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City of Winnipeg – North End Sewage Treatment Plant

Detailed Biosolids Delivery Model Analysis Report

April 14, 2022

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Section 1. Executive Summary

Project Background and Need

The City of Winnipeg (the "City") is in the process of delivering a ~$1.8B expansion and upgrade of its North End Sewage Treatment Plant ("NEWPCC") to meet more stringent nutrient regulations, replace aging infrastructure and accommodate development growth. The upgrade is composed of three (3) components:

1. the **Headworks Facilities**, which is currently underway as a Design-Build ("DB") procurement;
2. the **Biosolids Facilities** (the "Project"), which is the focus of this Delivery Model Analysis Report (the "Report"); and
3. the **Nutrient Removal Facilities** ("Nutrient Removal Facilities"), for which a Delivery Model analysis will be performed at a later date.

The Biosolids Facilities are currently in the planning stage. The Nutrient Removal Facilities are currently unfunded; a detailed contract model analysis for this project will be performed at a later date. While the focus of this Report is on the Biosolids Facilities, details about the Nutrient Removal Facilities will be provided for preliminary context.

Purpose of this Report

The purpose of this Report is to provide background information and context of the Project, a qualitative and quantitative analysis of Delivery Models suited for the Project, and to recommend the Delivery Model which best meets the objectives of the Project and the needs of the City.

Based on the recommendations in this Report, the City intends to advance the procurement process to RFQ issuance in late 2022, subject to Investing in Canada Infrastructure Program ("ICIP") funding approval.

Recommended Project Delivery Model

Based on the qualitative and quantitative assessment of the potential Project Delivery Models agreed to with the City, a **Design-Build-Finance ("DBF") Delivery Model is recommended as the preferred method** for delivering the Project. Other assessed models in this Report are Design-Bid-Build ("DBB") and DB. The key characteristics of the DBF contract structure are:

- **Bundled Design and Construction:** One private sector entity is responsible for the design and construction of the Project. This provides strong incentives for design and construction work to be cost efficient and integrated (reducing design coordination issues).
- **Risk Transfer:** Design and construction risks are transferred to the design-builder who would have the track record, capacity, experience, and expertise to carry out these roles. The market consultations conducted for this Project and the Nutrient Removal Facilities (the "Market Soundings") indicate strong interest among private sector entities to participate in each project under a DBF model.
- **Cost and Schedule Certainty**: As compared to the DBB and DB models, this model provides the most incentive for the design-builder to deliver within the target timelines. Given there is private capital at risk during construction (through short-term third party financing that provides bridge financing to the achievement of the Substantial Completion Payment ("SCP")), the design-builder is most incentivized to complete the Project on time to repay its lenders. Significant transfer of cost overrun risks during construction also provides a high degree of cost certainty to the City.
- **Payment on Performance:** The DBF model involves withholding some or all payments to the design-builder until construction and commissioning is completed to the specifications and requirements of the City. Per discussions with the City, 50% is currently contemplated to be withheld until Substantial Completion.
- **Private Capital at Risk:** As noted above, the DBF model includes an SCP which is intended to anchor schedule completion and cost risk. In order to bridge the funding gap created by the size of the SCP, the design-builder (or private partner) obtains short-term private construction financing. Since the SCP is at risk, it provides strong incentives for timely completion of construction.

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Summary of Qualitative Analysis

As part of the qualitative analysis undertaken, Deloitte and the City developed a set of evaluation criteria against which to assess each of the contemplated Delivery Models. Each Delivery Model was scored from 0 to 5, defined as follows:

- **0 to 1:** Delivery Model does not align with the City's objectives;
- **2 to 3:** Delivery Model partially aligns with the City's objectives; and
- **4 to 5:** Delivery Model fully aligns with the City's Objectives;

The result of this analysis is summarized in Figure 1. As indicated below, the **DBF Delivery Model scored the highest at 4.29** out of 5 available points.

Figure 1: Summary of Qualitative Analysis Scoring

Criteria	Weighting	DBB	DB	DBF
1. Schedule Duration and Certainty				
Criterion Un-weighted Score		1	3	5
Criterion Weighted Score	14.3%	0.14	0.43	0.71
2. Affordability				
Criterion Un-weighted Score		1	4	3
Criterion Weighted Score	14.3%	0.14	0.57	0.43
3. Market Interest				
Criterion Un-weighted Score		3	4	4
Criterion Weighted Score	14.3%	0.43	0.57	0.57
4. Operational Integreation				
Criterion Un-weighted Score		5	5	5
Criterion Weighted Score	0.0%	0.00	0.00	0.00
5. Commissioning Process				
Criterion Un-weighted Score		2	4	5
Criterion Weighted Score	14.3%	0.29	0.57	0.71
6. Optimal Treatment Process Selection				
Criterion Un-weighted Score		2	4	4
Criterion Weighted Score	14.3%	0.29	0.57	0.57
7. Risk Transfer - Design and Construction				
Criterion Un-weighted Score		2	4	5
Criterion Weighted Score	14.3%	0.29	0.57	0.71
8. Risk Transfer - Long-Term Performance				
Criterion Un-weighted Score		3	4	4
Criterion Weighted Score	14.3%	0.43	0.57	0.57
Total Evaluation Score	100%	2.00	3.86	4.29
Percentage of Available Points		40.0%	77.1%	85.7%

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Summary of Quantitative Analysis

Following the qualitative assessment, the Project Delivery Models were quantitatively assessed through a Value for Money ("VFM") analysis to determine whether the DB and DBF Delivery Models provide a positive VFM relative to the traditional Delivery Model.

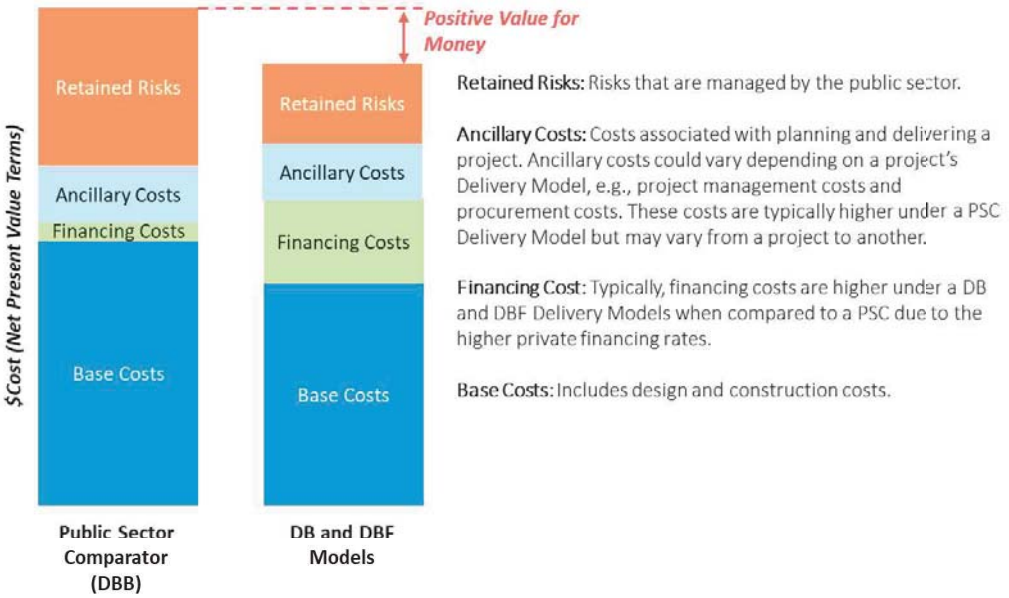
The VFM assessment quantifies and compares the risks retained by the City under the traditional DBB method of procurement, also referred to as the Public Sector Comparator ("PSC"), to the DB and DBF Delivery Models, as evidence in Table 1, in addition to a comparison of the projected cash flows under each model.

Table 1: Project risk assessment results

Risk category	**Estimated risks retained by the City**		
(Amounts in CAD millions)	**DBB**	**DBF**	**DB**
Project planning and budget	47.8	36.8	44.7
Property acquisition, approvals and site condition	20.6	14.9	14.9
Environmental assessment	-	-	-
Design and tendering risks	69.1	15.5	15.5
Construction risk	226.8	15.7	26.8
Project agreement	11.7	2.7	1.8
Total	**376.1**	**85.6**	**103.7**

The differential in the Net Present Value ("NPV") of the total costs between the PSC and DB/DBF options, inclusive of retained risk, is the estimated VFM savings of the DB/DBF models, as illustrated in Figure 2.

Figure 2: Comparison between PSC and DB and DBF Delivery Models (Illustration)



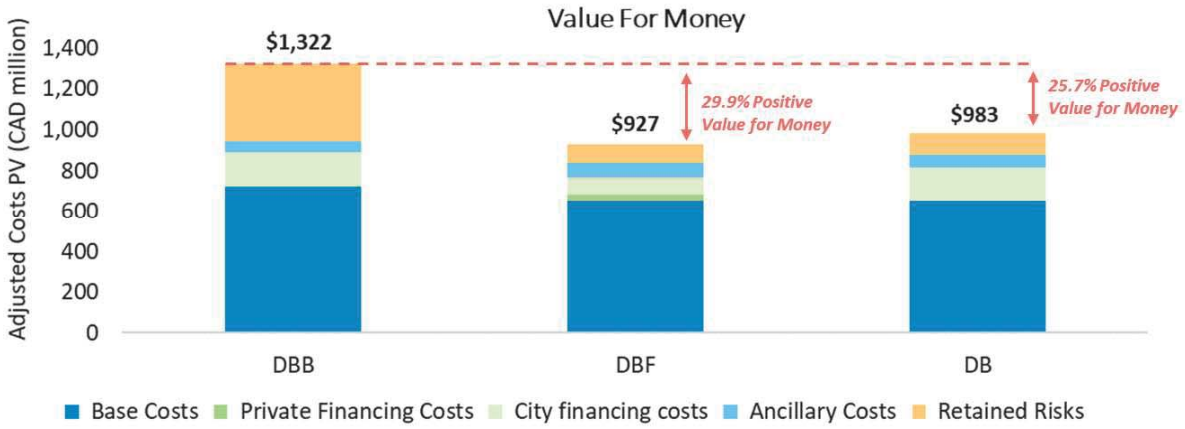
In the example above, the cash cost in the DB and DBF Delivery Models, before adjusting for risk, is higher than the cash cost under the PSC. This is generally the result of the higher financing costs incurred by the private sector, as well as the higher ancillary costs related to the planning and delivery of the Project. However, after adjusting for risks transferred to the private sector, the DB and DBF Delivery Models may present a lower risk-adjusted cost. This would result when the higher private sector financing costs and the higher ancillary costs are offset by the risk transfer and mitigation of public sector risks under the DB and DBF Delivery Models.

The DBF model is expected to provide VFM to the City arising from significant risk transfer during the construction phase of the Project. Conducting various sensitivity and scenario analyses illustrates that the DBF Delivery Model generates expected

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VFM savings within a range of 28.5% to 31.2% relative to the City's traditional Delivery Model[1]. A DB Delivery Model generates expected VFM savings within a range of 24.8% to 26.6% relative to the City's traditional Delivery Model. A summary of the costs and expected savings as compared to the PSC is illustrated in Figure 3.

Figure 3: VFM comparison between DBB (PSC), DBF, and DB Delivery Models – Base case scenario (NPV)



In conclusion, due to the outcome of the qualitative and quantitative analysis outlined in this Report, the DBF Delivery Model is most in line with the City's objectives for the Project and is expected to provide most VFM. As such, the DBF is the recommended Delivery Model for the Project.

[1] The NPV was calculated assuming a discount rate of 5% and a base date of January 2022

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Section 2. Glossary

Term	Definition
AD	Anaerobic Digesters
City	The City of Winnipeg
CUPE	Canadian Union of Public Employees, Local 500
DB	Design-Build Delivery Model, as described in Section 5.4.2.
DBB	Design-Bid-Build Delivery Model, as described in Section 5.4.1.
DBF	Design-Build-Finance Delivery Model, as described in Section 5.4.3.
DBFOM	Design-Build-Finance-Operate-Maintain Delivery Model
Delivery Model	The form of contract to design, build, operate or maintain the project, and includes traditional methods such as DBB and DB, as well as a DBF
Discount Rate	The City's discount rate which is equal to 5%, as directed by the City
Evaluation Criteria	The qualitative criteria developed and defined in Section 6.3. used to assess and rank each of the Project Delivery Models
GMP or Guaranteed Maximum Price	A firm contract price negotiated under a PDB Delivery Model
ICIP	Investing in Canada Infrastructure Program
Market Sounding	Confidential interactive sessions with potential private contractors to hear their perspectives on the planned procurement process, experiences with similar projects, potential interest, and key project issues (for both the Biosolids Facilities and Nutrient Removal Facilities upgrades)
NEWPCC	North End Sewage Treatment Plant
NPV or Net Present Value	The difference between the present value (the current worth of a future sum of money or stream of cash flows given a specified rate of return) of cash inflows and the present value of cash outflows. NPV provides an indication of the profitability of an investment.
O&M	Operations and maintenance
PDB	Progressive Design-Build, as defined in Section 5.4.2.
Participant	A potential private contractor for the Project who participated in the Market Sounding performed by Deloitte
Project	The Biosolids Facilities upgrade project of the overall NEWPCC upgrades
Project Agreement	Contract between the City and private contractor(s) to deliver the Project
Province	The Province of Manitoba
PSC or Public Sector Comparator	The traditional Project Delivery Model (DBB) used as the basis to compare the costs and benefits of the DB/DBF Delivery Models in the VFM analysis
Report	This document, which assesses a range of Project Delivery Models and recommends an optimal model that provides demonstrable public benefits and Value for Money
RFP	Refers to a Request for Proposal document(s) typically issued to solicit binding proposals through a procurement process
RFQ	Refers to a Request for Qualifications document(s) typically issued to pre-qualify a short-list of bidders through a procurement process
SCP or Substantial Completion Payment	A specified lump sum payment provided to the private contractor(s) upon certification of Substantial Completion for the Project
SEWPCC	South End Sewage Treatment Plant
Substantial Completion	The date at which the Project is sufficiently complete to begin operations

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VFM or Value for Money	The risk-adjusted cost-benefit analysis as further detailed in Section 7
WAPSO	Winnipeg Association of Public Service Officers
WAS	Waste Activated Sludge
WEWPCC	West End Sewage Treatment Plant

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Section 3. Restrictions and Limitations

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Deloitte's services may include advice or recommendations, but all decisions in connection with the implementation of such advice and recommendations shall be the responsibility of, and be made by, the City. The analysis of the Delivery Models within this Report is based on estimations and forecasts about future conditions of the Project that are subject to change. The estimations and forecasts may change based on changes in underlying macroeconomic factors and other events at a later date. As such, results may vary from those presented in this Report.

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Section 4. NEWPCC Upgrade Description and Rationale

Section 4.1. Sub-projects Comprising the NEWPCC Upgrade

NEWPCC is the oldest and largest sewage treatment plant in the city. With a projected catchment population of approximately 580,000 people, NEWPCC has been in commission for over 80 years. The City plans to deliver a ~$1.8B NEWPCC upgrade to meet more stringent nutrient regulations, replace aging infrastructure and accommodate development growth.

The NEWPCC upgrade was originally conceived to be delivered as a single DB, however due to the capital size (and hence, potential market capacity limitations), the different elements within the scope of each NEWPCC upgrade component, and the sequencing of activities required to preserve service continuity, the City ultimately established that the NEWPCC upgrade would not be feasible as one procurement package. In 2019, Winnipeg City Council approved for the NEWPCC upgrade to be carried out through three (3) major capital projects, with specific importance given to:

1. Attractiveness for design-builders;
2. Procurement considerations;
3. Construction considerations;
4. Schedule considerations;
5. Operations and Maintenance ("O&M") considerations;
6. Process constraints; and
7. Innovation.

The three major capital projects are as follows:

- Power Supply and Headworks Facilities: These are associated with critical end-of-life assets and scope that needs to be operational before the work in the remaining two projects can be brought on-line. The Power Supply project was awarded to Black and Macdonald Ltd. in 2018 and was delivered as a DB. The project is now substantially complete. The Headworks Facilities project is currently underway as a DB procurement, with the design-build contract awarded to Red River Solutions (joint venture between Aecon Group Inc. and Oscar Renda Contracting of Canada Inc.). The scope of work includes the design and construction of a new Headworks Facility that will include a raw sewage pump station, micro-tunnelled extensions of existing interceptor sewers, a grit removal system, fine screens, solids' compactors, a main control room, and a plant emergency standby power generator facility. Construction commenced in the third quarter of 2021 and is expected to be completed in 2025.[2]
- Biosolids Facilities: This Project will involve a wholesale replacement of the existing solids processing system, located on a greenfield site. The facilities are comprised of a thermal hydrolysis plant, Anaerobic Digesters ("ADs"), and centrifuges to process sludge generated from all three (3) treatment plants in the city.
- Nutrient Removal Facilities: This project will involve a wholesale replacement of the existing secondary treatment system, downstream of the primary clarifiers, to meet more stringent effluent quality standards. The facilities are comprised of an intermediate pumping station, reactors, and clarifiers, upgraded ultraviolet disinfection system, and excess wet weather treatment system.

Section 4.2. Outcomes of the NEWPCC Upgrade

The entire NEWPCC upgrade will deliver essential process upgrades to ~70% of the city's population, with the Biosolids Facilities to service 100% of the city's population. The implementation of NEWPCC's upgrade is expected to generate numerous benefits in line with the City's objectives – including accommodating economic development and population growth, continuing to protect key waterways, and maximizing nutrient reuse and recovery. Compliance with the Environment Act License is the highest priority objective.

The City is planning to upgrade NEWPCC to meet the following objectives:

[2] https://www.aecon.com/press-room/news/2021/07/07/aecon-joint-venture-awarded-contract-for-the-winnipeg-north-end-sewage-treatment-plant-project

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- **Comply with environmental regulations:** introduction of new technologies that reduce the amount of nutrients released into Lake Winnipeg. New Nutrient Removal Facilities processes will also meet effluent parameters of the Environment Act Licence.
- **Increase capacity:** meet needs of growing economic development in the city and accommodate expected future influent flows and loads.
- **Enhance treatment effectiveness:** via construction of new Biosolids Facilities, the Project will maximize nutrient reuse and recovery.
- **Replacement of aging infrastructures:** expedient replacement of critical components of the existing system, including raw sewage pumping, screening, and grit removal, as well as centrifuges and ADs.

Section 4.3. Focus of this Report on the Biosolids Facilities

Based on the overall NEWPCC upgrade timelines, the Biosolids Facilities is the next package to be procured. As such, the Nutrient Removal Facilities are not discussed further and will be the topic of a similar analysis and report in the future. The balance of the Report focuses on the Biosolids Facilities.

Biosolids Facilities

The Biosolids Facilities are planned to comprise of the process systems necessary to convert sludge that is generated on-site as well as that which is hauled from the South End Sewage Treatment Plant ("SEWPCC") and West End Sewage Treatment Plant ("WEWPCC") for beneficial re-use. The predesign for the Biosolids Facilities includes a thermal hydrolysis plant, ADs, and centrifuges to produce biosolids cake, and would be located on the west side of the NEWPCC plant.

In summary, the Biosolids Facilities upgrade will include the key components provided in Table 2.

Table 2: Biosolids Facilities key components

Biosolids Facilities	
Description	
• A wholesale replacement of the existing solids processing system. • Main components include a thermal hydrolysis plant, ADs, and centrifuges to process sludge generated from all three (3) treatment plants in the city – NEWPCC, WEWPCC and SEWPCC. • Will be located on a greenfield site, to the west of the existing plant, as seen in Figure 4.	
Key Parameters	
Average Loading	Currently estimated at 46.8 tons/day
Predesign Key Scope Elements	• Centrifuges • ADs • Thermal hydrolysis plant • Hauled raw sludge receiving • Waste Activated Sludge ("WAS") thickeners • Fermenters • Phosphorous release and recovery • Sludge screens • Biosolids storage and loading • Intermediate and final dewatering • Digester conversion

Site Map

Refer to Figure 4 for a three-dimensional diagram of the planned future state of the NEWPCC site, including: the Headworks Facilities, Biosolids Facilities, and Nutrient Removal Facilities. The site is owned by the City and will be made available to the private contractor(s) for the design and construction under a license arrangement. The City anticipates at this time that the

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private contractor(s) will be largely responsible for obtaining most permits and approvals necessary to carry out the Project, including Environmental Compliance Approvals and building permits.

Figure 4: Planned future NEWPCC site map



Section 4.4. Anticipated Timing for the Biosolids Facilities

Pending ICIP funding approval, the timelines currently anticipated for the Biosolids Facilities, assuming a DB or DBF Delivery Model, are provided in Table 3.

Table 3: Anticipated Project timing

Milestone	Target Date
RFQ issuance	Late 2022
RFP issuance	Mid 2024
Target financial close / construction start	Late 2025
Target SCP (50%)	Late 2030
Operations	Late 2030
Potential construction period	5 to 6 years

Section 4.5. Funding Commitments

To date, the Province has committed to advancing ICIP funding for the Biosolids Facilities project. ICIP funding is delivered via bilateral agreements between the federal and provincial governments (i.e., provincial support must first be attained). ICIP funding streams are established for the following types of infrastructure: public transit; green; community, culture, and recreation; and rural and northern communities. ICIP funding for this Project would fall under the green category. The City has not yet received feedback from the federal government on the status of this funding.

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Section 5. Project Delivery Models

This section outlines the City's decision making process to short-list preferred Delivery Models. The methodology identifies the City's procurement objectives and constraints which were utilized to establish a range of Project Delivery Models that are described in detail in this section.

Section 5.1. Appropriate Role of the Private Sector

As part an initial scope of work which predated this Report, Deloitte completed a screening assessment on the suitability of the private sector to deliver the Project in roles ranging from design to operations under a range of Delivery Models including a Design-Build-Finance-Operate-Maintain Delivery Model (or "DBFOM"). As a result of this screening assessment, two critical issues surfaced.

1. The first critical issue is related to the overall potential lack of viability of the DBFOM model, which included the following marketplace considerations that are particular to the scope and scale of the Biosolids Facilities:

    - the O&M function is critical to the DBFOM model, which in this case would be provided by the City's current wastewater staff;
    - with regard to the Canadian market of O&M providers, there are a limited number in existence and Canadian O&M providers have not operated at the scale of NEWPCC;
    - there have been no wastewater DBFOMs of this scale in Canada - the projects would need up to 5 credible O&M leads to create an optimal competitive environment, and thereby deliver optimal value to the taxpayers; and
    - the Market Sounding indicated that there are sufficient interested construction contractors for competitive DBF projects to be conducted for the Biosolids and Nutrient Removal Facilities as separate projects.

2. The second critical issue is that the NEWPCC is integrated into the operations of the City's overall wastewater system, which raises the following challenges:

    - significant in-house expertise and resources are deployed across the three major sewage treatment plants and an extensive regional collection network would be impacted if a private contractor were to assume control of operations and maintenance;
    - interface with Headworks Facilities, sludge inflow from SEWPCC and WEWPCC, and other existing components would present significant operational integration challenges;
    - transfer of operations has implications to the service continuity at SEWPCC and WEWPCC, and over the entirety of the wastewater treatment network in the City; and
    - collective agreements would be significantly impacted from a transfer of operations: Canadian Union of Public Employees, Local 500 ("CUPE"); and Winnipeg Association of Public Service Officers ("WAPSO").

Section 5.2. Delivery Model Analysis Methodology

Delivery Model refers to the manner in which the public sector contracts with a private contractor(s) to deliver an infrastructure project. There is a range of potential Project Delivery Models, from conventional public sector-led design, tender, construct and operate models to those involving varying levels of responsibilities and risks allocated between the public and private sector.

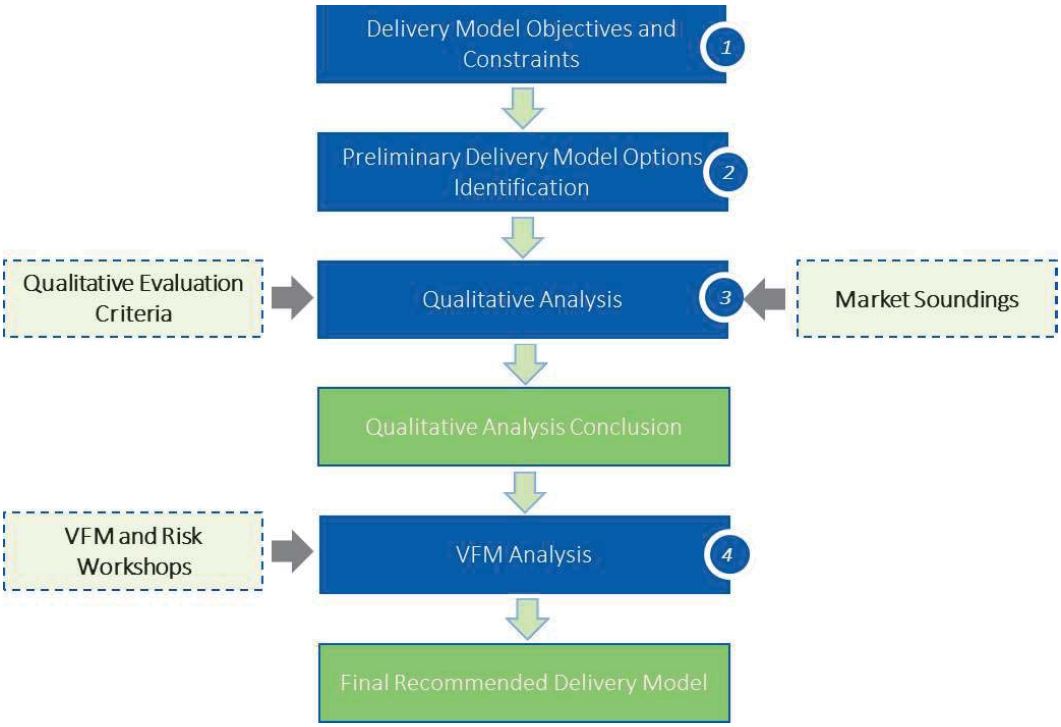
One of the main objectives of this Report is to determine the Delivery Model that:

- appropriately allocates risks to the party best able to manage them;
- is commercially viable for the City and private contractor(s); and
- results in Value for Money ("VFM") for the City as the Project sponsor, and the Winnipeg residents as utility rate payers.

The process for determining this Delivery Model is outlined in Figure 5.

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Figure 5: Methodology to select the recommended Project Delivery Model



The process shown in Figure 5 entails first identifying the City's Delivery Model objectives and constraints to ensure that the ultimate recommendation will meet the City's requirements. The second step in the process is to describe each of the considered Delivery Models and identify how each of the models would be applicable to the Project and the allocation of roles and responsibilities (between the City and private contractor(s)) therein.

The third step is to undertake a qualitative assessment of the Delivery Models. This assessment is undertaken based on the City's qualitative Evaluation Criteria against which each of the Delivery Models are evaluated. The qualitative assessment will also reflect feedback gathered through the Market Sounding with regard to the level of private sector interest in the Delivery Models considered. The Market Sounding process and results are detailed in Section 6.1 of this Report.

The Delivery Models are then quantitatively assessed through a VFM analysis which will confirm whether the Delivery Models generate a positive VFM relative to the traditional Delivery Model (DBB). The optimal Delivery Model will then be recommended as that which drives the highest VFM, consistent with the Project's objectives and constraints.

Section 5.3. Objectives and Constraints

As outlined in Section 4.2 of this Report, the City is planning to upgrade the Biosolids Facilities to meet the following key objectives:

- **Comply with environmental regulations:** provide treatment that reduces amount of nutrients released into Lake Winnipeg.
- **Increase capacity:** meet needs of growing economic development in the City and accommodate expected influent flows and loads to 2037 projections.
- **Enhance treatment effectiveness:** the Project maximizes nutrient reuse and recovery.
- **Replacement of aging infrastructure:** expedient replacement of critical components of the existing system.

The constraints relevant to the selection of the Delivery Model for the Project include the following:

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1. **Size & Complexity:** The 2018 estimated construction cost of the Project is ~$550M. The Project is complex and will require specialized designers and contractors.
2. **Environmental Regulation:** An objective for the Biosolids Facilities is to meet environmental regulatory requirements issued by the Province.
3. **Design & Technology:** The City has an existing strategic partnership with Veolia, who bring wastewater treatment expertise across all of the City's treatment plants. Certain vendors' technology has also been pre-selected by the City. While specifying particular vendors' technologies or processes may restrict innovation, several components within the Project will be performance based. The City will define any prohibited treatment processes as required within the RFQ and RFP. The City also has several pricing agreements in place for goods standardized by the City related to the NEWPCC control system, motor control centres, electric valve actuators, gas detection systems, and instrumentation.
4. **Service Continuity:** NEWPCC in its current form services ~70% of local citizenry. The existing solids processing subsystem services 100% of the local citizenry. Maintaining current operations during design and construction is important.
5. **Capital Funding:** Currently, there is no federal or provincial funding committed for the Project, though the Province has advanced the ICIP application to the federal government.

The City faces numerous interrelated constraints and considerations which impact the extent to which Delivery Models are suited to deliver the Project effectively. Based on several discussions with the City, and previous work undertaken by Deloitte, three potentially suitable Delivery Models were agreed to for assessment within this Report, which are detailed in the next section:

1. Design-Bid-Build (DBB);
2. Design-Build (DB); and
3. Design-Build-Finance (DBF).

Section 5.4. Detailed Description of Project Delivery Models

This section describes each of the Project Delivery Models under consideration, including how various components of the Project, such as construction, O&M, lifecycle, and financing would be undertaken under each of the models, including the private vs. public sector responsibility for various key tasks.

Section 5.4.1. DBB Model – Traditional Public Sector Procurement Approach

Through a traditional public sector procurement approach, the City would typically procure similar capital projects through a DBB Project Delivery Model.

Figure 6: DBB structure



Note that given the size of the Project, the City would manage one design contract and one or more construction contracts.

Table 4 illustrates the roles and responsibilities of the City and the private sector under the DBB structure.

Table 4: DBB roles and responsibilities

Role	City of Winnipeg	Private Sector
Approvals		

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Role	City of Winnipeg	Private Sector
• Environmental Impact Assessment approvals	✓	
• Other approvals	✓	
Design		
• Develop functional or concept design	✓	✓
• Develop detailed design	✓	✓
Design and Construction Co-ordination	✓	
Construction (labour, materials, equipment)		✓
Selection of Process Equipment	✓	
O&M		
• Operate and maintain the Project over the long-term	✓	
• Comply with performance specifications / requirements	✓	
• Meet and exceed all environmental and health & safety requirements	✓	
• Long-term lifecycle maintenance	✓	
Financing		
• Short-term private financing (during construction)	N/A	
• Long-term public financing	✓	
Ownership of the Project	✓	

Under a DBB model, the City would lead the design and construction of the infrastructure by directing its technical advisor and hiring one or more construction contractors. The City would procure the facility design from the technical advisor and tender the construction work to one or more construction firms through multiple tenders. The City would need to play a strong construction management and coordination role.

Payment for construction is typically made through monthly progress payments to construction contractors. The City would likely fund progress payments through traditional long-term public debenture financing and other provincial and federal sources such as via ICIP funding (as applicable). Due to this method of payment, construction contractors are paid as they go, and do not have to obtain significant amounts of private financing in order to carry out construction. As such, there is minimal external financial incentive to complete construction on-time, although the City may be able to assess delay liquidated damages in cases where completion delay is very clearly a contractor's fault. Performance is secured through methods such as liquidated damages, performance bonding, and construction warranties. The testing and commissioning process would be led by the City, however it would be a joint responsibility with the contractor(s) and technical advisor, and similar to construction, would require the City to coordinate these parties. Due to the un-integrated design and construction contracts, on a practical basis, the City retains considerable design and construction risk because there is no single point of accountability to the City for performance (the contractor(s) may retain some associated risk if the Project is not built according to the City's specifications).

Following construction completion, the infrastructure is turned over to the City who then assumes full responsibility for O&M of the Biosolids Facilities.

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DBB with Design-Assist

During the Market Soundings, several Participants raised the benefits of a more collaborative (with the construction contractor) DBB model which includes a design-assist component. Under this version of the DBB, a general construction contractor would be engaged by the City earlier on during the design phase to provide constructability input to the design and reduce construction timing/costs where possible. This may result in fewer design issues discovered in construction and hence potentially reduce change orders. DBB with design-assist is likely not compatible with the planned multi-tender approach, as it would require very early selection of a single large general contractor during the design stage. A key drawback of this approach is that it reduces competitive pressure on construction costs, since there is an incumbent contractor selected in advance of construction pricing, based primarily on qualifications. Although portions of the Project's construction may still be required by the City to be competitively tendered, significant portions of the construction likely would not be priced under competitive pressure.

While the model has some benefits, it is relatively new within Canada, and as such, projects developed using this type of model are still within the early development stages and cannot be fully verified as successful. Further, given the urgency required to deliver the Project, the City cannot afford to spend additional time developing procurement processes and documents which haven't been tried and tested in the local market.

The DBB with design-assist model is not assessed further in this Report but could be explored at a later stage depending on any further feedback from potential proponents for the Project or the Nutrient Removal Facilities project.

Section 5.4.2. DB Model

Under a DB model, all design, engineering, procurement, and construction roles are integrated through a single contract with a construction contractor. Therefore, nearly all design and construction risks are shifted to the design-builder.

Figure 7: DB structure

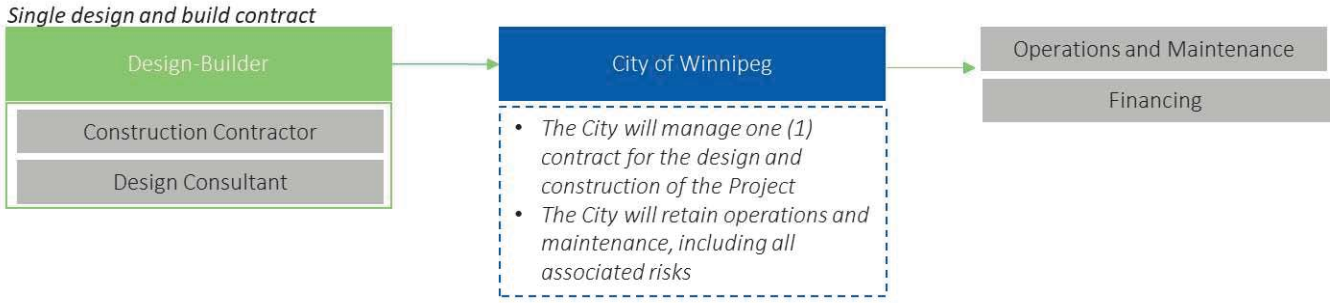


Table 5 illustrates the roles and responsibilities of the City and the private sector under the DB model.

Table 5: DB roles and responsibilities

Role	City of Winnipeg	Private Sector
Approvals		
• Environmental Impact Assessment approvals	✓	
• Other approvals	✓	✓
Design		
• Develop performance specifications	✓	
• Develop detailed design		✓
Design and Construction Co-ordination		✓

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Role	City of Winnipeg	Private Sector
Construction (labour, materials, equipment)		✓
Pre-Selection of Some Process Equipment	✓	
O&M		
• Operate and maintain the Project over the long-term	✓	
• Comply with performance specifications / requirements	✓	
• Meet and exceed all environmental and health & safety requirements	✓	
• Long-term lifecycle maintenance	✓	
Financing		
• Short-term private financing (during construction)		N/A
• Long-term public financing	✓	
Ownership of the Project	✓	

Under a DB model, all design and construction work is integrated into a single contract with a design-builder, and hence, associated risks are transferred to the private sector.

Payment for construction is typically made through monthly progress payments to the design-builder during the construction period. The City would likely fund progress/milestone payments during construction through traditional long-term public debenture financing and other provincial and federal sources such as via ICIP funding (as applicable). Due to this method of payment, design-builders are paid as they go, and do not have to obtain significant amounts of private financing in order to carry out construction. As such, there is minimal external financial incentive to completing construction on-time, although the City may be able to assess delay liquidated damages in cases where completion delay is very clearly the design-builders fault – which, compared to DBB, is more straightforward to assess given the single point of accountability for design and construction. The design-builder is responsible for commissioning.

Design-build performance is secured through methods such as payment and performance bonding and construction warranties. As with the DBB model, the infrastructure is turned over to the City following completion.

Progressive Design-Build

During the Market Soundings, several Participants raised the benefits of a Progressive Design-Build ("PDB") model which would allow for collaboration in early stages of the Project. Under a PDB model, the design-builder is retained early in the life of the Project through a selection process generally based on qualifications rather than delivery price or schedule. The design-builder would deliver the Project under two phases:

1. Phase 1: Includes budgeting, design development, preconstruction services and negotiation of a firm contract price (e.g., Guaranteed Maximum Price ("GMP")); and
2. Phase 2: Usually includes the final design, construction, and commissioning at a price not to exceed the GMP.

As opposed to the DB model, the design-builder leads a functional design in close collaboration with the City during Phase 1 and then develops a price proposal, which may be a lump sum (fixed) price, or a GMP. If authorized to proceed, the design builder completes detailed design and construction under the payment arrangement selected. In a GMP scheme, there could be an incentive regime to share "savings" with the design-builder if the Project is delivered below the GMP and meets the target schedule.

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Under a PDB Delivery Model, design and construction may be awarded through a single contract with the cost to be set at a future date, or there may be two separate agreements for each phase which allows for termination of an unsuccessful relationship (or a higher-than-acceptable price) after the design phase. Payment would be made on a monthly basis, either the actual costs incurred (if a GMP) or measured progress (if a lump sum price). Funding and commissioning would be identical to DB. This Delivery Model can reduce some risks for the City, primarily around the risks the contractor(s) has to take on during the planning and approvals, design, and construction phases. The process allows the two parties to work together to understand how those risks can be mitigated and who is best positioned to take on each risk. A key drawback of this approach is that it reduces competitive pressure on construction costs, since there is an incumbent contractor selected in advance of construction pricing.

While the model has some benefits, it is relatively new within Canada, and as such, local projects developed using this type of model are still within the early development stages and cannot be fully verified as successful. Further, given the urgency required to deliver the Project, the City cannot afford to spend additional time developing procurement documents which haven't been tried and tested in the local market.

The PDB model is not assessed further in this Report but could be explored at a later stage depending on any further feedback from potential proponents for the Project or for the Nutrient Removal Facilities project.

Section 5.4.3. DBF Model

Under a DBF model, all design, engineering, procurement, and construction roles are integrated with a single private sector DB contractor, similar to a DB model, shifting design and construction risks to the design-builder. A special purpose vehicle is usually created to deliver the project to enable non-recourse project financing.

Figure 8: DBF structure



Table 6 illustrates the roles and responsibilities of the City and the private sector under the DBF structure.

Table 6: DBF roles and responsibilities

Role	City of Winnipeg	Private Sector
Approvals		
• Environmental Impact Assessment approvals	✓	✓
• Other approvals	✓	✓
Design		
• Develop functional design	✓	
• Develop detailed design		✓
Design and Construction Co-ordination		✓
Construction (labour, materials, equipment)		✓

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Role	City of Winnipeg	Private Sector
Pre-Selection of Some Process Equipment	✓	
O&M		
• Operate and maintain the Project over the long-term	✓	
• Comply with performance specifications / requirements	✓	
• Meet and exceed all environmental and health & safety requirements	✓	
• Long-term lifecycle maintenance	✓	
Financing		
• Short-term private financing (during construction)		✓
• Long-term public financing	✓	
Ownership of the Project	✓	

Under a DBF model (similar to the DB model), all design and construction work is integrated into a single contract with a design-builder, and hence, associated risks are transferred to the private sector.

If a DBF model is chosen for the Project, the City has contemplated providing progress payments based on actual work completed, with a 50% holdback of these payments to be paid at Substantial Completion (the hold-back adds up to form the SCP) as a method to incentivize cost and schedule certainty and to anchor the associated risk transfer. Given this 50% holdback, the design-builder would need to obtain financing from private sector lenders to bridge the construction period. This structure strongly incentivizes the design-builder to complete construction on time and in conformance with specifications in order to receive payment and repay its lenders. Given the size of the Project, the design-builder would typically finance this amount through a non-recourse project finance basis which has a robust and well established market in Canada.

The City would likely fund payments to the design-builder through traditional long-term public debenture financing and other provincial and federal sources such as via ICIP funding.

Design-build performance is secured through the holdback described above, which is not paid until commissioning is successfully completed. It is not only an incentive for the design-builder, but also liquid (cash) security for the City and is in accordance with a performance-based contract where payment is not (fully) made until performance is proven.

As with the DBB and DB model, the infrastructure is turned over to the City following completion.

PDB + Financing

Market Sounding Participants also expressed interest in a variation of a PDB model which includes the design-builder providing construction financing. The description provided for the PDB model in Section 5.4.2. would still apply, however for this variation of the PDB model, private construction financing would be applied similar to the DBF model. This would add costs to the City, potentially without significant additional benefits compared to the PDB model, given that the DB contractor cannot be allocated all design and construction risks due to the collaborative nature of the design process. As compared to the DBF model, the PDB could include an SCP which would necessitate the need for the private financing; the details and confirmation of the financing would need to be confirmed during the development phase which leads to the GMP.

While the model has some benefits, it is relatively new within Canada, and as such, local projects developed using this type of model are still within the early development stages and cannot be fully verified as successful. Further, given the urgency

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required to deliver the Project, the City cannot afford to spend additional time developing procurement documents which haven't been tried and tested in the local market.

This variation of the PDB model is not assessed further in this Report but could be explored at a later stage depending on any further feedback from potential proponents for the Project or for the Nutrient Removal Project.

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Section 6. Qualitative Analysis

Section 6.1. Market Soundings

A Market Sounding exercise was conducted by Deloitte on behalf of the City to gain further insights from a range of potential industry participants into the various components of the Biosolids Facilities upgrade and the Nutrient Removal Facilities upgrade projects. The purpose of the Market Sounding was to engage in confidential interactive sessions with potential private contractors (the "Participants") to hear their perspectives on the planned procurement process, experiences with similar projects, potential interest in the projects and key project issues. The Market Sounding sought input on key topics such as scopes of the projects, transaction structures and risk allocation. The results from the Market Sounding have been utilized to support the assessment of the Delivery Models for the Project.

At the time of the Market Soundings, the City and Deloitte contemplated that this Report would determine an optimal Delivery Model for both the Biosolids and Nutrient Removal Facilities upgrade projects. As such, this component of the qualitative analysis includes feedback received on both projects. The Market Sounding findings focused on the Nutrient Removal Facilities will be carried forward to future analysis by the City and is provided in this Report for full context.

Section 6.1.1. Approach

The Market Sounding exercise was conducted on a confidential, non-attributable basis and participation in the Market Sounding by the Participants does not preclude participation in any future or other procurement process. The Participants were provided with a Market Sounding guide that included background information on the projects. The Market Sounding interviews were scheduled for 1.25 hour periods (0.5 hours for engineering firms) and all interviews were conducted via teleconference / videoconference over the June to July 2021 period. In addition to Deloitte members, staff from the City participated in the Market Sounding interviews.

For the purposes of the Market Sounding, certain key parameters for each project such as capital cost, average loading tons per day, and deal structure, as summarized in Table 7, were provided to the Participants to aid in developing an understanding of the projects in preparation of the Market Sounding.

Table 7: Market Sounding information

Item	Details
Biosolids Facilities	
Construction Cost	Approximately $550M (2018$ estimate)[3]
Average Loading (Current Estimate)	46.8 tons/day
Key Scope Elements	Centrifuges, Anaerobic Digesters, Thermal Hydrolysis Plant, Hauled Raw Sludge Receiving, WAS Thickeners, Fermenters, Phosphorous Release and Recovery, Sludge Screens, Biosolids Storage & Loading, Intermediate and Final Dewatering, Digester Conversion.
Potential Deal Structure	DBF
Nutrient Removal Facilities	
Construction Cost	Approximately $830M (2018$ estimate)[3]
Average Loading (Current Estimate)	550 ML/day
Key Scope Elements	• Excess Wet Weather Treatment System, and Intermediate Pumping Station. • Nutrient Removal Reactors, Nutrient Removal Clarifiers.
Potential Deal Structure	DBF
Key Anticipated Project Timelines	

[3] Per City budget approved by Council in 2019.

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Item	Details
Biosolids Facilities *(Note: Schedule timelines to be revised following ICIP funding approval. Refer to **Table 3** for the current estimate.)*	• RFQ Issuance: Mid-to-late 2022 • RFP Issuance: Early 2023 • Target Financial Close / Construction Start: Late 2023 • Construction Period: Approximately 5.5 to 6 years • Target Substantial Completion / Operations Start: Mid-to-late 2029
Nutrient Removal Facilities[4] *(Note: The project is currently unfunded; schedules provided were conceptual in nature only and will be revised once funding is established.)*	• RFQ Issuance: Late 2024 • RFP Issuance: Early-to-mid 2025 • Target Financial Close / Construction Start: Mid-2026 • Construction Period: Approximately 6 years • Target Substantial Completion / Operations Start: Mid-2032
Key Considerations	
Current Operations	Maintaining current operations during design, construction and commissioning of the Biosolids Facilities and Nutrient Removal Facilities is both critical and required.
Future Operations & Maintenance	The City is not considering the transfer of O&M responsibilities (i.e., O&M will remain with the City).
Construction Timelines	A number of seasonal factors contribute to the construction timelines for Nutrient Removal Facilities, including high groundwater and that some works must be performed during the winter season due to lower flows in the system.
DBF Deal Structure	• All design and construction work would be undertaken under a single integrated contract. • City would hold back 50% of the monthly progress payments / milestone payments, with the remainder to be paid back at Substantial Completion to incentivize cost and schedule certainty. • The DB contractor would be required to obtain construction financing, to finance the 50% holdback. • The City would continue to have full O&M responsibility over the entirety of the NEWPCC. • Post construction warranty O&M risk is retained by the City.

Section 6.1.2. Participants

In consultation with City staff, a list of potential Market Sounding Participants was prepared comprising of firms that would be expected to bid on the projects with strong expertise as well as experience on past projects with similar size, scope and complexity. The Participants selected consisted of various DB / general contractors, engineering firms, and lenders / debt arrangers to ensure a balanced pool of interviewees and ensure that feedback on all key aspects of the projects was obtained. Of the 18 private sector firms contacted for the Market Soundings, 12 firms agreed to participate in the Market Soundings. Overall, the Participants indicated a significant level of interest in the projects. Table 8 provides the list of firms which participated in the Market Soundings.

Table 8: List of Participants

#	Participant	Category
1.	Maple Reinders	Design-Builder / General Contractor
2.	PCL	Design-Builder / General Contractor
3.	Graham	Design-Builder / General Contractor
4.	Bird	Design-Builder / General Contractor

[4] As noted earlier, the Nutrient Removal component will be assessed further in a separate report by Deloitte.

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#	Participant	Category
5.	Aecon	Design-Builder / General Contractor
6.	SNC-Lavalin	Design-Builder / General Contractor
7.	Ledcor	Design-Builder / General Contractor
8.	Alberici Western Constructors Ltd.	Design-Builder / General Contractor
9.	Sacyr	Design-Builder / General Contractor
10.	RBC Capital Markets	Financier
11.	WSP	Engineering
12.	Tetra Tech	Engineering

Section 6.1.3. Market Sounding Discussion Topics

The Market Sounding was based around the key questions and discussion topics provided in Table 9. The discussion, as shown in the below table, covered various topics such as the contemplated deal structure, project schedules, market interests, and potential risks of the projects.

Table 9: Market Sounding discussion questions

#	Category	Question
1.	Design-Builder / General Contractor Questions	
1.1.	Deal Structure	Does the size or schedule of either the Biosolids Facilities and/or the Nutrient Removal Facilities prohibit the application of separate DBF procurements, or a bundling together under a single deal structure?
1.2.	Deal Structure	Are there issues with a DBF deal structure that could limit overall market interest?
1.3.	Deal Structure	Should the City be considering other deal structures for either of the Biosolids Facilities and/or the Nutrient Removal Facilities, or to facilitate bundling?
1.4.	Schedule	Specific to a DBF for the Nutrient Removal Facilities, what provisions could the City establish regarding existing plant operations to enable you to consider assuming schedule completion risk?
1.5.	Schedule	Are the timelines outlined workable for a DBF for each of the Biosolids Facilities and Nutrient Removal Facilities? • How long of an RFP open period would be appropriate for each? • Are there any innovative approaches that could be considered to speed up the project timelines?
1.6.	Schedule	Could bundling the Biosolids Facilities and Nutrient Removal Facilities into a single deal structure / project condense the overall timeline or bring other benefits? Is bundling viable?
1.7.	Debt Market Capacity	Is there capacity in the Canadian construction debt market to fund DBFs for the Biosolids Facilities and/or the Nutrient Removal Facilities, or as a bundled procurement?
1.8.	Debt Market Capacity	Is there any concern on capacity in the Canadian market on obtaining standard performance security for DBFs for the Biosolids and the Nutrient Removal Facilities, or as a bundled procurement?
1.9.	Payment Approach	What construction period payment approaches are most acceptable to you under a DBF deal structure – i.e. monthly progress payments or milestone payments, both with significant holdback to be repaid at Substantial Completion?
1.10.	Risk	Do you have any concerns with risk allocation that may cause challenges in bidding the Biosolids Facilities and/or the Nutrient Removal Facilities? Are they specific to DBF?

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#	Category	Question
1.11.	Risk	What type of information, released to proponents during the RFP open period, would enable you to complete suitable due diligence?
1.12.	Honorarium	What is the appropriate size for a design and bid fee / honorarium?
1.13.	Market Interest	Are there scope elements in either of the Biosolids Facilities and/or the Nutrient Removal Facilities that limit your interest? If so, what mitigants would create interest?
1.14.	Market Interest	If the City prescribes specific processes (e.g., thermal hydrolysis) or vendors/suppliers for some of the Project components, how would that affect your interest in the Project or value for the City?
1.15.	Market Interest	What role would your company assume?
1.16.	Market Interest	Are you interested in participating in the Biosolids Facilities and/or the Nutrient Removal Facilities? What are the key factors that will influence your decision to participate?
1.17.	Other	Is there any other information you would like to share with us in relation to the Biosolids Facilities and/or the Nutrient Removal Facilities?
2.	Engineering Firm Questions	
2.1.	Market Interest / Capacity	Does your firm have the expertise and capacity to develop a design for: • The Biosolids Facilities; and/or • The Nutrient Removal Facilities?
2.2.	Market Interest / Capacity	Does your firm have interest in taking a design role on a DB or DBF team for the Biosolids Facilities and/or the Nutrient Removal Facilities? • If not, what barriers or constraints exist that limit your interest?
2.3.	Deal Structure	If not for currently proposed Delivery Models, then what Delivery Models would you suggest that would be more attractive for your firm?

Section 6.1.4. Responses and Key Findings

Upon completing the Market Sounding, the feedback from all Participants was divided across the key segments listed in Table 10 and detailed in Table 11.

Table 10: Market Sounding topics

Market Sounding Topics		
• Market Interest and Capacity	• Procurement Process	• Financing Capacity
• Project Scope and Delivery Model	• Construction Term and Scope	• Honorarium
• Procurement Risks	• Construction Period Payments	

Key findings applicable to both projects are summarized in Table 11.

Table 11: Market Sounding key findings

#	Topic	Key Findings
1.	**Market Interest and Capacity**	• Participants communicated a **significant level of interest** in both projects' scopes, with size being a potential constraint. • A **bundled approach was generally not preferred** for delivering the Biosolids Facilities and Nutrient Removal Facilities. Participants noted that their interest could significantly

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#	Topic	Key Findings
		decrease if the projects were delivered in a bundled approach, due to the following key factors: - Overall size of the combined projects (combined approx. $1.3B) would significantly limit market capacity (would require a joint venture of over three large contractors); - Lengthy construction timelines for each project would create additional complexity; and, - Significant increase in construction period and completion risks. • Generally, Participants noted that the **market's current appetite for risk is lower** as compared to the previous two to three years. • Participants stated they would participate through a joint venture with at least one or two other contractors, given the size of each project. • Participants also noted **comfort with the City's successful recent track record** implementing similar Delivery Models to the DBF which would aide market interest in the projects.
2.	**Project Scope and Delivery Model**	• Based on the information provided, **no significant concerns were noted with respect to the proposed scope of the projects**, with the key assumption that the City would retain operations and maintenance responsibility for both projects. - Participants noted that the City should allow some level of flexibility in design to encourage innovation from the market. - There were some suggestions that the City should look to provide output specifications to the market (e.g. biogas yield at the Biosolids Facilities) and let the market determine the best technology and process (e.g. thermal hydrolysis or other) to provide the best value to the City. If the process is prescribed, it could limit the technology options and suppliers (e.g. there are only two to three proven suppliers of thermal hydrolysis). • Overall, the DBF model was acceptable to the Participants. However, some concerns raised with the level of potential risks with a DBF model which may limit interest from potential contractors. - A key risk noted was the completion/process prove-out risk when the contractor is not in control of operations and is under financial pressure from the lenders (repayment of short-term private financing through the SCP). • Participants **suggested some alternative Delivery Models, with a more collaborative approach** to consider for both projects, given the size and complexity of each. - There was strong advocacy for early contractor involvement models for both Projects, such as a **Progressive Design-Build ("PDB")** (with or without private financing). - Other early contractor involvement models discussed included Construction Management ("CM"), alliance, and design assist models. - More collaborative approaches were noted to be of most benefit to the Nutrient Removal Facilities. • Further, a few Participants expressed support for a DBFOM Delivery Model (for the Biosolids Facilities in particular), which could be of greater interest to the market than a DBF due to the larger scope of contract (i.e. teams may be private operator-led) and the fact that it addresses some of the completion risk associated with a DBF. - Note: the City's current collective agreements and the complexities associated with the integration of NEWPCC into overall City wastewater collection and treatment were not discussed with the Participants.

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#	Topic	Key Findings
3.	Project Risks	• Most Participants noted that the City should retain the risk for prescribed processes or vendors/suppliers, and that the City should also ensure these are tried and tested technologies, especially in consideration of the Winnipeg climate. • Participants indicated that one of the largest risk factors they anticipate can result from any passed down and unknown risks from the existing facilities and how the two projects would link into the existing NEWPCC operations. • All Participants identified risks around process guarantees and performance expectations to be another key factor. - The performance expectations must be reasonable from the City as the operator to ensure market interest. - Further, a process guarantee should be required from the pre-selected technology supplier, as applicable, which should be passed on to the City. - Some Participants noted that they would be unwilling to wrap the pre-selected technology (e.g., Cambi) within their contract and take risk on due to the relatively small balance sheets of such technology suppliers. Hence, this risk would have to be taken by the City. • Participants also stated that if the operational handover is not defined properly, it could create excess risk allocation to the contractor beyond its control and would be a major concern. • Some of the other key risks noted by Participants for the City's consideration included: - Geotechnical / environmental risks (e.g., groundwater conditions, geotechnical aspects); - Existing facilities conditions; - Permitting risks; and - Unknown utilities.
4.	Procurement Process	• Participants strongly agreed that procuring these projects separately would promote the most competition, stating that bundling would be a challenge regardless of the Delivery Model. Some Participants mentioned they could still bid on bundled Projects, though the competition would be greatly reduced. • The RFP open period timelines provided for the projects were generally considered to be reasonable, with a general expectation of a 6 to 9 month RFP open period. Some key considerations impacting timelines may include the following: - Participants may look for a lot more technical information in the RFQ stage (e.g., mass balance information) to provide greater background for their pursuit decision(s). - Extent of completion of procurement documents (i.e., RFP and Project Agreement) at first issuance and ensuring alignment between output based performance specifications and reference concept designs. - Clear communication of the evaluation criteria to the proponents and whether (and how) innovations would be considered. - Considerable relevant background information / documentation (e.g., geotechnical studies) provided to the proponents in the RFP open period. - All seasonal and operational constraints must be clearly communicated in the projects' procurement documents for planning of the construction schedules. • The importance of having "project champions" from City leadership for the projects to provide certainty to the bidders on completion of the procurement process(es) to justify participation. • Information and clarity about Veolia's contract with the City and their potential role should be provided in the procurement documents. Concerns included disclosure of the proponents' proprietary information (especially if proponents are bringing in competing

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#	Topic	Key Findings
		technology) and Veolia's access to it and whether Veolia would be precluded from bidding on the projects. Such **potential conflict of interest issues** would have to be worked through by the City prior to the procurement process.
5.	**Construction Term and Scope**	• Although the construction periods for both projects (over 5 years) were considered by the Participants to be long, **overall they seemed reasonable given the size and complexity of the Projects**. - Biosolids Facilities: Participants noted that there could be opportunities to reduce the construction period for Biosolids Facilities and shorten the schedule. - Nutrient Removal Facilities: Given the constraints of the project, workarounds, and tie-ins with existing NEWPCC operations etc., a relatively long construction period is logical. • Participants cited that collaborative approaches, such as the PDB, CM and other alternative project Delivery Models proposed could shorten the construction period with more time spent upfront with involvement of the City as the operator to design the facilities and de-risk the projects for the contractors.
6.	**Construction Period Payments**	• The construction period payments **structure proposed was generally acceptable,** with some indicating preference for a milestone payments structure whereas others preferred the monthly construction period payments, both with proposed 50% holdback to be paid through an SCP. • Some concerns were highlighted around milestone payment structures including: - Milestone definitions often presume a specific sequence of construction which may not be applicable to all proposals or may not reflect actual construction in the field, which can create funding/financing problems during construction; and - From a financing / funding perspective, if milestone payments are not made per schedule and the private financing facility has been drawn already, then funding for construction costs could become an issue – contractors may not be willing to absorb the risk due to timing differences. In essence, each milestone payment creates a risk incident during the construction period. • 100% SCP was also proposed which would make it clean and easy to administer.
7.	**Financing Capacity**	• There is **sufficient capacity and interest in the Canadian debt market** to provide financing for the two projects and lenders would look for a customary risk profile for a DBF Delivery Model. - Established contractual arrangements are very important for lenders. The City should look to avoid new processes and changes to contractual agreements should be avoided where possible. - Although most lenders typically go for a maximum of 5 years of construction financing, the bank market currently has a strong appetite. • No concerns were noted on the ability and capacity of the contractors to meet the standard performance security requirements for the Projects. • Note that under a DBF model, lenders would determine the right level of performance security to presume for the projects.
8.	**Honorarium**	• Participants noted that pursuit costs are sizable and hence would prefer an honorarium / design-bid fee of approximately **1% - 2% of the capital cost** (to primarily cover external costs), stating that the larger the honorarium the better as it allows for meaningful effort and innovation in design, as well as more accurate pricing with lower built-in contingencies.

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Section 6.1.5. Summary

The Market Soundings indicated that there is a **significant level of interest from potential market participants** in the projects. All Participants expressed a **general interest in participating under a DBF Delivery Model** for each project but suggested **consideration of certain alternate Delivery Models, such as the PDB and design-assist models, particularly for the Nutrient Removal Facilities**.

Further, the Market Soundings highlighted a number of important elements related to market interest such as: the need for an **extended commissioning period** for the projects, **reducing construction schedules**, a **clear risk allocation outline** with special consideration to potential risks that can result from existing operations, and an **honorarium / design-bid fee** of approximately 1% - 2% of the capital cost.

The feedback obtained through the Market Soundings was used to review the Delivery Models to assess for the projects, with the Delivery Models listed in Table 12 considered for assessment. As discussed in Section 5.4, the additional Delivery Models in Table 12 have been described as potential variations which will be considered in the next phases of procurement based on bidder feedback.

Table 12: Delivery Models considered for assessment

Initial Delivery Models Considered	Additional Delivery Models based on Market Sounding Feedback
Standalone Traditional DBB	**Standalone Traditional DBB with design-assist**
Standalone DB	**Standalone Progressive DB (PDB)**
Standalone DBF	**Standalone Progressive DB (PDB) with an SCP***

**Note Refer to Section 5.4.2. for a discussion on the role of private financing in a PDB model.*

Some interest was expressed at a high-level by Participants during the Market Sounding in a DBFOM Delivery Model (more specifically for the Biosolids Facilities). However, as the focus and objective of the Market Sounding was to obtain feedback on the DBF Delivery Model, such interest was indicated based on limited information on key operational aspects of the Projects that would need to be considered to determine whether a DBFOM Delivery Model would be practical, including for example the City's existing collective agreements and the high degree of integration of NEWPCC into the City's overall wastewater collection and treatment operations.

Section 6.2. Qualitative Evaluation Criteria

As stated in the previous section, the **remainder of the qualitative analysis will be focused on the Biosolids Facilities upgrade project (the Project)**. The feedback received during the Market Soundings relevant to the Nutrient Removal Facilities will be utilized at a later date.

The qualitative evaluation criteria in Table 13 ("Evaluation Criteria") have been developed considering the aforementioned objectives and constraints in Section 5.3 of this Report and the following key principles:

- Criteria comprehensively capture the priorities and objectives of the City;
- Focused on criteria that differentiate the Delivery Models; and
- Delivery Models are to be assessed on the extent to which they meet the criteria objectives.

Table 13: Qualitative Evaluation Criteria

Evaluation Criteria	Description
Schedule Duration and Certainty	The impact that the Delivery Model has on: • the completion timeline for the Project, including procurement, design, and construction; • the constructor's ability to deliver on time; and • the constructor bearing responsibility for construction delays.

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Evaluation Criteria	Description
	A critical objective for the City is to increase biosolids processing capacity to accommodate future development, with current biosolids processing capacity only able to fulfill requirements for the next five (5) to nine (9) years. Therefore, ability to reach Project completion efficiently is important.
Affordability	The impact that the Delivery Model has on the capital cost of the Project. This also includes the certainty of the design-build or construction price.
Market Interest	The impact that the Delivery Model has on the level of interest and competition from potential private sector market participants. There should be significant interest from the market in order to promote competition between participants with the required capacity, expertise and experience required to deliver the Project.
Operational Integration	The impact that the Delivery Model has on operational effectiveness, including integration considerations with the existing operations at NEWPCC and other wastewater facilities in the city. Additionally, this criteria considers the impact that the Delivery Model has on meeting environmental and regulatory standards.
Commissioning Process	The impact the Delivery Model has on ensuring a smooth and successful commissioning process.
Optimal Treatment Process Selection	The impact that the Delivery Model has on the selection of the optimal (i.e. most cost-effective approach which meets the performance requirements) treatment process.
Risk Transfer – Design and Construction	The impact that the Delivery Model has on the secured transfer of design and construction risks.
Risk Transfer – Long-Term Performance	The impact that the Delivery Model has on the secured transfer of long-term performance risks and asset quality.

Section 6.3. Qualitative Assessment of Delivery Models

Each Delivery Model has been evaluated and assigned a score based on the Evaluation Criteria in Table 13. The scoring reflects the extent to which each Delivery Model meets the City's overall Project and procurement objectives and/or mitigates the City's constraints as supported in each individual criterion.

Scores are defined as follows:

- **0 to 1:** Delivery Model does not align with the City's objectives;
- **2 to 3:** Delivery Model partially aligns with the City's objectives; and
- **4 to 5:** Delivery Model fully aligns with the City's Objectives.

The relative importance of each evaluation criterion defined in Table 13 is assumed to be equal, with the exception of operational integration which has an assumed weighting of zero given this criterion doesn't distinguish Delivery Models.

Table 14: Evaluation Criteria weights

Criteria	Maximum Raw Score	Weighted Criteria Score
1. Schedule Duration and Certainty	5.0	0.71
2. Affordability	5.0	0.71
3. Market Interest	5.0	0.71
4. Operational Integration	5.0	0.00
5. Commissioning Process	5.0	0.71
6. Optimal Treatment Process Selection	5.0	0.71
7. Risk Transfer - Design and Construction	5.0	0.71

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Criteria	Maximum Raw Score	Weighted Criteria Score
8. Risk Transfer - Long-Term Performance	5.0	0.71
Total Evaluation Score (rounded)		5.0

A total weighted score out of 5.0 is calculated for each Delivery Model in Table 15 so that each can be directly compared.

Section 6.3.1. Schedule Duration and Certainty

Delivery Model	Score	Explanation
Incentives to complete construction on time and entity responsible for construction bears consequences of delays		
DBB	1	• Construction period payments are typically made on a monthly progress payments basis as the work is performed. As the constructor does not have to undertake material amounts of private financing, there is less incentive to complete construction on time. • Use of multiple construction contracts creates coordination risk and raises the risk of construction delays and claims. Related co-ordination risk is retained by the City. • Separate design and construction contracts puts the City in the middle of design and construction coordination, which further increases co-ordination risk retained by the City. • Delay liquidated damages can be included in the construction contracts to create completion incentive, but in practice may be difficult to apply given the multi-party accountability inherent in the Delivery Model structure (designer, City, various construction contractors and suppliers involved). Also, such liquidated damages requires action by the City which is subject to disputes, as the contract provisions are often not efficient to enforce (could be mitigated to some extent through early City legal involvement).
DB	3	• Due to the integrated design and construction structure, design and construction coordination would be the responsibility of the design-builder who would also be responsible for most delays and/or cost overruns during construction. This increases incentive for the design-builder to deliver on time. • Delay liquidated damages can be included in the contract, and because of the integrated design and construction structure, can be more readily applied than in DBB because accountability for most causes of delay is transferred and clear. However, as with the DBB, such liquidated damages requires action by the City which is subject to disputes, as the contract provisions are often not efficient to enforce (could be mitigated to some extent through early City legal involvement).
DBF	5	• Same as DB with respect to overall co-ordination and responsibility of most delays and/or cost overruns during construction. • Portions of the monthly payments are withheld and due upon achievement of Substantial Completion. In order to bridge the funding gap that results from this payment regime, the design-builder obtains short-term private financing to fund the portion of the construction period costs that are withheld up to Substantial Completion. Hence, the design-builder is incentivized to complete construction on time and in accordance with specifications in order to receive payment and repay the short-term lenders on time or early (at the time of Substantial Completion) to avoid penalties and additional interest charges from lenders. • Same as DB with respect to inclusion of delay liquidated damages in the contract. However, with funds held back up to Substantial Completion, the City has a highly efficient means to collect (e.g. set off mechanisms exist) which are highly efficient to enforce and anchor the risk transfer envisioned. The City should be careful to only

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Delivery Model	Score	Explanation
Incentives to complete construction on time and entity responsible for construction bears consequences of delays		
		include events that result in direct damages to the City as the lenders will also impose delay costs typically for increased financing costs and/or administrative costs.

Section 6.3.2. Affordability

Delivery Model	Score	Explanation
Impact on the capital cost of the Project and certainty for which the Project can adhere to the City's price		
DBB	1	• The City is responsible for design coordination. Consequently, the City would be responsible for any change orders as a result of design issues leading to potential cost overruns. • Cost overruns resulting from delays are more likely than under a DB or DBF model. • The City will have to coordinate with multiple contractors and the risk of claims under a DBB model with multiple construction contracts is high.[5]
DB	4	• Cost overruns from design issues are less of an issue in comparison to the DBB model as one design-builder will be responsible for design and construction coordination as well as for any delays and / or cost overruns. • The price competition that results from a DB procurement will incentivize bidders to minimize the capital costs required to meet the City's objectives. • Transferring the risk of cost overruns during construction provides a high degree of price certainty to City.
DBF	3	• Same as DB with respect to cost overruns. • Same as DB with respect to capital cost minimization. • The Project will be marginally more expensive compared to DB (all else equal) as private finance is more expensive than City-issued debt, and the procurement costs for the City and Proponents are higher in DBF versus DB. • Similar to DB with respect to price certainty, however the anchoring of risk transfer provided by the SCP[3] may enhance price certainty further.

Section 6.3.3. Market Interest

Delivery Model	Score	Explanation
Impact on the level of interest, expertise and competition from potential private sector market participants		
DBB	3	• Note that the DBB Delivery Model was not specifically discussed in the Market Soundings to gauge market interest. • Depending on the size of each construction tender, the Project may be sufficiently attractive to garner interest from local as well as national / international contractors. • Depending on the size of each construction tender, the size of the Project could preclude some of the smaller entities from leading the Project on their own. It should also be noted that these smaller entities typically do not have the financial strength/capacity, track record or experience on projects of a similar scope and scale to the Project. • Some contractors specializing in water/wastewater construction may favour DB and DBF over DBB as it allows them to compete not just on price for a tendered design, but on construction means/methods and on design. Relative to the DB approaches,

[5] Refer to the criterion 'Incentives to complete construction on time and entity responsible for construction bears consequences of delays' regarding issues related anchoring risk transfer, the collection of liquidated damages and the benefits of the SCP.

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Delivery Model	Score	Explanation
		contractor interest could be limited. The intent of issuing multiple smaller construction tenders would further commoditize the construction and reduce the interest of the contractors who are of this opinion. • There is a high level of expertise/experience in the market.
DB	4	• The interest of the construction contractor market in DBF (as assessed in the Market Sounding) can reasonably be assumed to apply to the DB model, as adding the financing aspect to a DB (i.e. as in DBF) is more likely to decrease, rather than increase, interest of construction contractors. • Market Sounding Participants noted comfort with the City's successful recent track record delivering projects similar to this Delivery Model which would increase market interest for this approach. • As with the DBB, there is a high level of expertise/experience in the market.
DBF	4	• Per the Market Sounding feedback, there is a high level of interest in a DBF model. Further, Participants noted sufficient capacity and interest in the Canadian debt market to provide financing. • Market Sounding Participants noted comfort with the City's successful recent track record delivering projects similar to this Delivery Model which would increase market interest for this approach. • As with the DBB and DB, there is a high level of expertise/experience in the market.

Section 6.3.4. Operational Integration

Delivery Model	Score	Explanation
Impact on operational integration considerations with NEWPCC and existing wastewater facilities in the City and ability to meet environmental and regulatory standards		
DBB	5	• O&M is performed by the City. As such, the DBB model allows the City to manage the operational integration once construction is complete. • Ability to meet all required environmental and regulatory standards stems from the performance specifications used to develop the design, and the City's operation of the Project.
DB	5	• Same as DBB.
DBF	5	• Same as DBB.

Section 6.3.5. Commissioning Process

Delivery Model	Score	Explanation
Impact on commissioning considerations with NEWPCC		
DBB	2	• Separate design and construction contracts puts the City in the middle of the commissioning process to some extent, thus this risk is partially borne by the City. • Lack of design and construction coordination[5] reduces the ability to best plan for a smooth commissioning process and integration into existing wastewater facilities in the City. Potential for several construction contractors increases coordination challenges as well. • Deficiencies that result in a delay to the date of commercial operations due to a poorly designed commissioning process is a risk largely borne by the City.
DB	4	• In addition to increased design and construction coordination compared to DBB, the DB would allow for better planning for integration with NEWPCC and existing wastewater facilities in the City.

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Delivery Model	Score	Explanation
		• Commissioning delays are primarily borne by the design-builder but anchoring of risk transfer and related financial impacts are not as effective. [5]
DBF	5	• Same as DB. • Under a DBF model, there is potential benefit to replacing a portion of the SCP with a warranty period operational performance letter of credit rather than a standard warranty in a DB or DBB model. • Risk transfer and related financial impacts are anchored through the SCP. [5]

Section 6.3.6. Optimal Treatment Process Selection

Delivery Model	Score	Explanation
Impact on selection of most optimal treatment process		
DBB	2	• Process and equipment selection are determined through a design process and comparison of alternatives which results in a recommendation, but not a guarantee. • Co-ordination risks may exist with the procurement and/or hand-off of the technology.[5] • Performance guarantees may be available for certain pieces of equipment, but are not reasonably available for the treatment process in its entirety due to the separate design and construction contracts. • There is no competitive process under this model to determine the most efficient treatment process technologies.
DB	4	• The DB model includes a design competition, including on treatment processes and equipment (excluding those which the City has pre-selected), which has the potential to result in an optimal (i.e., most cost-effective approach which meets the performance requirements) process train. • Due to the integrated design and construction, performance guarantees could be obtained for the treatment processes/technologies. This transfers some risk for process train and equipment selection to the design-builder. • Co-ordination risks may exist with the procurement and/or hand-off of the technology.[5]
DBF	4	• Same as DB. • Co-ordination risks are anchored through the SCP[3], however procurement and/or hand-off of the technology can be addressed by requiring the design-builder to procure and install the equipment, with the City maintaining responsibility to select the Vendor and pay as a pass through (e.g., as a specific major equipment payment).

Section 6.3.7. Risk Transfer – Design and Construction

Delivery Model	Score	Explanation
Transfer of significant design and construction risks to the private sector		
DBB	2	• There is no single point of accountability for design and construction; each are under separate contracts. • The City retains responsibility for management and coordination of construction[5] and design. Hence, design coordination issues encountered during construction may result in change orders for which the City would be liable. • Major performance security over the construction contractor (i.e. bonding) does not cover design issues. Performance security is not liquid; surety will seek to avoid liability.

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Delivery Model	Score	Explanation
DB	4	• Design-builder has bundled responsibility for design, construction, testing, and commissioning which minimizes design, coordination, and construction risks borne by City. • Performance security is limited typically to bonding which is not liquid; surety will seek to avoid liability. Letters of credit may be an alternative, however amounts are encumbered by the contractors' financial capacity. Liquidated damages can be applied but may be challenging to implement.[5]
DBF	5	• Same as DB model, with addition of SCP to anchor the risk which creates liquid security for the City over performance.

Section 6.3.8. Risk Transfer – Long-Term Performance

Delivery Model	Score	Explanation
Transfer of significant operations and long-term performance risks to the private sector		
DBB	3	• No private sector entity is involved during the O&M period as the City assumes responsibility for all long-term performance. • A one-year operational advisory period (currently envisioned by the City) could look to mitigate some of the performance risk and require the contractor / technology provider to address and resolve any issues which may impact long-term performance over the relevant period. • Risk of construction defects discovered during operations after expiry of warranty period would be the City's risk.
DB	4	• Similar to DBB, no private sector entity is involved during the O&M period as the City assumes responsibility for all long-term performance. • Latent defect warranties are sometimes longer with DB (up to 10 years). • A one-year operational advisory period (currently envisioned by the City) could mitigate some of the performance risk and require the contractor / technology provider to address and resolve any issues which may impact long-term performance over the relevant period.
DBF	4	• Same as DB.

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Section 6.4. Results of Qualitative Analysis

A summary of the qualitative assessment is presented in Table 15.

Table 15: Summary of Qualitative Analysis Scoring

Criteria	Weighting	DBB	DB	DBF
1. Schedule Duration and Certainty				
Criterion Un-weighted Score		1	3	5
Criterion Weighted Score	**14.3%**	**0.14**	**0.43**	**0.71**
2. Affordability				
Criterion Un-weighted Score		1	4	3
Criterion Weighted Score	**14.3%**	**0.14**	**0.57**	**0.43**
3. Market Interest				
Criterion Un-weighted Score		3	4	4
Criterion Weighted Score	**14.3%**	**0.43**	**0.57**	**0.57**
4. Operational Integreation				
Criterion Un-weighted Score		5	5	5
Criterion Weighted Score	**0.0%**	**0.00**	**0.00**	**0.00**
5. Commissioning Process				
Criterion Un-weighted Score		2	4	5
Criterion Weighted Score	**14.3%**	**0.29**	**0.57**	**0.71**
6. Optimal Treatment Process Selection				
Criterion Un-weighted Score		2	4	4
Criterion Weighted Score	**14.3%**	**0.29**	**0.57**	**0.57**
7. Risk Transfer - Design and Construction				
Criterion Un-weighted Score		2	4	5
Criterion Weighted Score	**14.3%**	**0.29**	**0.57**	**0.71**
8. Risk Transfer - Long-Term Performance				
Criterion Un-weighted Score		3	4	4
Criterion Weighted Score	**14.3%**	**0.43**	**0.57**	**0.57**
Total Evaluation Score	**100%**	**2.00**	**3.86**	**4.29**
Percentage of Available Points		**40.0%**	**77.1%**	**85.7%**

As demonstrated in Table 15, the DBF model scores the highest with an overall score of 4.29 out of a possible 5.0 points. In order to finalize the analysis and confirm if a DBF is the recommended Delivery Model, a VFM analysis is performed in Section 7 of the Report.

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Section 7. Value for Money Analysis

Section 7.1. VFM Context and Purpose

As presented in Figure 5, following the qualitative assessment, the Project Delivery Models are then quantitatively assessed through a VFM analysis which will confirm whether the DB and DBF Delivery Models are expected to have a positive VFM relative to the traditional Delivery Model.

When considering the VFM analysis, the following must be noted:

- VFM analysis is applied as a decision-assist tool to quantify the estimated costs and benefits of the Project Delivery Models on a risk adjusted basis.
- The VFM results should be considered together with the financial analysis and broader objectives to ensure a full analysis of the Project.
- VFM results will vary over time and are highly sensitive to financing assumptions. Results within this Report are preliminary in nature and based on the assumptions stated herein.
- The risk assessment in a VFM is a comparative assessment; any quantification of risk should only be viewed within this context and not interpreted on an absolute or stand-alone basis.
- The VFM is intended to demonstrate feasibility of the Project Delivery Models relative to the traditional DBB Delivery Model.

Section 7.2. VFM Methodology

For the purpose of this Report, a VFM assessment was conducted based on the following three principles:

1. An innovation factor is applied to the design and construction costs to recognize that the base costs of the PSC are expected to be higher than the DB and the DBF models as a result of:

    - use of performance-based specifications in DB and DBF Delivery Models allow contractors to consider innovative and alternative ways to deliver a project such that the hard construction costs are lower as compared to a traditional Delivery Model (which has highly prescriptive specifications); and
    - the competitive environment of DB and DBF projects which includes integration of a design competition.

2. The City's discount rate ("Discount Rate") is equal to 5%, as directed by the City. The City's base case cost of borrowing is based on the rate that the City could obtain if it borrowed funds to finance the Project.
3. The core of the VFM is a risk matrix that uses historical risk quantification data from similar projects that is adjusted as required to reflect the specific risks of the Project as quantified through a risk workshop (described below).

Further, no adjustment has been made for "competitive neutrality" as there is no anticipated difference in beneficial revenues to the City for the different Delivery Models under consideration.

The VFM assessment compares the net present costs of:

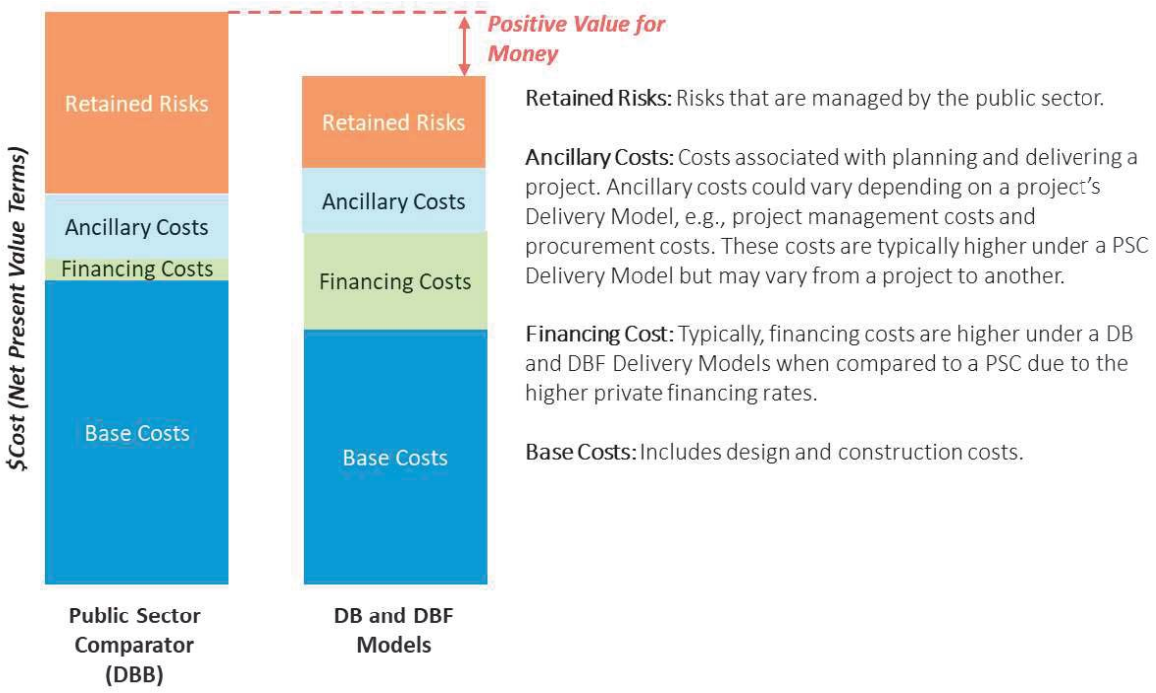
- An estimation of the total, risk-adjusted costs of delivering the Project under a DB and DBF Delivery Model; and
- A PSC, or specifically the DBB model, which estimates the total risk-adjusted costs of delivering the Project under the public sector's traditional method of delivering public infrastructure projects.

Figure 9 illustrates how value is demonstrated through a typical VFM calculation. In the example, the cash cost in the DB and DBF Delivery Models, before adjusting for risk, is higher than the cash cost under the PSC. This is generally the result of the higher financing costs incurred by the private sector, as well as the higher ancillary costs related to the planning and delivery of the Project. However, after adjusting for risks transferred to the private sector, the DB and DBF Delivery Models may present a lower risk-adjusted cost. This would result when the higher private sector financing costs and the higher ancillary costs are offset by the risk transfer and mitigation of public sector risks under the DB and DBF Delivery Models.

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The purpose of the VFM analysis is therefore to quantify the estimated amount, if any, by which the net present costs of the Project when delivered as a DB and DBF Delivery Model are lower than delivery under the PSC.

Figure 9: Comparison between PSC and DB and DBF Delivery Models (Illustration)



Section 7.3. Project Costs

For the purpose of this Report and the quantitative analysis, the Project's costs were divided into the following three cost line items:

- **Base cost:** This cost line item include costs which are related to the design and construction of the Project. This line item include construction, consultants (engineering & others), contingencies, and overhead costs for design and construction of the Project[6].
- **Ancillary costs:** Consists of ancillary costs during construction and other costs. Ancillary costs during construction include annual SPV/contractor costs during construction, financial close cost, honorarium, and the City's ancillary Project costs (e.g. owners' engineer costs, internal project management costs).
- **Financing costs:** This cost line item is only relevant in the case of DBF Delivery Model which results from the design-builder's short term financing for costs during the design-construction period which are not funded by the City's monthly construction period payments. Financing costs also include the City's financing costs incurred for funding its construction period obligations (costs incurred over the construction period only).

These cost items have been included in the financial model which was used to develop the VFM analysis. The financial model includes the DBB scenario (used as the PSC), the DB, and DBF Delivery Models and utilizes common assumptions for each. The costing information was provided by the City (in 2018$) per the City's 2019 approved budget and has not been updated for current market conditions or updated design. Based on the costing information and financing assumptions (Table 17), a summary of the Project's capital costs under each of the Delivery Models are provided in Figure 10.

[6] Design and construction costs for the Project used within the VFM analysis are based on cost assumptions provided by the City.

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Figure 10: Summary of Project capital costs by Delivery Model

Summary of Costs (nominal - CAD '000)	DBB	DBF	DB
Total Project Capital Costs	738,963	736,543	700,454

Further details on the key inputs and assumptions utilized to determine the costs and develop the financial model and VFM analysis are provided in Section 7.5.

Section 7.4. Project Financing Structure and Assumptions

Table 16 details the structure for each of the selected Delivery Models for the Project; DBB, DBF, and DB, outlining the relevant construction period payments and financing / funding structure. Note that the City's funding structure for its construction period obligations does not impact the VFM but would be important for the City's internal budgeting / funding plan purposes.

Table 16: Delivery Models structure

#	Delivery Model	Description
1	DBB	• The City pays monthly construction period progress payments for the total Project's capital costs base and ancillary costs during the construction period based on the percentage of monthly construction progress achieved. • The City may finance its total construction period payments obligations via a long-term debenture (e.g. 30 year debenture) or other available municipal, provincial, or federal (e.g. ICIP) funding sources, as applicable.
2	DB	• Monthly construction period payments structure is assumed to be the same as the DBB model. • The City may finance its total construction period payments obligations via a long-term debenture (e.g. 30 year debenture) or other available municipal, provincial, or federal (e.g. ICIP) funding sources, as applicable.
3	DBF	• The City pays monthly construction period payments based on percentage of monthly construction progress achieved. City would hold back 50% of the monthly payments with the remainder to be paid back at Substantial Completion to incentivize cost and schedule certainty (via the SCP). • The contractor undertakes short-term private construction financing for 50% holdback which is paid back through the SCP from the City. • The City may finance its total construction period payments obligations via a long-term debenture (e.g. 30 year debenture) or other available municipal, provincial, or federal (e.g. ICIP) funding sources, as applicable.

Section 7.5. Financial Model Assumptions

The key financial assumptions set out in Table 17 have been included in the financial model to develop the VFM analysis.

Table 17: Summary of key financial assumptions

Financial Assumptions	Assumption	Rationale
Escalators		
Indexation Base Year	2018	City provided costs in 2018 dollars
Construction Cost (Design & Build Costs) Inflation Rate	3.00%	Based on discussions between the City and Deloitte

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Financial Assumptions	Assumption	Rationale
Procurement Schedule Assumptions[7]		
RFQ Release Date	Late 2022	Based on discussions between the City and Deloitte. The City is currently targeting release of RFQ by late 2022.
RFP Release Date	Mid 2024	Based on discussions between the City and Deloitte. The City is currently targeting release of RFP by mid 2024.
Financial Close Date	Late 2025	Based on discussions between the City and Deloitte. The City is currently targeting financial close by late 2025.
Key Project Dates / Timing		
Base Date (NPV)	January 2022	Based on discussions between the City and Deloitte (Base Date for NPV represents the base date for the VFM analysis)
Construction Start Date	Late 2025	Based on discussions between the City and Deloitte. The City is currently targeting start of construction by late 2025
Construction Length (Months)	60 (5.0 years)	Based on discussions between the City and Deloitte. Estimated construction duration of 5 to 6 years.
Spending Curve	Monthly	Construction costs are assumed to have a flat, equal spending, monthly curve, for the purpose of the analysis.
Assumed Substantial Completion Date	Late 2030	Based on discussions between the City and Deloitte. The City is currently targeting substantial completion date by late 2030.
Discount Rates		
City Discount Rate (for VFM)[8]	5.00%	Based on discussions between the City and Deloitte
City financing costs	4.50%	The assumption is based on the 2024F City 30 Year external debenture rate[8]. The City's financing costs is assumed over the construction period only and does not include required financing to fund the SCP.
Private contractor financing assumptions		
All-in interest rate (annual) [9]	2.77%	• **Base rate (1.35%)** - Based on 5 year Government of Canada ("GOC") bond yield as of Q1 2022 • **Credit spread (1.10%)** - based on precedent projects, including swap spread • **Contingency buffer (0.32%)** - Based on forecasts on GOC yields, the 5 year bond yield is expected to increase 32 bps over the next 3 years

[7] Project schedule might vary depending on ICIP approval.
[8] Source: https://winnipeg.ca/cao/pdfs/EconomicDemographicVariables.pdf
[9] Based on a recent RBC forecasts publication (Financial markets monthly publication, January 2022)

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Financial Assumptions	Assumption	Rationale
Upfront fee	0.75%	Deloitte's benchmarks of precedent comparable projects (discussed and confirmed with the City)
Commitment fee	0.28%	Deloitte's benchmarks of precedent comparable projects (discussed and confirmed with the City)

Section 7.6. Risk Analysis and Quantification

A risk analysis has been carried out for the Project as a whole, with risk matrices constructed under the DBB, DB, and DBF Delivery Models.

Section 7.6.1. Process and Methodology

An overview of the risk assessment process carried out for the Project is illustrated in Figure 11.

Figure 11: Overview of the risk assessment process

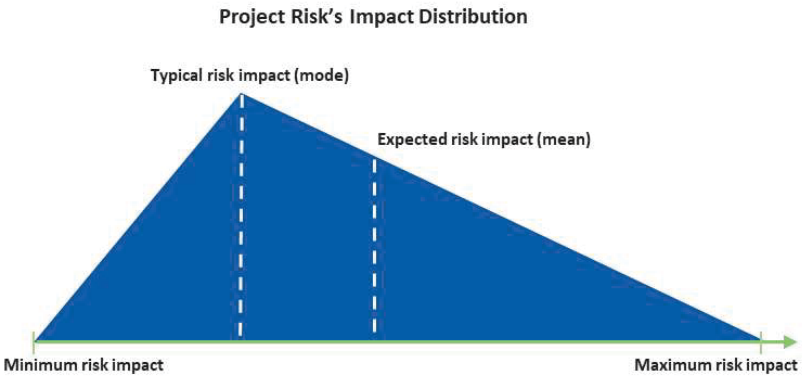


- **Step 1 - Development of a draft risk matrix:** The draft risk matrix was prepared utilizing risk quantified on previous similar projects, and typical risk allocation in DBB, DB, and DBF contracts, and risk allocation seen in comparable waste/wastewater infrastructure projects.
- **Step 2 - Risk assessment:** The risk assessment process involved facilitation of a risk workshop with the City who contributed based on their expertise, professional experience, and judgment. Through the risk workshop, participants discussed the key risks, including assessing the probability of each risks occurring and the impact of each risk (worst, best, and typical cases) should it occur. The results were mapped onto the "quantitative" risk assessment to ensure directional consistency. New risks were also added for risks that the participants determined were not already captured within the risk matrix.
- **Step 3 - Risk quantification:** On completion of the risk assessment, Deloitte ran a statistical simulation (a Monte Carlo simulation[10]) in order to calculate the value of risk retained by the City under the PSC (DBB), DB, and DBF models (Note: transferred risk to the private contractor does not impact the VFM analysis). This simulation yields a risk cost distribution for each risk taking into account the probability and impact, and a total risk cost distribution (total of all risk costs). The resultant statistical mean is then used as the expected impact for each risk. Most risk impacts have a "triangular" distribution (as illustrated in Figure 12), meaning that the range of potential impacts could be normally distributed, skewed toward the right, or skewed to the left. The mode (typical value) often fails to reflect the wider range of worse-than-typical outcomes. Therefore, the mean value is used as the expected impact.

[10] Monte Carlo simulation is an estimation method based on a broad class of computational algorithms that rely on repeated random sampling to obtain numerical results i.e. by running simulations many times over in order to calculate probabilities.

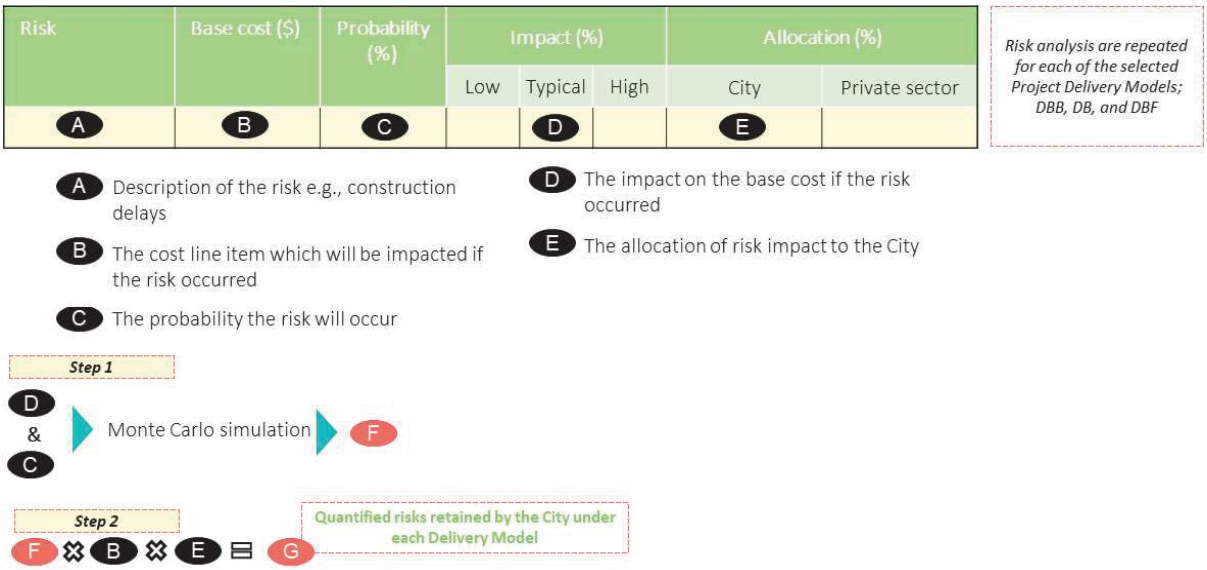
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Figure 12: Illustration of risk impact quantification (risk distribution)



The statistical simulation provides an expected value for the impact of each risk, under both the DBB, DB, and DBF Delivery Models and is calculated in the manner illustrated in Figure 13.

Figure 13: Illustration of quantification of retained risks



Note that risks transferred to the private contractor do not affect VFM results, because the VFM assessment is carried out from the public sector's perspective (City's perspective).

Section 7.6.2. Risk Workshop and Review

As noted above, the Project team (representatives from the City and Deloitte) convened for a risk workshop facilitated by Deloitte following the approach depicted in Figure 14.

Figure 14: Risk workshop approach



The risk workshop was conducted in September 2021 by the Project team. During the risk workshop, the risk assessment methodology and the completeness and accuracy of the risks listed in the risk matrix were reviewed. The risk workshop participants were provided with the draft risk matrix, developed by Deloitte, and discussed each of the risks in the matrix to determine probability and impact. A total of eight (8) participants attended the risk workshop from the City and Deloitte.

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Based on the discussions during the risk workshop Deloitte revised the initial risk matrix and provided it to the City for internal review. The probabilities and impacts of the other risks were assessed "off-line" by Deloitte and confirmed by the City.

Section 7.6.3. Risk Matrix

The risk analysis carried out by the Project team examined a total of 51 discrete risks across all components in the categories shown in Table 18.

Table 18: Risk categories

Risk categories[11]	
1. Project planning and budget	2. Property acquisition, approvals and site condition
3. Environmental assessment	4. Design and tendering risks
5. Construction risk	6. Project agreement

Certain key risks for each of the risk categories are set out for summary purposes in Table 19. These are the key risks that have been determined to have a significant probability of occurring or have a high-risk impact.

Table 19: Significant risks

Risk	Description
Project planning and budget	
Planning, process and key strategic policy	Key strategic approvals from the City are not received in time and / or delay the issue of procurement documents delaying either the construction process and/or delaying the commissioning of the facility.
Changes in government funding policies	The option of funding the Project is changed by the City, Provincial and/or federal governments over the term of construction.
Public and stakeholder resistance	Municipal council, or other stakeholders may oppose the Project, potentially taking their opposition public or the public may not accept the role of the private sector in developing the Project. This could result in schedule delay or a risk of non-approval.
Property acquisition, approvals and site condition	
Utility relocations – Private and City utilities	An unforeseen utility relocation for private utility companies (electricity, telecommunications, natural gas and/or cable could) and / or unforeseen utility/works relocation or upgrade of municipal watermain, storm sewers, wastewater sewers, results in delays or additional costs which in turn results in delays or additional costs.
Geotechnical risk	Unforeseen geotechnical issues arise that were not identified in any previous reports resulting in claims for additional time and costs.
Existing condition information	Reports provided to bidders are inadequate and do not sufficiently describe the existing site conditions resulting in claims for additional time and costs.
Design and tendering risks	
Change in design specifications during RFP	Changes are required to the facility design by the City, caused by legislative, regulatory or policy changes, leading to additional design costs.

[11] Ownership and concession management risks were excluded from the risk analysis exercise as the Delivery Models being assessed do not include a concession period (O&M term) in their deal structures.

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Risk	Description
Incomplete and / or unclear RFP documentation	RFP documentation is incomplete which results in increased addenda and could convey a sense of uncertainty to bidders that reduces their tolerance for risk and results in higher bids.
Litigation risk	Litigation during or after the procurement process which delays the Project. This could come from a losing private player or from a union.
Construction risk	
Construction scheduling, co-ordination and management issues	Scheduling, co-ordinating, and managing construction activities, such as co-ordinating the work of sub-contractors and the procurement of equipment and materials. Scheduling and co-ordination issues can lead to delay, additional costs (subcontractor claims), or disruption.
Acceleration to maintenance schedule – Construction impact	The construction contractor having to accelerate the schedule in order to achieve the completion date. Acceleration can result in increased costs to the contractor (such as increased equipment utilization, higher prices for urgent materials, increased labor costs due to overtime, site coordination and safety issues); additionally, acceleration may also have a quality assurance impact due to sub - trades working longer hours (leading to potential incidents due to fatigue and impacting schedule). Such acceleration can lead to a higher tendency of cutting corners, having higher than expected deficiencies list and slower correction rates.
Commissioning Delays - Deficiencies & Process	Delays in the commissioning process due to deficiencies result in a delay in the date of commercial operations or due to a poorly defined commissioning process and/or due to the City not appropriately carrying out its role in the commissioning process, which result in a delay in the date of facility commercial operations. The delays could also arise from failure to complete training and orientation, under project Delivery Models where the City is the operator.
System integration challenges	Integration issues/challenges with the City's existing NEWPCC operations (and other facilities) leading to potential delays in achieving completion and handover of operations to the City.
Project Agreement	
Project agreement ambiguities	Ambiguities exist in the Project legal documents that could lead to disagreements at a later stage, or that the Project legal agreements do not contemplate events which were seen to be remote or were unforeseeable at the time of drafting the agreements.

Section 7.6.4. Risk Analysis Results

A summary of the results of the risk analysis conducted for the Project is provided in Table 20 depicting the risks retained by the City under the DBB, DB, and DBF models. The top three categories that transfer the most risk to the private contractor under the DB and DBF models are:

1. Project planning and budget risks;
2. Design and tendering risks; and
3. Construction risks.

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Table 20: Project risk assessment results

Risk category	Estimated risks retained by the City		
(Amounts in CAD millions)	**DBB**	**DBF**	**DB**
Project planning and budget	47.8	36.8	44.7
Property acquisition, approvals and site condition	20.6	14.9	14.9
Environmental assessment	-	-	-
Design and tendering risks	69.1	15.5	15.5
Construction risk	226.8	15.7	26.8
Project agreement	11.7	2.7	1.8
Total	**376.1**	**85.6**	**103.7**

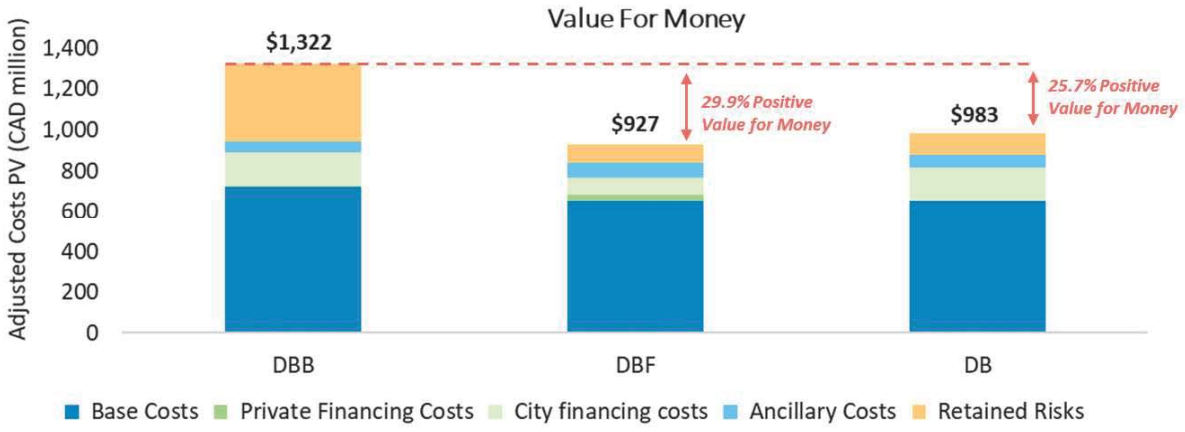
The DBF can transfer a significant amount of design, tendering, and construction risks to the private sector. For example, any construction delays or increased costs, caused by schedule acceleration, lack of resources (equipment, materials, labour), inefficient design coordination by the construction contractor (e.g. design gaps), and inefficient coordination with subcontractors, will be accounted for by the private sector under the DBF model. Note that some of these risk transfers also exist within the DB model with some key differences around the incremental risk transfer that can be achieved (especially for construction risks) under the DBF due to anchoring of risk to Substantial Completion (private capital at risk). Under the DBF, the Project Agreement will use the SCP to ensure the construction budget and schedule being met.

Section 7.7. Preliminary VFM Assessment

The cash flow model and the risk assessment results are integrated to produce the preliminary VFM assessment of the Project for the DBF and the DB models. The VFM results presented below are expressed as a percentage. The VFM for the DB and DBF models has been developed based on the inputs and assumptions provided in Section 7.3 to Section 7.5 and the risk assessment results presented in Section 7.6.4.

Both the DB and DBF Delivery Models provide robust VFM due to risk transfer primarily during the construction phases of the Project. Although the design and development of the biosolids infrastructure is technically complex, the key risks associated with the Project are generally risks that can be controlled and mitigated by the private contractor. Therefore, the transfer of these risks to a private contractor counterparty that has experience and expertise in the design and construction similar projects is expected to result in VFM savings. The base case scenario VFM outcomes are shown in Figure 15.

Figure 15: VFM comparison between DBB (PSC), DBF, and DB Delivery Models – Base case scenario (NPV)



It is worth noting that although the higher financing costs under the DBF lead to higher overall Project capital costs in comparison to the PSC (DBB) and DB models, they are mitigated by the reduced risks retained by the City under the DBF approach thus driving positive VFM. Further, one of the key benefits of the DBF model is the anchor of private capital during the construction period and the associated performance security and incentive to meet the City's performance specifications and construction timelines.

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A range of VFM results has been generated through conducting sensitivity and scenario analyses (using a combination of the sensitivity parameters) to determine impact on VFM from a potential change in future market conditions based on the following parameters:

- City Discount Rate: +/- 25 bps;
- Construction Costs Inflation Rate: +/-100 bps; and
- Short-term private financing all-in interest rate: +/- 25 bps.

Table 21: VFM sensitivity analysis (percentage VFM)

Delivery Model	Base case	City discount rate		Construction Costs Inflation Rate		Private financing interest rate	
		+25 bps	-25 bps	+100 bps	-100 bps	+25 bps	-25 bps
DBF	29.85%	29.85%	29.85%	28.52%	31.21%	29.69%	30.02%
DB	25.67%	25.67%	25.67%	24.76%	26.59%	25.67%	25.67%

When reviewing the results of the VFM the following discussion points are provided for additional context to inform the interpretation of the results.

1. As noted in this Report, the assumptions between DB and DBF is that both are founded on an output performance based approach. This effectively means that the private contractor is provided a high degree of flexibility on the design solution, construction means and methods, and the overall co-ordination of the various procurements and approvals needed to meet the schedule. As a result, the corresponding difference between DB and DBF on the related risks are negligible.
2. The primary difference between the DB and the DBF is the payment structure:

    - In a DB, payments are made on a monthly basis on progress. During the commissioning period, the private contractor would have been paid 90% of the payments. The balance of 10% is to meet construction lien act requirements. From a payment perspective the DB exposes the City to significant financial risks if issues are uncovered during the commissioning period.
    - In a DBF, 50% of the payments are held-back and subject to meeting the commissioning process on the date committed to in the Project Agreement (i.e., the SCP). The financial risks to the private contractor are significantly higher in a DBF which gives the City significant security; in addition, the City has significant leverage to resolve any issues since the payment remains in the City's hands until all commissioning requirements are met. The benefit of the SCP brought by the DBF does not jump-out in the VFM because of the methodical approach in the risk assessment as noted in point 1 above. Deloitte believes, based on our experiences on other similar projects and feedback from our clients, that the benefit of the DBF is much greater when considering the aforementioned qualitative benefits.

3. Regarding the private financing that is required for the DBF, the cost of the financing is very economical (~3%) and compares favorably to the private financing that the City would obtain under the DBB or DB options. The difference in the private financing is in the structure, in that for the DBB and DB the City would raise the funds via a corporate debenture (which is still private financing) and uses the City's tax base as the primary form of security. While in the DBF, the private contractor raises the private financing on a project basis using the Project Agreement with the City as the form of security. Neither is a privatization. The private financing in a DBF is not an input but rather an output to support the SCP structure noted in point 2 above, and to recognize the fact that private contractors are not lenders and as such do not have a means of raising the amounts needed to finance the SCP.

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Section 8. Procurement Strategy and Implementation Plan

Section 8.1. Recommended Project Delivery Model

The goal of this Report is to recommend an optimal Project Delivery Model that provides the greatest value to the City in accordance with its objectives and constraints. Based on the qualitative and quantitative analysis completed in Section 6 and Section 7, the assessment of the Delivery Models has demonstrated that the DBF model is best suited to meet the City's objectives. The VFM assessment completed in Section 7 confirms that the Project procured under the DBF model will provide a positive value for money under a range of sensitivity assumptions, achieved through appropriate degree of risk transfer from the City to the private sector. Hence, a procurement approach based on the DBF model is recommended for the Project. In addition, the Market Soundings described in Section 6.1 confirmed that there is interest from the private sector to participate in the Project under such Delivery Model.

As a next step, the City shall review and approve of the submission of this Report to City Council in order to proceed with the procurement of the Project under the DBF Delivery Model.

Section 8.2. High-Level Procurement Strategy

Upon receiving approval from City Council to proceed with the DBF model for the Project, the next step is to begin developing a procurement process for the City to progress from planning to construction.

The City has successfully followed best practices in DBF-style procurement processes through the delivery of three prior transportation projects – Disraeli Bridges, Chief Peguis Trails, and Southwest Rapid Transitway (Stage 2). For each of these projects, the City adopted a two-stage procurement strategy comprising an RFQ phase to short-list qualified consortiums followed by an RFP to select the preferred proponent that offered best value to the City. This two-stage approach is considered to be the market standard in Canada for DBF procurements and ensures an accessible, fair and competitive environment.

Given the City's past experience and positive track record with this approach, and the market's familiarity and comfort with such processes, a two-stage procurement process is recommended for the Project. The City will ensure that the procurement process complies with applicable procurement policies and regulations including the City's Materials Management policies as well as provincial legislation.

The sections below outline the high-level next steps in the work flow of a typical process, including key considerations to ensure the Project attracts a high degree of interest from the market to drive competition.

RFQ Stage

An RFQ is issued by the City in the early stage of the procurement process to qualify applicant teams based on their experience in design and construction of similar projects, as well as their financial strength and capacity to undertake the Project and obtain the financing required. The RFQ is used to short-list the applicant teams who meet the desired qualifications. Prequalified applicants will be invited to the RFP process.

The best practice to mitigate potential issues during a procurement process is to maximize the information provided to the market at the earliest stage, i.e. the RFQ stage. As such, Deloitte recommends that a preliminary Project summary is provided in the RFQ that outlines the key commercial terms and risk allocations that will form the basis of the procurement process and the Project Agreement to be provided in the RFP stage. The preliminary Project summary will allow the City to obtain sufficient feedback from the market during the RFQ stage which can allow the City to review/adjust the procurement process and RFP stage documents, as required.

Based on discussions to date with the City and its advisors, in addition to typical term sheet information (i.e., change in law, target substantial completion, ownership, funding, payment structure, etc.), Deloitte recommends the following information be provided in the preliminary Project summary at the RFQ stage to ensure that respondents are fully aware of the project complexities and envisioned risk allocation:

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- **Treatment processes:** Any prohibited treatment processes should be disclosed in the RFQ.
- **Pre-selected process equipment / vendor pre-selection:** Details on process equipment/vendors that the City intends to prescribe be used in the Project, and any details on agreements to cover pricing, procurement and commissioning with such vendors and the City's anticipated risk transfer to the design-builder with respect to such equipment should be disclosed in the RFQ.
- **CP Rail crossing:** Given a CP Rail line crossing would likely need to be crossed as part of the Project, related risks, information on the permitting process, and other options for site access should be detailed in the RFQ.
- **Site utilities capacity:** The current capacity for electricity, gas, and water to the site (including the name of each supplier) should be disclosed in the RFQ.
- **COVID-19, supply chain, and escalation protection:** The City's envisioned strategy to protect bidders from COVID-19 risks, supply chain challenges observed in the current market, and escalation should be disclosed in the RFQ.
- **Veolia contract:** The City should include details of its relationship with Veolia, including how that will impact the Project design and development, and the associated risk allocation, within the RFQ.
- **Geotechnical and environmental conditions:** Details on the site and laydown areas, geotechnical and environmental conditions, and the anticipated risk allocation, should be disclosed in the RFQ.
- **Social procurement policy:** The City should include specifics on social procurement policy / community benefits agreements under development, as this adds an element of risk for bidders in terms of staffing. As much relevant information as possible should be disclosed within the RFQ.

Providing details on the abovementioned topics will ensure the procurement process is open and transparent from day one. Further, in order to ensure that the preliminary Project summary is comprehensive, the City will need to undertake legal and contractual work during the RFQ stage (typically this occurs later in the RFP stage).

In addition, commercially confidential meetings could be used in the RFQ stage to ensure that bidders understand the preliminary Project summary and the City can collect comments on it.

There is a trend in today's market to apply more collaborative methods of procurement, such as the PDB model. The nature of the Project is such that a DBF continues to be feasible, as confirmed during the market soundings. However, in the event that the market continues to shift, the RFQ should explore evaluation criteria that create flexibility should issues arise during the RFP open period that necessitate a shift in structure; the objective is to avoid a situation where the RFQ would be invalid and require a re-start of the procurement qualification process.

RFP Stage

The RFP stage is a more detailed process requiring the qualified respondents to submit a proposal on how they will deliver the Project to the specifications described in the procurement documents (i.e. a design for the facility, execution plans, etc.) and with a fixed price. The RFP stage will include the evaluation of the submissions scored in accordance with the evaluation criteria set out by the City. During the RFP open period, commercially confidential meetings are held with qualified respondents to allow open dialogue with the City to seek clarification on the design specifications or other aspects of the Project Agreement and RFP.

Additional consultation may be required at the commencement of the RFP process to ensure the qualified proponents can accept the risk allocation. The objective would be to highlight any risk areas that may not be acceptable and allow a forum that would enable a mutually agreed upon result to be reached.

Preferred Proponent

The final stage prior to commercial and financial close is when a preferred proponent is selected. The preferred proponent will be the qualified respondent that has submitted a proposal which receives the highest score as per the evaluation criteria specified in the RFP. In this stage, the terms of the contract are finalized and signed and financing is secured as required.

Commercial and Financial Close

Commercial Close refers to the point of time when the preferred proponent agrees to the terms and conditions as described in the Project Agreement. At this point, the Project Agreement is final and subject to the preferred proponent completing a

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rate setting protocol to lock in the required financing (this is when financial close occurs). These typically occur within days of one another.

Section 8.3. Other Procurement Process Considerations

Market Priming

Although not a part of the procurement process per se, ensuring the market has as much advance notice as possible (ideally several months) of the City's intent will allow consortium teams the time required to form and constitute themselves to be ready to respond to the RFQ. Such notice should include the intended Delivery Model, Project scope, and procurement process timing.

Pre-selected Process Equipment and/or Vendors

If the City intends to pre-select and specify major components of the Biosolids Facilities that must be integrated into the design and construction, a strategy for each component should be developed and executed prior to the RFQ process so that applicants understand the level of flexibility that they will have in the design process, and any risks related to these components (e.g. commissioning risk) that the City intends to transfer to the design-builder.

Establishing supply in agreements for these components in advance of the RFQ may benefit the City, in particular with respect to getting firm pricing, to the extent possible, under competitive conditions. Once the RFQ is released, there will be limited or no competitive tension on pricing from such vendors.

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