impact of the risk would be high as the NPV of the project would shift materially without forecasted revenues. The risk that competition would increase and reduce revenues at the existing facility if end product output (i.e., compost) was produced in the outsourcing option is low. Furthermore, if the risk occurred and compost sales decreased at the existing processing facility, the impact is expected to be low to the operator and minimal to The City. Further, if the option 2B (outsourcing with AD) revenue was lower than anticipated, the impact to The City would be low as there would be a contracted price per tonne. Therefore, any fluctuations in revenues would not impact the results of the analysis materially.	To reduce the risk of reduced revenues for The City, consultation with ATCO should occur in advance of development to ensure all mitigating strategies to avoid energy loss and generation downtime are in place. To mitigate the risk of competition for the sale of compost, depending on the location of the new processing facility, limitations could be added to the contract around specific clients or pricing to reduce competition.

Qualitative Risk		Option 1: Expansion		Option 2: Outsourcing		Notes	Mitigation Strategies
No.	Risk	Prob	Impact	Prob	Impact		
Strategic Risks							
10	Environmental	Low	Low	Low	Medium	The risk of environmental impact and odour compliance is low for both options. The City abides by all requirements and any contracted third party would be mandated to do the same. If the risk were to occur, The City would take action to ensure compliance and the impact is expected to be low. The outsourcing option is expected to have a medium impact to The City. There are costs associated with reputation (discussed further, below) and a private partner may look to The City for financial contributions (through rate increases or alternative sources), ultimately costing The City more.	To mitigate this risk, The City can develop a payment mechanism that includes penalties for instances of non-compliance. This will incentivize action that is aligned with The City's goal and mandates.
Other Risks							
11	Contract Management	Low	Low	Medium	Low	The contract management risk is low for the expansion option as the existing contracts would be extended. Therefore, no heightened risks are introduced. If the risk were to occur, the impact is expected to be low as there is an operating relationship and matters would be dealt with efficiently. If the outsourcing option is selected, the probability of contract management risks occurring is medium because there will be new contracts to manage with new partners which brings uncertainty and opportunity for poor performance or additional costs. If the risk occurs, the impact is believed to be low because The City can hire additional resources or reallocate existing resources to support resolve any issues.	To mitigate contract management risks, The City should evaluate its existing staffing to determine if there is a need to hire new staff in advance of the contract delivery. Further, The City should ensure the RFP evaluation includes adequate due diligence for selecting a reputable company with strong credentials.
12	Reputational	Low	Low	Low	High	The risk of The City's reputation being negatively impacted as a result of operator's poor performance or business decisions is low in both scenarios because The City conducts a due diligence process and has a detailed procurement process. If the risk occurs under the expansion option, the assessed impact is low because of the existing relationship The City has with the facility operator and The City's retained control over operations. If the risk occurs when outsourcing, the risk is high because The City will not have the ability to influence the private sector to the same degree as it would under the expansion option. Further, the contract length would be long-term without opportunity for negotiation or re-tender increasing the impact of the risk.	To reduce reputational risks, additional due diligence processes, such as reference checks and credentials should be reviewed. Further, clauses can be included in the for-ownership takeback or contract termination in the event that actions occur that lead to or may lead to irreversible reputational damage.

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