# Regional Municipality of Durham

## Pre-Sort/Transfer & Organics Management

### Preliminary Service Delivery Model Assessment

**June 2017**

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# Notice

Ernst & Young Orenda Corporate Finance Inc. ("EY") and GHD limited ("GHD") (collectively, the "Consultants") was engaged by the Regional Municipality of Durham (the "Region" or "Clients") to investigate the inclusion of mixed waste processing and organics management of the Region's waste streams.

This Report was prepared on the Client instructions solely for the purposes of the Client. It should not be relied upon for any other purpose. The Report is based on objective analysis and information provided to us by the Client and third parties and does not necessarily represent EY view, comments, conclusions and opinions.

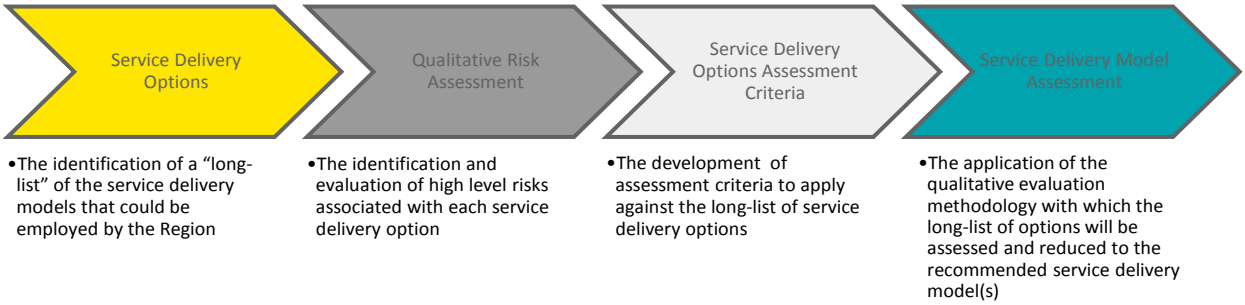
The Report may not have considered issues relevant to all third parties. Any use such third parties may choose to make of the Report is entirely at their own risk and we shall have no responsibility whatsoever in relation to any such use and to the fullest extent permitted by law we do not accept or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

We have not undertaken any form of investigation, audit, substantiation or verification procedures for the information, data and projections provided to us. We have not sought to verify the accuracy of the data or the information and explanations provided.
Our work has been limited in time and a more detailed / lengthy exercise may reveal material issues that this review has not. No obligation is assumed by EY to revise this Report to reflect any circumstances or information that become available subsequent to the date of this Report.

# 1. Introduction

Ernst & Young Orenda Corporate Finance Inc. ("**EY**") and GHD Limited ("**GHD**") (collectively, the "**Consultant Team**") have prepared this service delivery model assessment for the Regional Municipality of Durham (the "**Region**" or "**RMD**") to recommend a preferred model(s) for the mixed waste pre-sorting and organic waste management project (the "**Project**"). The evaluation of service delivery models for the proposed Project will enable the Region to understand the available service delivery models, their associated risks/advantages, and impacts. The methodology to carry out this assessment is illustrated in Figure 1 below.

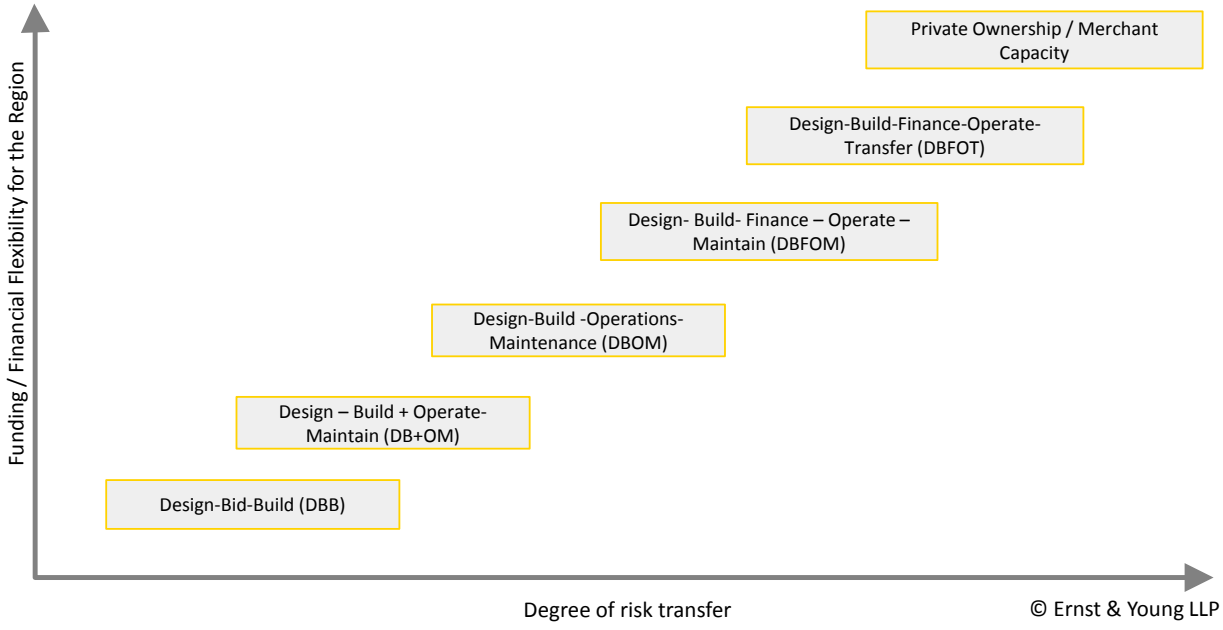
**Figure 1: Service Delivery Model Assessment Methodology**




# 2. Service Delivery Model Options

Once a technical option has been selected, the Region will have to consider a long-list of service delivery models for the Project ranging from the Design-Bid-Build model to private ownership. Each service delivery model differs in the level of private sector involvement and risk transfer – as the degree of private sector involvement increases, the level of risk transfer to the private sector also increases (as noted in the figure below).

**Figure 2: Service Delivery Models**



The following sections outline the service delivery models which might be considered, along with a brief description of what each option would entail.

## 2.1. Design-Bid-Build

The Design-Bid-Build ("**DBB**") service delivery model has typically been the most common method of infrastructure service delivery by the public sector. Under this model, the Region completes the design of the infrastructure either in-house or contracted to private design firms. Once designs are completed, the Region then invites bids from qualified bidders to build the infrastructure based on the developed designs. The bids are reviewed and the contract is awarded to the lowest bid meeting specifications.

During the construction phase, the selected construction contractor enters into a contract to undertake construction of the works under the supervision of an architect/project manager and/or design consultant representing the Region's interest. Following the completion of construction, the asset is commissioned and handed over to the Region for operation and maintenance.

This approach is well-suited to projects for which the Region can, and has a desire to, specify its exact requirements and therefore seek firm, competitive prices in the market. It is mostly suited to conditions wherein the precise information required to complete a detailed design is readily available, rather than in available only to technology providers. Relative to pre-sort systems and organics processing systems, much of this information tends to be specialized from a design perspective, and often the technology providers must be involved in some detailed capacity in order to procure the project. This often does not involve DBB configurations. At this point, each of the organics processing projects undertaken by municipalities in Ontario of any scale comparable to the Region's has been undertaken using a design-build or design-build-operate methodology. The intent of this approach is to take specialized process design information and wrap it into an overall design and build project wherein process guarantees and performance rest with the design-build entity. Of note, this issue of specialized information is true irrespective of license agreements for technology; the process designers and developers of various technology are generally the most suited to deploying the overall design.

In a DBB contract, the Region maintains ownership of the infrastructure and is responsible for the design, the construction, the financing, the operations and maintenance as well as for the lifecycle maintenance.

## 2.2. Design-Build + Operate-Maintain (Separate Contracts)

Another option for consideration includes the Design-Build ("**DB**") and then Operate-Maintain ("**OM**") model with the Region procuring services under two (2) separate contracts.

Design-Build + Operate-Maintain model ("**DB+OM**") a two-tier procurement is carried out to select one (1) bid for the integrated design and construction of the project per specification is obtained from qualified bidders, with a separate procurement for the operations and maintenance of the asset. Under a DB + OM method, the DB bidder develops its detailed design in accordance with a subset of the output specifications. Following design approval, the selected contractor (or a partnership between a designer and construction contractor) proceeds with construction of the asset.

A secondary (possibly subsequent) service delivery process would then be initiated to source an OM partner to provide operations and maintenance services as per performance and availability specifications. The OM contracts

are typically five (5) to ten (10) year contracts with option for renewal.

Compared with the DBB approach, the DB+OM model combines the design and construction schedules, thus streamlining the service delivery process and allowing innovation. For example, this could involve some concurrent design and construction activities to shorten the overall timeline, or on larger projects, modular designs that allow for sequential approval to begin construction on approved components sooner. In the DB+OM model the Region maintains ownership of the asset.

This approach is well suited to more complicated projects where there is scope for innovation. However, as noted, organics processing includes relatively specialized design and operating information and having a separate OM contractor operate a project designed and built by others can create performance issues that the OM contractor may attribute to the design basis in which they were not potentially involved. This type of model is relatively rare in this space, although DBOM models can be deployed where a true DBOM is employed but separate contracts are let for the DB and O components.

## 2.3. Design-Build-Operate

Under the design-build-operate ("**DBO**") model, also referred to as the design-build-operate-maintain ("**DBOM**") model, the design, construction, operations and maintenance related to the asset are procured under a single contract with a private sector partner ("**Project Co**").

In a DBOM project the Region owns and funds the construction of new assets. Project Co will be responsible for the design, construction, operation and maintenance of the facility based on output specifications laid out in the DBOM contract.

This is the most common deployment method for organics processing facilities in Ontario. The following are some examples of DBOM's in the municipal sector:

- City of Guelph's Organics Waste Processing Facility
- City of Hamilton's Centralized Composting Facility
- City of Toronto's Disco Road Organics Processing Facility
- City of Toronto's Dufferin Organics Processing Facility
- Region of Waterloo (purchases capacity at Guelph DBO project)
- Region of Halton (purchases capacity at Hamilton DBO project)
- City of Calgary organics composting facility
- Upcoming anaerobic digestion facility for Region of Peel (under development)
- Upcoming organics processing facility for County of Simcoe (under development)

One of the aspects of DBOM that is often linked to this business model is ownership of land. Generally, if the municipal proponent makes land available for a project, this further suggests that ownership and financing of the facility will rest with the municipality. Further, this methodology is generally pursued depending on the municipality's desire to control performance and outputs. Design-build contracts allow the municipality to constrain overall project performance and to levy securities against performance to ensure that final products are of acceptable quality and that environment performance is maintained as it pertains to design features. An operating contract under the DBOM model further includes municipal control over operations, ensuring that reporting and monitoring of systems is prescribed, and that securities are lodged to ensure acceptable performance metrics over

the operating term.

A further and important aspect of DBOM is that this compels veracity of design. As much of organics processing technology is specialized, it can be beneficial to a municipality to have the private sector compelled to operate the facility that it design-builds. This prevents, for instance, sale of technology and exit of the technology provider, or disassociation between the technology provider and the operator. DBOM compels a design and construction project that must be operable.

Under DBOM models, operating contracts have typically ranged from between three (3) years (with two one-year City-renewals), such as the City of Toronto, through to 25-year contracts.

### 2.4. Design-Build-Finance-Operate-Transfer

Design-Build-Finance-Operate-Transfer ("**DBFOT**") model is an integrated approach that under which a private sector partner is procured through a competitive tendering process to design, finance, build, operate and maintain the infrastructure in a manner that meets the requirements and specifications of the Region. Risks related to the design, construction, financing, operations and maintenance of the asset are transferred to the private sector for the contract term.

Under the DBFOT model, the private sector owns the asset until the end of the contract when the ownership and operating and maintenance risks are transferred back to the Region. This model is relatively rare in North America; given the relative sparsity of this business model, the DBFOT model was excluded from the risk assessment.

### 2.5. Design-Build-Finance-Operate-Maintain

The Design-Build-Finance-Operate-Maintain ("**DBFOM**") model is the DBFOT equivalent service delivery model applied in the North American market. Under the DBFOM service delivery model, the private sector partner is procured through a competitive tendering processing to design, build, finance, operate and maintain the asset for a specified contract term. Currently, the City of Surrey is employing this delivery model with additional investment from P3 Canada on a 25-year contract length with Orgaworld/Shanks; this project is currently in commissioning and involves anaerobic digestion technology. The City of Hamilton is currently pursuing a public-private partnership ("**P3**") DBFOT for its biosolids processing facility; this project is currently in design stage.

Under the DBFOM model, the Region maintains ownership of the asset while risks related to design, construction, financing, operations and maintenance are transferred to the private sector.

### 2.6. Private Ownership Model / Merchant Capacity

The private ownership model is represented by an asset which is fully owned and operated by the private sector. The Region would enter into a contract for organic waste processing, in which the Region would deliver organic waste from a transfer pre-sort facility to a merchant partner facility (merchant capacity). The Region would be charged a processing fee by the merchant partner and be responsible for costs related to haulage and transportation of organic waste. Private ownership provides the Region with the least amount of control while transferring the most risk to the private sector.

There are several examples of merchant capacity in the private sector in Ontario:

- Orgaworld composting facility in London
- Orgaworld composting facility in Ottawa
- Miller Waste composting facility in Pickering

- Walker Industries composting facility in Thorold
- Bio-En anaerobic digestion facility in Elmira
- Seacliff Energy anaerobic digestion facility in Leamington
- Stormfisher anaerobic digestion facility in London
- Lafleche composting facility in Moose Creek

Of note, there have been a number of merchant capacity plants over time in Ontario, and a number have failed due to poor performance, impaired economics, and environmental issues (particularly odour). Given the lack of control over merchant capacity facilities, municipal use of this model can potentially lead to performance issues that are sufficiently significant as to require landfilling of organic materials. This is especially true because there is a general lack of overall organics processing capacity in the province.

One of the other models under this banner is the use of a partner for energy and products output. In the current framework in Ontario, energy production from organic waste has increased value, either via greenhouse gas emissions reductions or via the sale of products such as renewable natural gas or electricity. While the markets favour this type of output, finding the most appropriate market is most appropriately undertaken by partnering with an entity that has detailed knowledge and access to these markets.

## 2.7. Summary of Service Delivery Models

The table below summarizes who between the Region and private partner is responsible for the various activities related to the project for all service delivery models presented above.

**Table 1: Summary of Service delivery Models**

| Service Delivery Model | DBB | DBOM | DB+OM | DBFOT | DBFOM | Private Ownership / Merchant Capacity |
|---|---|---|---|---|---|---|
| **Design** | Design Contractor | Project Co | DB Contractor | Project Co | Project Co | Private Sector |
| **Construction** | Construction Contractor | Project Co | DB Contractor | Project Co | Project Co | Private Sector |
| **Funding/Financing** | Region | Region | Region | Project Co | Project Co | Private Sector |
| **Operations and Maintenance** | Region or OM Contractor | Project Co | OM Contractor | Project Co | Project Co | Private Sector |
| **Asset Ownership** | Region | Region | Region | Project Co (transferred to Region at end of contract term) | Region | Private Sector |

# 3. Qualitative Risk Assessment

Each of the subsequent models, will involve an increasing level of private sector involvement (with private ownership representing the highest level of private sector involvement) as well as a greater allocation of risk to the private sector.

## 3.1. Qualitative Risk Assessment Methodology

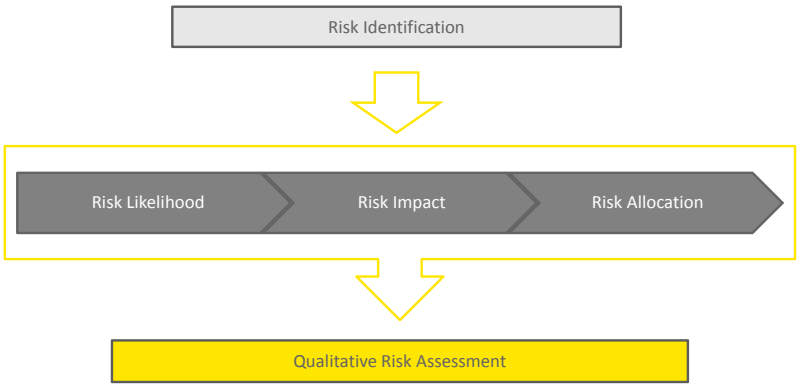
Potential risks associated with the identified service delivery models were assessed for likelihood of occurrence (probability) and potential impact should the risk occur. The transfer of risk from the Region to the private sector carries significant impacts on the Region.

As such, a high-level risk assessment was conducted on identified risk areas based on the likelihood of occurrence (i.e. risk is unlikely/likely/most likely to occur) and potential impacts (i.e., low/medium/high cost impacts). Highly likely and high impact risks are expected to have the most influence on the overall value provided by a specific service delivery model.

The approach to the qualitative risk assessment exercise included undertaking the following steps:

- Risk identification and categorization – Identification and definition of risks relevant to the Project. A listing of risks was developed based on recent relevant projects and the Consultant Team's experience on engagements of similar size and scope. Risks were categorized as: (i) policy and strategic risks; (ii) permitting and approvals risks; (iii) design and construction risks; (iv) operation and maintenance risks; and (v) technology related risks.
- Risk assessment examined the probability, impact and allocation of each risk identified as described below:
    - Probability or likelihood of occurrence – ranks the likelihood of occurrence for each identified risk. The probabilities were ranked as unlikely, likely, and highly likely to occur.
    - Risk impacts – measures the potential impact of each risk should they occur. The impacts were ranked as high, medium or low impact.
    - Risk Allocation – assigns the allocation of each identified risk. Risk were either retained by the Region, shared between the Region and the private sector or fully transferred to the private sector.

**Figure 3: Qualitative Risk Assessment Methodology**




The probability, impact and allocation of risks were assessed to determine a risk score for each service delivery

model under consideration.

## 3.2. Description of Identified Risks

The table below lists the 20 Project-relevant risks identified and defined to conduct the risk assessment.

| No. | Risk | Description |
|---|---|---|
| **Policy and Strategic Risks** | | |
| 1 | Region's Strategic Direction | Risk that the service delivery model does not align with the Region's policies and/or strategic direction including the Region's 70% waste diversion target and organics management strategy. |
| 2 | Legislative/Regulatory Changes | Risk that the service delivery model does not align with current and/or future legislative/regulatory requirements related to Climate Change and Low-Carbon Economy Act and the Waste-Free Ontario Act. |
| 3 | Planning, Process and Approvals Practices | Risk that Region's approvals on a project level are not received in a timely manner, ultimately resulting in the delay of the issue of tenders. |
| **Finance/ Economic Risks** | | |
| 4 | Affordability/Taxpayer Impacts | Risk that the service delivery model is not affordable, therefore not providing the best value for taxpayer dollars. |
| 5 | Cost Escalation | Risk associated with higher than anticipated Project costs (for design, construction, operations and maintenance) resulting from escalation of costs over the Project term. |
| 6 | Net Benefit | Risk that the service delivery model does not provide maximum social, environmental and financial returns (triple bottom line) to the Region. |
| **Design and Construction Risks** | | |
| 7 | Delays during Construction | Risk that completion of the asset is delayed due to construction delays. Delays may result from accelerated construction schedules, construction management/efficiency issues, lack of coordination between design and construction, and quality management issues resulting in negative impacts on the Project's capital costs. |
| 8 | Default During Construction | Risk that contractor/ Project Co. has to be replaced due to default (Bankruptcy, Failure to Meet Obligations) during the construction period resulting in delays to the delivery of the asset and additional costs. |
| 9 | Scope changes initiated by the Region during design and construction | Risk that the Region may request changes/additions to Project scope during design and construction phases resulting in additional delays and costs to the Project. |
| **Operations and Maintenance Risks** | | |
| 10 | Default During Operations | Risk that contractor/Project Co has to be replaced due to default (Bankruptcy, Failure to Meet Obligations) during the operations period resulting in unavailability of the facility and additional costs. |
| 11 | Failure to meet operating performance standards / targets | There is a risk that the facility does not perform as required. This risk is not related to the design of the facility but the impacts on productivity arising from poor management, operations or maintenance and equipment/technology failure. |

| No. | Risk | Description |
|---|---|---|
| 12 | Changes in general input waste (feedstock) composition | Risk of unplanned changes in composition or quality of feedstock, resulting in inoperability or technical issues. |
| 13 | Changes in input (feedstock) volume | Risk of unplanned/off-schedule changes in volume of feedstock, resulting in inoperability, technical issues and increased operating costs. |
| 14 | Haulage and Transportation | There is a risk that issues with haulage or transportation of materials from the transfer facility results in delays or additional costs for the Region (e.g. catastrophic issues in which Region cannot get waste out of the facility, weather-related incidents, road blockages, etc.). This risk also includes potential for haulage and transportation cost increases related to economic conditions (i.e. rising prices for fuel). |
| 15 | Process Output Quality | Risk that process outputs (including compost, residuals, biogas, etc.) do not meet content and quality measures for marketability. |
| **Other Implementation Risks** | | |
| 16 | Site Approvals and Permitting | Risk of delays or additional costs related to site approvals and permitting (including planning, environmental approvals, geotechnical issues, archaeological finds and building permits). |
| 17 | Private Market Capacity | The risk that the market does not have sufficient capacity for waste processing options or that there are no private sector facilities available for waste processing. |
| 18 | Market Acceptability | Risk that the service delivery model is unfamiliar to the market (including contractors, designers, technology providers and operators) leading to the inability to attract sufficient interest in the Project. |
| 19 | External Environmental Impacts | Risk of external environmental impacts including odour or noise which may result from operations and lead to issues and concerns from stakeholders (including local groups). |
| **Technology related risks** | | |
| 20 | Asset/technology obsolescence | Risk that assets, including facility and equipment, may become obsolete or need to be replaced during the contract period as a result of technology advances, changes to input content and equipment/technology availability. |

## 3.3. Qualitative Risk Assessment

The following sections summarize the risk assessment of the identified Project risks under each of the noted service delivery models. Further details and rationale for the applied risk scores are provided in Appendix A.

### 3.3.1. Scoring Methodology

The service delivery models were assessed/ranked based on the likelihood/probability and potential impact on the Region. To further qualify this evaluation, a scoring matrix was developed to determine the risk score for each service delivery model by multiplying the scores related to likelihood, impact and allocation.

$$\boldsymbol{Risk\ Score = Likelihood * Impact * Allocation}$$

A risk score was calculated for each identified risk under each service delivery model. The sum of the individual risk scores were used to perform a comparative analysis to determine which service delivery model would expose the Region to the highest degree of risk. The service delivery model yielding the highest risk score would be classified as the option exposing the Region to the most risk. Conversely, the service delivery model yielding the lowest risk score would be classified as the option with the least risk to the Region.

The scoring scale applied to the likelihood was defined as follows:

**Table 2: Scoring Scale - Likelihood/Probability**

| Likelihood/Probability | Score |
|---|---|
| Unlikely | 1 |
| Likely | 2 |
| Very Likely | 3 |

The scoring scale applied to the potential impact on the Region was defined as follows:

**Table 3: Scoring Scale – Potential Impact on the Region**

| Potential Impact | Score |
|---|---|
| Low | 1 |
| Medium | 2 |
| High | 3 |

The allocation of risk was defined as percentage of risk retained by the Region (100%, 75%, 50%, 25% or 0%). The allocation scale is summarized below:

**Table 4: Scoring Scale – Allocation of Risk**

| Allocation of Risk | % of Risk Held by the Region |
|---|---|
| Fully Retained | 100% |
| Mostly Retained | 75% |
| Somewhat Retained | 50% |
| Minimally Retained | 25% |
| Fully Transferred | 0% |

### 3.3.2. Summary of Risk Assessment Scores

The table below provides a summary of the risk scores allocated to individual risks under each service delivery model. Further details and rationale on the scores related to likelihood, impact and allocation are provided in Appendix A.

**Table 5: Summary of Risk Assessment Scores**

| No. | Risk | DBB Score | DB+OM Score | DBOM Score | DBFOM Score | Private Ownership Score |
|---|---|---|---|---|---|---|
| **Policy and Strategic Risks** | | | | | | |
| 1 | Region's Strategic Direction | 3 | 3 | 3 | 3 | 2 |
| 2 | Legislative/Regulatory Changes | 9 | 9 | 9 | 9 | 9 |
| 3 | Planning, Process and Approvals Practices | 6 | 6 | 6 | 6 | 2 |
| **Financial / Economic Risks** | | | | | | |
| 4 | Affordability/Taxpayer Impacts | N/A | N/A | N/A | N/A | N/A |
| 5 | Cost Escalation Risk | 9 | 9 | 0.75 | 0.75 | 9 |
| 6 | Net Benefit Risks | 1 | 1 | 4 | 4 | 6 |
| **Design and Construction Risks** | | | | | | |
| 7 | Delays during Construction | 1.5 | 1 | 0.25 | 0.25 | 0 |
| 8 | Default During Construction | 3 | 3 | 0.5 | 0 | 0 |
| 9 | Scope changes initiated by the Region during design and construction | 6 | 6 | 6 | 4 | N/A |
| **Operations and Maintenance Risks** | | | | | | |
| 10 | Default During Operations | 3 | 3 | 0 | 0 | 1.5 |
| 11 | Failure to meet operating performance standards / targets | 3 | 0 | 0 | 0 | 0 |
| 12 | Changes in general input waste (feedstock) composition | 4.5 | 4.5 | 3 | 3 | 4 |
| 13 | Changes in input (feedstock) volume | 2.25 | 2.25 | 1.5 | 1.5 | 4.5 |
| 14 | Haulage and Transportation | N/A | N/A | N/A | N/A | 2 |
| 15 | Process Output Quality | 0.5 | 0 | 0 | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Other Implementation Risks** | | | | | | |
| 16 | Site Approvals and Permitting | 4 | 4 | 2 | 2 | 0 |
| 17 | Private Market Capacity | N/A | N/A | N/A | N/A | 9 |
| 18 | Market Acceptability | 9 | 9 | 1 | 4 | 4 |
| 19 | External Environmental Impacts | 4 | 1 | 0 | 0 | 0 |
| **Technology related risks** | | | | | | |
| 20 | Asset/technology obsolescence | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| **Total Risk Score** | | **69.5** | **62.5** | **37.75** | **38.25** | **53.75** |

Based on the risk scores generated by the qualitative risk assessment (noted above), the DBFOM and DBOM service delivery models were identified as those with the lowest overall score. The low comparative risk score indicates that the DBOM and DBFOM service delivery models would allow the Region to transfer the most risk to the private sector while minimizing or mitigating the retained risks.

# 4. Service Delivery Model Assessment

The objective of this service delivery model assessment is to recommend a preferred service delivery model(s) with the following methodology:

1. Identify the assessment criteria
2. Assign weighting for each criteria based on relative importance to the Region
3. Assign a score to each service delivery model based on rationale and assumptions to determine the recommended service delivery model(s)

## Assessment Criteria Description and Scoring Methodology

The section below notes the selected assessment criteria based on the Project and Region objectives and considerations. The three (3) criteria applied in the service delivery model assessment include:

- Risk assessment
- Ownership and control
- Cost predictability

Each of the above noted criteria will be assessed based on the scoring scales provided in the tables below. Each criterion has been assigned specific scoring scales, ranked from low to high scores, with one (1) representing a low score and three (3) representing a high score.

**Risk Assessment**

The risk assessment criterion evaluates the degree to which the qualitative risk assessment results in a minimized risk score, which takes into account the likelihood, potential impact and allocation of risk under each service delivery model. The risk assessment covered risks related to policy and strategy, planning, permitting and approvals, finance/economics, design and construction, operations and maintenance, technology and other implementation risks.

| Score | Description |
|---|---|
| 1 | The majority of Project risks are retained by the Region, resulting in the highest risk score compared to other service delivery models. |
| 2 | The service delivery option allows for the transfer or sharing of risks with the private sector. The resulting risk score lies between the highest and lowest calculated risk scores. |
| 3 | The majority of Project risks are transferred by the Region to the private sector or mitigated, resulting in the lowest risk score as compared to other service delivery models. |

**Ownership and control**

Ownership of the facility allows the Region a higher degree of control and flexibility over facility operations. This criterion measures the degree to which ownership and control of the facility is maintained by the Region during the entire Project lifecycle (including planning and development through operations and maintenance).

| Score | Description |
|---|---|
| 1 | The ownership of the facility is completely transferred to the private sector, providing the Region with minimal/no control or flexibility over long-term facility operations. |

| Score | Description |
|---|---|
| 2 | The Region remains the ultimate owner of the facility, and is afforded some control over facility operations, however, some control of facility operations is transferred to the private sector. |
| 3 | Service delivery model provides the Region with complete ownership and control over the facility, including ultimate control and flexibility over long-term facility operations. |

**Cost Predictability**

The Region is subject to financial constraints related to the delivery and operation of the facility under each service delivery model. This criterion evaluates the degree to which Project costs can be predicted and managed over the life of the Project under each service delivery model. Project costs include planning and development costs, financing/funding, design and construction costs, operating and maintenance costs, etc.

| Score | Description |
|---|---|
| 1 | The service delivery model does not allow for predictable or affordable Project costs. The Region is not best positioned to manage Project costs during the Project period and costs related to the facility are not predictable during the operating period. |
| 2 | The service delivery model allows for affordable Project costs within the Region's financial constraints. The Project costs are predictable and manageable in the short-term (less than 10-years), however, the service delivery model results in some unpredictability in Project costs over the long-term (greater than 10-years). |
| 3 | The service delivery model provides affordable and predictable Project costs for the Region over the long-term (greater than 10-years) within the Region's financial constraints. |

The table below summarizes the assessment based on the scoring criteria above, the weightings and the identified assessment criteria. The calculated score represents the total weighted score for each service delivery model. The service delivery model yielding the highest score represents the model which provides the greatest alignment with the Region's objectives based on the selected service delivery model assessment criteria.

Table 6: Service Delivery Model Assessment - Summary

| Assessment Criteria | Weighting | DBB | DBOM | DB+OM | DBFOM | Private Ownership |
|---|---|---|---|---|---|---|
| Risk Assessment | 33.3% | 1 | 3 | 1 | 3 | 2 |
| Ownership and Control | 33.3% | 3 | 2 | 3 | 2 | 1 |
| Cost Predictability | 33.3% | 1 | 3 | 1 | 3 | 2 |
| **Total** | **100%** | **5** | **8** | **5** | **8** | **5** |

# 5. Additional Considerations

## 5.1. Industry Service Delivery Best Practices

As noted, the province has a variety of business models for municipal deployment of organics processing capacity, largely through DBOM or merchant capacity models. Examples of each are given in the above sections. Generally, the industry favors an approach where technology components and process guarantees lie outside of municipal

control. For DBOM approaches, process guarantees lie with the DBOM lead proponent, which generally shifts this responsibility internally to the technology provider. For merchant capacity, the entire development cycle and performance envelope rests with the private sector.

### 5.2. Proprietary Information with Pre-Sort and Organics Management Technology

Even though much of the information regarding organics processing facilities is specialized, there are proportionately few instances where licenses are required for deployment, and generally license obligations can be shifted to DBOM lead proponents such that the municipality does not sign a license agreement. For pre-sort systems, there is seldom any type of license agreement, as the equipment is generally off-the-shelf and available via multiple vendors.

## 6. Recommended Service Delivery Model

The qualitative risk assessment and service delivery model assessment combined lead to the conclusion that the DBOM and DBFOM Service Delivery Models are preferred models for this Project (both are within a close margin of indifference).

It is recommended that that the DBOM and DBFOM options not be excluded from further analysis and investigation. Many of the assumptions used in this Report must be validated with additional analysis as more details regarding the Project become available.

# Appendix A: Risk Assessment Rationale and Scoring

## DBB Service Delivery Model

The table below summarizes the qualitative risk assessment for the DBB service delivery model.

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| **Policy and Strategic Risks** | | | | | |
| 1 | Region's Strategic Direction | Unlikely | High | 100% | The facility is expected to be built to align with the strategic direction of the Region. Any changes to the strategic direction of the Region (i.e. impacts on diversion targets) could result in potential changes to how the organics waste is managed.<br>As the Region would remain the owner of the facility under a DBB delivery model, the expected impact on the Region would be high.<br>Significant lead time is expected for any changes to the Region's strategic direction; this should allow for required changes to be made in a timely manner. |
| 2 | Legislative/Regulatory Changes | Highly Likely | High | 100% | The facility is expected to be built to align with current changes/amendments to legislative requirements related to climate change.<br>Any changes to the legislative/regulatory requirements could result in potential changes as to how the organic waste is managed.<br>As the Region would remain the owner of the facility under a DBB delivery model, the expected impact on the Region would be high.<br>The Region is aware of current legislative requirements and tracking anticipate future legislative requirements given that they typically take considerable amount of time to enact and take effect. |
| 3 | Planning, Process and Approvals Practices | Likely | High | 100% | Delays in Project approval would result in significant delays and cost implications for the Region. |
| **Finance / Economic Risks** | | | | | |
| 4 | Affordability/Taxpayer Impacts | N/A | N/A | N/A | This risk is difficult to assess prior to the in-market procurement phase of this project. |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| 5 | Cost Escalation | Highly Likely | High | 100% | Under the DBB model, the Region has the responsibility of completing the design, manage the construction and operate the facility (either in house or through a contractor). This model exposes the region to significant cost escalations risk. |
| 6 | Net Benefit | Unlikely | Low | 100% | Under the DBB model, the Region has full control over the design, construction and operation of the facility and they will ensure that the necessary steps are taken in order to achieve the highest social, environmental and financial returns to the Region. |
| **Design and Construction Risks** | | | | | |
| 7 | Delays during Construction | Highly Likely | Medium | 25% | Under the DBB model the majority of risks related to construction delays are transferred to the construction contractor, while others are retained by the Region. Construction delays such as adverse weather or other unanticipated events may be retained by the Region. |
| 8 | Default During Construction | Unlikely | High | 100% | If the construction contractor defaults, the Region would bear high impacts related to sunk costs and costs related to subsequent construction contractor procurement and project completion. |
| 9 | Scope changes initiated by the Region during design and construction | Likely | High | 100% | Scope changes initiated by the project owner during construction are common. Under the DBB model, the Region would be responsible for the cost impacts related to scope changes.<br>**Potential Mitigation Strategy:**<br>Ensuring the involvement of stakeholders in various stages of the development of the Project, in particular the design and planning stages, could minimize the need for scope changes during design and construction phase.<br>Under the DBB model the probability of this risk occurring is typically highly likely. With the above noted mitigation strategy, the likelihood has been amended to likely. |
| **Operations and Maintenance Risks** | | | | | |
| 10 | Default During Operations | Unlikely | High | 100% | If the OM contractor defaults, the Region would bear high impacts related to downtime and costs related to subsequent contractor procurement and facility operation or transport of waste to alternative processing facilities (in other jurisdictions or privately owned). |
| 11 | Failure to meet operating performance standards / targets | Likely | High | 50% | The DBB model implies the issuance of separate contracts for design, construction and the operation of the facility. |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| | | | | | The separation of duties results in this risk being likely to occur as there may be inefficiencies in transferring roles between separate contractors. For example, the operator under a DBB model, will not be involved in the design of the facility. |
| 12 | Changes in general input waste (feedstock) composition | Likely | High | 75% | Any changes in input/waste composition could lead to significant challenges for waste processing. Specific technologies (AD) are sensitive to waste composition and would require additional steps for pre-processing or recalibration to allow for changing input compositions.<br>As the inputs/feedstock to the process are typically subject to guarantees, the Region could face costs related to changes in inputs. |
| 13 | Changes in input (feedstock) volume | Unlikely | High | 75% | The inputs/feedstock to the process could be subject to minimum volume guarantees as is typical under waste facility operating contracts. Excess waste volumes (outside of facility capacity) would be subject to either storage until capacity is available, or transport to another jurisdiction or merchant facility for processing to maintain diversion targets. Feedstock volumes are typically linked to demographics and seasonality, factors which occur over longer periods of time and are easier to predict. As such, the risk is unlikely to occur in the short term.<br>**Potential Mitigation Strategy:**<br>The Region may consider ensuring available storage space or negotiate contract terms with private sector contractors to help mitigate this risk.<br>However, additional storage is not currently under consideration by the Region. The potential impact of excess waste volume is high. |
| 14 | Haulage and Transportation | N/A | N/A | N/A | N/A |
| 15 | Process Output Quality | Unlikely | Low | 50% | The risk is unlikely to occur as any failure to meet output/recoverable standards would be dependent on the technology choice. This risk assumes a steady input stream (volume and quality) of feedstock to the process.<br>Typically operations contracts for waste facilities include guarantees for minimum input feedstock.<br>**Potential Mitigation Strategy:**<br>The Region should undertake due diligence in consultation with technical advisors to ensure that the optimal |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| | | | | | technology is selected to minimize risks related to process output quality. The potential impact of this risk was downgraded from medium to low. |
| **Other Implementation Risks** | | | | | |
| 16 | Site Approvals and Permitting | Likely | Medium | 100% | Under the DBB model, this risk would be retained by the Region. As seen on similar projects, there are often project delays related to site approvals and permitting which could lead to schedule changes (increased timeline) and/or additional costs (high impact).<br>**Potential Risk Mitigation Strategy:**<br>There is some precedent on similar waste projects to transfer or share some risk related to ECA and building approval processes within Project and procurement documentation. This would be subject to negotiation with and acceptance by the market. The potential to transfer some risk related to permitting reduces the impact from high to medium. |
| 17 | Private Market Capacity | N/A | N/A | N/A | N/A |
| 18 | Market Acceptability | Highly Likely | High | 100% | The DBB service delivery model has not historically been applied on projects of similar size and scope. The DBB model is well-suited to projects for which the Region can, and has a desire to, specify its exact requirements and therefore seek firm, competitive prices in the market. It is mostly suited to conditions wherein the precise information required to complete a detailed design is readily available, rather than in available only to technology providers. |
| 19 | External Environmental Impacts | Likely | Medium | 100% | AD processes and operations, could generate odours (during reception, digestate dewatering and composting, biogas management phases).<br>A considerable portion of the process is fully contained in digesters. Most of the operations which could generate odours would be undertaken in ventilated buildings and under negative pressure.<br>Other pollution, such as noise pollution would be mainly associated with trucks delivering waste to the site. Site loaders would mainly operate into the buildings/facilities with a low noise impact. Under the DBB model, the Region would retain risk related to external environmental |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| | | | | | impacts.<br>**Potential Risk Mitigation Strategy:**<br>The facility can be designed to mitigate this risk, including enclosed processes and treatment of potential outputs. The Region would need to include detailed specifications related to the design requirements for reducing external environmental impacts, thereby reducing the impact from high to medium. |
| **Technology related risks** | | | | | |
| 20 | Asset/technology obsolescence | Unlikely | High | 25% | AD technology is well-accepted by the market and currently in use. The probability of this risk is low, as AD technology is less mature than in-vessel composting technology, and the technology is not expected to become obsolete during the contract period.<br>If, however, the technology does become obsolete during the contract term, the cost of replacement (for the Region) would be high, including capital costs and delays/downtime in the processing of materials. Under the DBB delivery model, the DB contractor is responsible for the design, including due diligence related to technology. Technology obsolescence related to the Region's strategic direction would be either shared or retained by the Region (depending on the terms of the contract). |

## DB+OM Service Delivery Model

The table below summarizes the qualitative risk assessment for the DB+OM service delivery model.

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| **Policy and Strategic Risks** | | | | | |
| 1 | Region's Strategic Direction | Unlikely | High | 100% | The facility is expected to be built to align with the strategic direction of the Region. Any changes to the strategic direction of the Region (i.e. impacts on diversion targets) could result in potential changes to how the organics waste is managed.<br>As the Region would remain the owner of the facility under a DBB delivery model, the expected impact on the Region would be high.<br>Significant lead time is expected for any changes to the Region's strategic direction; this should allow for required changes to be made in a timely manner. |
| 2 | Legislative/Regulatory Changes | Highly Likely | High | 100% | The facility is expected to be built to align with current changes to legislative requirements related to climate change.<br>Any changes to the legislative/regulatory requirements could result in potential changes as to how the organic waste is managed.<br>As the Region would remain the owner of the facility under a DBB delivery model, the expected impact on the Region would be high.<br>The Region is aware of current legislative requirements and tracking anticipate future legislative requirements given that they typically take considerable amount of time to enact and take effect. |
| 3 | Planning, Process and Approvals Practices | Likely | High | 100% | Delays in Project approval would result in significant delays and cost implications for the Region. |
| **Finance / Economic Risks** | | | | | |
| 4 | Affordability/Taxpayer Impacts | N/A | N/A | N/A | This risk is difficult to assess prior to the in-market procurement phase of this project. |
| 5 | Cost Escalation | Highly Likely | High | 100% | Under this model, the Region has the responsibility of completing the design, manage the construction and operate the facility (either in house or through a contractor). This model exposes the region to significant cost escalations risk. |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| 6 | Net Benefits | Unlikely | Low | 100% | Under this model, the Region has full control over the design, construction and operation of the facility and they will ensure that the necessary steps are taken in order to achieve the highest social, environmental and financial returns to the Region. |
| **Design and Construction Risks** | | | | | |
| 7 | Delays during Construction | Likely | Medium | 25% | Under the DB+OM model the majority of risk related to construction delays are transferred to the construction contractor, while others are retained by the Region. Construction delays such as adverse weather or other unanticipated events may be retained by the Region. The separation of the DB and OM contracts does not provide an incentive for the DB contractor to complete the construction on time when compared to the DBOM model as delays related to the start of OM would bear less impact on the DB contractor. |
| 8 | Default During Construction | Unlikely | High | 100% | If the construction contractor defaults, the Region would bear high impacts related to sunk costs and costs related to subsequent construction contractor procurement and project completion. |
| 9 | Scope changes initiated by the Region during design and construction | Likely | High | 100% | Scope changes initiated by the project owner during construction are common (highly likely). Under the DB+OM model, the Region would be responsible for the cost impacts related to scope changes initiated by the Region.<br>**Potential Mitigation Strategy:**<br>Ensuring that design requirements are considered in detail with consensus from all relevant parties during planning stage (i.e. ahead of issuing procurement documentation and/or contract), such that the need for scope changes is minimized during design and construction phase. This strategy would reduce the likelihood of occurrence from highly likely to likely. |
| **Operations and Maintenance Risks** | | | | | |
| 10 | Default During Operations | Unlikely | High | 100% | If the OM contractor defaults, the Region would bear high impacts related to downtime and costs related to subsequent contractor procurement and facility operation or transport of waste to alternative processing facilities (in other jurisdictions or privately owned). |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| 11 | Failure to meet operating performance standards / targets | Likely | Medium | 0% | The DB+OM model implies the issuance of separate contracts for design/construction and the operation of the facility. The separation of duties results in this risk being likely to occur as there may be inefficiencies in transferring roles between separate contractors.<br>**Potential Mitigation Strategy:**<br>The length of the contract and Region-developed performance specifications could mitigate this risk. Consultation sessions and negotiation with contractors would ensure that contractors understand and accept the performance standards set out by the Region. This strategy could potentially reduce the impact from high to medium. |
| 12 | Changes in general input waste (feedstock) composition | Likely | High | 75% | Any changes in input/waste composition could lead to significant challenges for waste processing. Specific technologies (AD) are sensitive to waste composition and would require additional steps for pre-processing or recalibration to allow for changing input compositions.<br>As the inputs/feedstock to the process are typically subject to guarantees, the Region could face costs related to changes in inputs. |
| 13 | Changes in input (feedstock) volume | Unlikely | High | 75% | The inputs/feedstock to the process could be subject to minimum volume guarantees as is typical under waste facility operating contracts. Excess waste volumes (outside of facility capacity) would be subject to either storage until capacity is available, or transport to another jurisdiction or merchant facility for processing to maintain diversion targets. Feedstock volumes are typically linked to demographics and seasonality, factors which occur over longer periods of time and are easier to predict. As such, the risk is unlikely to occur in the short term.<br>**Potential Mitigation Strategy:**<br>The Region may consider ensuring available storage space or negotiate contract terms with private sector contractors to help mitigate this risk.<br>However, additional storage is not currently under consideration by the Region. The potential impact of excess waste volume is high. |
| 14 | Haulage and Transportation | N/A | N/A | N/A | N/A |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| 15 | Process Output Quality | Unlikely | Low | 0% | The risk is unlikely to occur as any failure to meet output/recoverable standards would be dependent on the technology choice.<br>This risk assumes a steady input stream (volume and quality) of feedstock to the process. Typically operations contracts for waste facilities include guarantees for minimum input feedstock. This risk assumes a steady input stream (volume and quality) of feedstock to the process.<br>**Potential Mitigation Strategy:**<br>The Region should undertake due diligence in consultation with technical advisors to ensure that the optimal technology is selected to minimize risks related to process output quality. The potential impact of this risk was downgraded from medium to low. |
| **Other Implementation Risks** | | | | | |
| 16 | Site Approvals and Permitting | Likely | Medium | 100% | Under the DBB model, this risk would be retained by the Region. As seen on similar projects, there are often project delays related to site approvals and permitting which could lead to schedule changes (increased timeline) and/or additional costs.<br>**Potential Risk Mitigation Strategy:**<br>There is some precedent on similar waste projects to transfer or share some risk related to ECA and building approval processes within Project and procurement documentation. This would be subject to negotiation with and acceptance by the market. The potential to transfer some risk related to permitting reduces the impact from high to medium. |
| 17 | Private Market Capacity | N/A | N/A | N/A | N/A |
| 18 | Market Acceptability | Highly Likely | High | 100% | Organics processing includes relatively specialized design and operating information and having a separate OM contractor operate a project designed and built by others can create performance issues that the OM contractor.<br>The DB+OM service delivery model has not historically been applied on projects of similar size and scope.<br>This type of model is relatively rare in this space, although DBOM models can be deployed where a true DBOM is employed but separate contracts are let for the DB and OM components. |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| 19 | External Environmental Impacts | Likely | Medium | 25% | AD processes and operations, could generate odours (during reception, digestate dewatering and composting, biogas management phases).<br>Under the DB+OM model, the OM Contractor would be responsible for managing external environmental impacts during operations.<br>**Potential Risk Mitigation Strategy:**<br>The facility can be designed to mitigate this risk, including enclosed processes and treatment of potential outputs. The Region would need to include detailed specifications related to the design requirements for reducing external environmental impacts. This strategy reduces the risk impact from high to medium. |
| **Technology related risks** | | | | | |
| 20 | Asset/technology obsolescence | Unlikely | High | 25% | AD technology is well-accepted by the market and currently in use. The probability of this risk is low, as AD technology is less mature than in-vessel composting technology, and the technology is not expected to become obsolete during the contract period.<br>If, however, the technology does become obsolete during the contract term, the cost of replacement (for the Region) would be high, including capital costs and delays/downtime in the processing of materials.<br>Under the DB+OM delivery model, Project Co is responsible for the design, including due diligence related to technology. Technology obsolescence related to the Region's strategic direction would be either shared or retained by the Region (depending on the terms of the contract). |

## DBOM Service Delivery Model

The table below summarizes the qualitative risk assessment for the DBOM service delivery model.

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| **Policy and Strategic Risks** | | | | | |
| 1 | Region's Strategic Direction | Unlikely | High | 100% | The facility is expected to be built to align with the strategic direction of the Region. Any changes to the strategic direction of the Region (i.e. impacts on diversion targets) could result in potential changes to how the organics waste is managed.<br>As the Region would remain the owner of the facility under a DBB delivery model, the expected impact on the Region would be high.<br>Significant lead time is expected for any changes to the Region's strategic direction; this should allow for required changes to be made in a timely manner. |
| 2 | Legislative/Regulatory Changes | Highly Likely | High | 100% | The facility is expected to be built to align with current changes to legislative requirements related to climate change.<br>Any changes to the legislative/regulatory requirements could result in potential changes as to how the organic waste is managed.<br>As the Region would remain the owner of the facility under a DBB delivery model, the expected impact on the Region would be high.<br>The Region is aware of current legislative requirements and tracking anticipate future legislative requirements given that they typically take considerable amount of time to enact and take effect. |
| 3 | Planning, Process and Approvals Practices | Likely | High | 100% | Delays in Project approval would result in significant delays and cost implications for the Region. |
| **Finance / Economic Risks** | | | | | |
| 4 | Affordability/Taxpayer Impacts | N/A | N/A | N/A | This risk is difficult to assess prior to the in-market procurement phase of this project. |
| 5 | Cost Escalation | Highly Likely | Low | 25% | Under this model, the Region enters into a single contract with the Private Sector and passes on the responsibility to design, build and operate the facility typically for a 20+ year period. Through this model, the region is able to transfer the majority of the cost escalation risk. |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| 6 | Net Benefits | Likely | Medium | 100% | Under this model, the Region has limited control over the design, construction and operation of the facility. The Region will enter into a contractual obligation with the private sector based on an agreed upon set of design, construction and performance specifications that would be designed to maximize the highest social, environmental and financial returns to the Region. Due to the lack of control over the contract period, this risk is higher under this model. |
| **Design and Construction Risks** | | | | | |
| 7 | Delays during Construction | Unlikely | Low | 25% | Under the DBOM model the majority of the risks related to construction delays are transferred to Project Co which would reduce the impact of such risks on the Region.<br>The single DBOM contract provides an incentive to the consortium to complete the construction on time in order to commence operations and start earning processing fees as soon as possible. |
| 8 | Default During Construction | Unlikely | Medium | 25% | Under the DBOM model, If the construction contractor defaults, the consortia (Project Co) would be responsible for the replacement of contractors. The Project may still face schedule delays due to default during construction however Project Co would face penalties for these delays. |
| 9 | Scope changes initiated by the Region during design and construction | Likely | High | 100% | Scope changes initiated by the project owner during construction are common (highly likely). Under the DBOM model, the Region would be responsible for the cost impacts related to scope changes initiated by the Region. Typically, under this model, higher penalties would be built into the contract for changes in scope which could result in a reduced likelihood of occurrence of this risk as compared to the DBB model.<br>**Potential Mitigation Strategy:**<br>Ensuring that design requirements are considered in detail with consensus from all relevant parties during planning stage (i.e. ahead of issuing procurement documentation and/or contract), such that the need for scope changes is minimized during design and construction phase. This strategy would reduce the likelihood of occurrence from highly likely to likely. |
| **Operations and Maintenance Risks** | | | | | |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| 10 | Default During Operations | Unlikely | High | 0% | If the OM contractor defaults, under the DBOM model, Project Co would bear the impacts related to downtime and costs related to subsequent contractor procurement and facility operation. Under the DBOM model, this risk is fully transferred to Project Co. |
| 11 | Failure to meet operating performance standards / targets | Unlikely | Medium | 0% | Under the DBOM model this risk is transferred to Project Co. Project Co would incur penalties for failing to meet performance standards, therefore the risk is unlikely to occur and the impact on the Region is expected to be low.<br>**Potential Mitigation Strategy:**<br>The length of the contract and Region-developed performance specifications could mitigate this risk. Consultation sessions and negotiation with contractors would ensure that contractors understand and accept the performance standards set out by the Region. This strategy could potentially reduce the risk impact from a high impact on the Region to a medium impact. |
| 12 | Changes in general input waste (feedstock) composition | Likely | High | 50% | Any changes in input/waste composition could lead to significant challenges for waste processing. Specific technologies (AD) are sensitive to waste composition and would require additional steps for pre-processing or recalibration to allow for changing input compositions.<br>As the inputs/feedstock to the process are typically subject to guarantees, the Region could face costs related to changes in inputs. |
| 13 | Changes in input (feedstock) volume | Unlikely | Medium | 50% | The inputs/feedstock to the process could be subject to minimum volume guarantees as is typical under waste facility operating contracts. Costs for processing may increase if volumes exceed allowable capacities, resulting in additional fees to the Region.<br>Excess waste volumes (outside of facility capacity) would be subject to either storage until capacity is available, or transport to another jurisdiction or merchant facility for processing to maintain diversion targets.<br>**Potential Mitigation Strategy:**<br>The Region may consider ensuring available storage space or negotiate contract terms with private sector contractors to help mitigate this risk.<br>However, additional storage is not currently under consideration by the Region. The potential impact of |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| | | | | | excess waste volume is high. |
| 14 | Haulage and Transportation | N/A | N/A | N/A | N/A |
| 15 | Process Output Quality | Unlikely | Low | 0% | The risk is unlikely to occur as any failure to meet output/recoverable standards would be dependent on the technology choice. This risk assumes a steady input stream (volume and quality) of feedstock to the process. Typically operations contracts for waste facilities include guarantees for minimum input feedstock. |
| **Other Implementation Risks** | | | | | |
| 16 | Site Approvals and Permitting | Likely | Medium | 50% | As seen on similar projects, there are often project delays related to site approvals and permitting which could lead to schedule changes (increased timeline) and/or additional costs. Under the DBOM model, the Region could transfer some approvals and permitting risks to Project Co. |
| 17 | Private Market Capacity | N/A | N/A | N/A | N/A |
| 18 | Market Acceptability | Unlikely | Low | 100% | The DBOM service delivery model is the most common deployment method for organics processing facilities in Ontario. |
| 19 | External Environmental Impacts | Likely | Medium | 0% | AD processes and operations, could generate odours (during reception, digestate dewatering and composting, biogas management phases).<br>Under the DBOM model, Project Co would be responsible for managing external environmental impacts during operations.<br>**Potential Risk Mitigation Strategy:**<br>The facility can be designed to mitigate this risk, including enclosed processes and treatment of potential outputs. The Region would need to include detailed specifications related to the design requirements for reducing external environmental impacts. This strategy reduces the risk impact from high to medium. |
| **Technology related risks** | | | | | |
| 20 | Asset/technology obsolescence | Unlikely | High | 25% | AD technology is well-accepted by the market and currently in use. The probability of this risk is low, as AD technology is less mature than in-vessel composting technology, and the technology is not expected to become obsolete during the contract period.<br>If, however, the technology does become obsolete during the contract term, the cost of replacement (for the Region) |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| | | | | | would be high, including capital costs and delays/downtime in the processing of materials.<br>Under the DBOM delivery model, Project Co is responsible for the design, including due diligence related to technology. Technology obsolescence related to the Region's strategic direction would be either shared or retained by the Region (depending on the terms of the contract). |

## DBFOM Service Delivery Model

The table below summarizes the qualitative risk assessment for the DBFOM service delivery model.

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| **Policy and Strategic Risks** | | | | | |
| 1 | Region's Strategic Direction | Unlikely | High | 100% | The facility is expected to be built to align with the strategic direction of the Region. Any changes to the strategic direction of the Region (i.e. impacts on diversion targets) could result in potential changes to how the organics waste is managed.<br>As the Region would remain the owner of the facility under a DBB delivery model, the expected impact on the Region would be high.<br>Significant lead time is expected for any changes to the Region's strategic direction; this should allow for required changes to be made in a timely manner. |
| 2 | Legislative/Regulatory Changes | Highly Likely | High | 100% | The facility is expected to be built to align with current changes to legislative requirements related to climate change.<br>Any changes to the legislative/regulatory requirements could result in potential changes as to how the organic waste is managed.<br>As the Region would remain the owner of the facility under a DBB delivery model, the expected impact on the Region would be high.<br>The Region is aware of current legislative requirements and tracking anticipate future legislative requirements given that they typically take considerable amount of time to enact and take effect. |
| 3 | Planning, Process and Approvals Practices | Likely | High | 100% | Delays in Project approval would result in significant delays and cost implications for the Region. |
| **Finance / Economic Risks** | | | | | |
| 4 | Affordability/Taxpayer Impacts | N/A | N/A | N/A | This risk is difficult to assess prior to the in-market procurement phase of this project. |
| 5 | Cost Escalation | Highly Likely | Low | 25% | Under this model, the Region enters into a single contract with the Private Sector and passes on the responsibility to design, build and operate the facility typically for a 20+ year period. Through this model, the region is able to transfer the majority of the cost escalation risk. |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| **Operations and Maintenance Risks** | | | | | |
| 10 | Default During Operations | Unlikely | High | 0% | Under the DBFOM model, this risk would be transferred to Project Co. In the unlikely event that the defaults, Project Co would face penalties related to delays and unavailability. |
| 11 | Failure to meet operating performance standards / targets | Unlikely | High | 0% | Under the DBFOM model this risk is transferred to Project Co. Project Co would incur penalties for failing to meet performance standards, therefore the risk is unlikely to occur and the impact on the Region is expected to be low. |
| 12 | Changes in general input waste (feedstock) composition | Likely | High | 50% | Any changes in input/waste composition could lead to significant challenges for waste processing. Specific technologies (AD) are sensitive to waste composition and would require additional steps for pre-processing or recalibration to allow for changing input compositions.<br>As the inputs/feedstock to the process are typically subject to guarantees, the Region could face costs related to changes in inputs. |
| 13 | Changes in input (feedstock) volume | Unlikely | High | 50% | The inputs/feedstock to the process could be subject to minimum volume guarantees as is typical under waste facility operating contracts. Costs for processing may increase if volumes exceed allowable capacities, resulting in additional fees to the Region.<br>Excess waste volumes (outside of facility capacity) would be subject to either storage until capacity is available, or transport to another jurisdiction or merchant facility for processing to maintain diversion targets.<br>**Potential Mitigation Strategy:**<br>The Region may consider ensuring available storage space or negotiate contract terms with private sector contractors to help mitigate this risk.<br>However, additional storage is not currently under consideration by the Region. The potential impact of excess waste volume is high. |
| 14 | Haulage and Transportation | N/A | N/A | N/A | N/A |
| 15 | Process Output Quality | Unlikely | Low | 0% | The risk is unlikely to occur as any failure to meet output/ recoverable standards would be dependent on the technology choice This risk assumes a steady input stream (volume and quality) of feedstock to the process. Typically operations contracts for waste facilities include guarantees |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| | | | | | for minimum input feedstock. |
| **Other Implementation Risks** | | | | | |
| 17 | Site Approvals and Permitting | Likely | Medium | 50% | As seen on similar projects, there are often project delays related to site approvals and permitting which could lead to schedule changes (increased timeline) and/or additional costs. Under the DBFOM model, the Region could transfer some approvals and permitting risks to Project Co. |
| 18 | Private Market Capacity | N/A | N/A | N/A | N/A |
| 19 | Market Acceptability | Likely | Medium | 100% | The DBFOM service delivery model is not typically applied for organics processing facilities in Ontario. |
| 20 | External Environmental Impacts | Likely | Medium | 0% | AD processes and operations, could generate odours (during reception, digestate dewatering and composting, biogas management phases).<br>Under the DBFOM model, Project Co would be responsible for managing external environmental impacts during operations.<br>**Potential Risk Mitigation Strategy:**<br>The facility can be designed to mitigate this risk, including enclosed processes and treatment of potential outputs. The Region would need to include detailed specifications related to the design requirements for reducing external environmental impacts. This strategy reduces the risk impact from high to medium. |
| **Technology related risks** | | | | | |
| 23 | Asset/technology obsolescence | Unlikely | High | 25% | AD technology is well-accepted by the market and currently in use. The probability of this risk is low, as AD technology is less mature than in-vessel composting technology, and the technology is not expected to become obsolete during the contract period.<br>If, however, the technology does become obsolete during the contract term, the cost of replacement (for the Region) would be high, including capital costs and delays/downtime in the processing of materials.<br>Under the DBFOM delivery model, Project Co is responsible for the design, including due diligence related to technology. Technology obsolescence related to the Region's strategic direction would be either shared or retained by the Region (depending on the terms of the contract). |

## Private Ownership / Merchant Capacity Service Delivery Model

The table below summarizes the qualitative risk assessment for the private ownership service delivery model.

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| **Policy and Strategic Risks** | | | | | |
| 1 | Region's Strategic Direction | Unlikely | Medium | 100% | In selecting a merchant partner, the Region is expected to conduct sufficient due diligence to ensure that the privately owned facility and contract with the private sector allows for alignment with the strategic direction of the Region.<br>Any potential changes to the strategic direction of the Region (i.e. impacts on diversion targets, changes to organics programs) may require amendments to the contract and additional costs for processing.<br>Significant lead time is expected for any changes to the Region's strategic direction; this should allow for required changes to be made in a timely manner. |
| 2 | Legislative/Regulatory Changes | Highly Likely | High | 100% | A privately owned facility would be expected to be built and operate in alignment with current legislative requirements related to climate change. Any changes to legislation would require the merchant partner to update the facility and amend processes accordingly.<br>Any potential changes to legislation could be costly to the private sector partner, resulting in downtime and potential changes to operations.<br>Significant lead time is expected for any future legislative changes; this should allow for required changes to be made in a timely manner and allow the private sector to remain compliant with regulations.<br>Changes to legislation related to climate change could result in concerns related to higher costs or penalties for transportation across longer distances. As the Region would be responsible for the haulage and transportation from the transfer facility to the merchant facility, these penalties would be held by the Region. |
| 3 | Planning, Process and Approvals Practices | Unlikely | Medium | 100% | Delays in contract review and approvals related to procuring merchant capacity services could result in stoppages and disturbance in waste collection and transfer operations. |
| **Finance / Economic Risks** | | | | | |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| 4 | Affordability/Taxpayer Impacts | N/A | N/A | N/A | This risk is difficult to assess prior to the in-market procurement phase of this project. |
| 5 | Cost Escalation | Highly Likely | High | 100% | The merchant capacity model provides less control to the Region in the long-term due to the shorter contract term when compared to a DBOM model. The shorter contract term makes it more likely for price to escalate (not only CPI) especially at contract re-negotiation. |
| 6 | Net Benefits | Likely | High | 100% | Under this model, the Region has no control over what the private sector facility operations or how they handle the organic waste delivered to them. This could potentially impact the Region's ability to maximize their social, environmental and financial returns. |
| **Design and Construction Risks** | | | | | |
| 7 | Delays during Construction | Unlikely | Low | 0% | Under the merchant capacity model, the Private Sector would have full autonomy over the design and construction of the asset. Any delays or defaults would solely impact the private sector partner. |
| 8 | Default During Construction | Unlikely | Low | 0% | |
| 9 | Scope changes initiated by the Region during design and construction | N/A | N/A | N/A | N/A |
| **Operations and Maintenance Risks** | | | | | |
| 10 | Default During Operations | Unlikely | Medium | 75% | In the event that the merchant partner defaults during operations, the Region would face impacts related to the cost and time for the sourcing of a new service provider/merchant partner. The unavailability of the merchant facility could result in costs related to storage and transportation of waste to alternate processing sites. |
| 11 | Failure to meet operating performance standards / targets | Unlikely | Medium | 0% | Under the merchant capacity model, performance of the facility and management of operations are the responsibility of the merchant.<br>As is typical for merchant capacity contracts, the impact on the Region, should this risk occur, would be high. Any issues related to unavailability could potentially result in the Region needing to transport waste to other processing centres or landfill.<br>**Potential Mitigation Strategy:**<br>The length of the contract and Region-developed performance specifications could mitigate this risk. Consultation sessions and negotiation with contractors would ensure that contractors understand and accept the performance standards set out by the Region. This |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| | | | | | strategy could potentially reduce the risk impact from a high impact on the Region to a medium impact. |
| 12 | Changes in general input waste (feedstock) composition | Likely | Medium | 100% | The feedstock composition accepted by the services suppliers would be defined by the residual available treatment capacity at the existing merchant partner facility. |
| 13 | Changes in input (feedstock) volume | Likely | High | 75% | The quantity accepted by the services suppliers would be defined by the residual available treatment capacity at the merchant partner's facility.<br>Any changes to input volumes (additional volumes) may result in penalties or additional costs to the Region depending on the agreement with the merchant.<br>**Potential Mitigation Strategy:**<br>The Region may consider ensuring available storage space or negotiate contract terms with private sector contractors to help mitigate this risk.<br>However, additional storage is not currently under consideration by the Region. The potential impact of excess waste volume is high. |
| 14 | Haulage and Transportation | Unlikely | Medium | 100% | This risk is unlikely, however, issues or delays in bringing materials from the transfer station could result in penalties (from merchant if volumes are guaranteed) and/or additional costs for the Region related to transportation. |
| 15 | Process Output Quality | Unlikely | Low | 0% | Dependent on the terms of the contract, it is expected that the output quality, sale and storage would be the responsibility of the private sector under the private ownership model. This risk assumes a steady input stream (volume and quality) of feedstock to the process. |
| **Other Implementation Risks** | | | | | |
| 16 | Site Approvals and Permitting | Unlikely | Low | 0% | It is expected that the ECA and building permits would already be in place under the merchant capacity model, with limited impact on the Region. |
| 17 | Private Market Capacity | Highly Likely | High | 100% | Under current market conditions, there are very limited options available for merchant capacity related to organics processing. The need for organics processing capacity in the Province is expected to increase significantly in the next 5 years. If there are no new organics processing facilities developed, a shortage of treatment capacity would occur. |

| No. | Risk | Likelihood | Potential Impact | % Retained by Region | Rationale/Notes |
|---|---|---|---|---|---|
| | | | | | Historically, the private sector has been reluctant to develop additional capacity without guaranteed contracts. |
| 18 | Market Acceptability | Likely | Medium | 100% | There have been a number of merchant capacity plants over time in Ontario, and a number have failed due to poor performance, impaired economics, and environmental issues (particularly odour). |
| 19 | External Environmental Impacts | Likely | Medium | 0% | Organic waste treatment processes and operations, could generate odours (during reception, digestate dewatering and composting, biogas management phases).<br>Under the private ownership model, the private sector would be responsible for managing external environmental impacts during operations.<br>**Potential Risk Mitigation Strategy:**<br>The facility can be designed to mitigate this risk, including enclosed processes and treatment of potential outputs. The Region would need to include detailed specifications related to the design requirements for reducing external environmental impacts. This strategy reduces the risk impact from high to medium. |
| **Technology related risks** | | | | | |
| 20 | Asset/technology obsolescence | Unlikely | High | 25% | This risk would be dependent on the type of technology in use at the merchant facility. The impact on the Region if the risk were to occur could result in additional costs related to transporting materials to other processing facilities during the replacement phase.<br>Under the private ownership delivery model, the private sector partner is responsible for the design, including due diligence related to technology. Technology obsolescence related to the Region's strategic direction would be either shared or retained by the Region (depending on the terms of the contract). |

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