Deloitte.

City of Regina
Wastewater Treatment Plant Expansion & Upgrade Project

Summary of Delivery Model Assessment

January 22, 2013

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1 Introduction

1.1 Introduction

This report summarizes and consolidates the work undertaken to recommend a delivery model for the City of Regina's WWTP expansion and upgrade project (the "Project").

1.2 Scope of Work and Methodology

Deloitte was retained to undertake the delivery model assessment (in association with AECOM) such that it meets the requirements of both City Bylaw No. 2012-22 (referred to herein as the P3 Policy) and PPP Canada (should the City elect to submit a business case to PPP Canada). The P3 Policy states that a "delivery model assessment" includes one or more of the following types of assessments: i) a screening assessment; ii) a strategic assessment; and iii) a value for money assessment. This report presents the findings of each of these assessments.

Table 1 – P3 Policy - Stages of Delivery Model Assessment

Assessment Level	Description	Possible Outcomes
1 - Screening Assessment	High-level comparison of project characteristics against criteria to assist in determining potential suitability of a project for P3 delivery.	1. Flag as potential P3 project 2. Flag for traditional procurement (or other non-P3 model)
2 - Strategic Assessment	A more detailed examination of the risks, costs, market of service providers, and objectives and constraints to identify, at the strategic level, if a project should be procured as a P3, which P3 delivery model(s) is most suitable, and whether or not further assessment is justified.	1. Recommendation for traditional procurement (or other non-P3 model) 2. Recommendation to procure project as a P3, including recommended P3 delivery model 3. Recommendation to undertake Value for money Assessment prior to deciding on delivery model
3 - Value for Money Assessment	An extension of the Strategic Assessment, including quantification of project risks and a preliminary comparison of the relative cost of traditional procurement and P3 procurement through cash flow modelling.	1. Recommendation for traditional procurement (or other non-P3 model) 2. Recommendation to procure project as a P3, including recommended P3 delivery model

In this case, all three assessment levels have been deployed in assessing the preferred delivery model for the Project.

In addition to Deloitte (responsible for guiding the assessments, collecting input, and undertaking financial and other analysis), AECOM (the City's consulting engineer on the Project) developed the cost estimates and provided input to all aspects of the assessment. Importantly, a large City staff team with representation from Environmental Engineering, Finance, Strategy, Human Resources, Procurement, and Legal departments has provided key input through a range of workshops, meetings, and document reviews.

1.3 Limitations

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2 Project overview and delivery models

2.1 Project Overview

Wastewater treatment in Regina dates back to 1956 when the first lagoons were put into service. Various upgrades to the treatment process have been added over time. With continued and projected growth in the City and more stringent regulatory requirements, which are due to take effect at the end of 2016, the City of Regina is undertaking a comprehensive review of its wastewater treatment processes and is planning a major wastewater treatment plant (WWTP) upgrade. The upgrade will expand the treatment capacity from 70 million litres per day (ML/d) to 92 ML/d. It will also add a nutrient removal treatment process to meet the new regulatory requirements, which will remove both nitrogen and phosphorus prior to discharging treated effluent to Wascana Creek.

As currently envisaged, the upgrades to the WWTP will include improvements to the existing grit removal system, new secondary treatment facilities, including biological reactors and secondary clarifiers, sludge thickening, effluent filtration, UV disinfection upgrades, wet weather attenuation, odour control and improvements to the existing anaerobic digesters and biogas systems. Also, a significant amount of existing equipment at the WWTP will be replaced as it is nearing the end of its service life.

The Project has an estimated construction cost of $207 million +/- 15%.

2.2 Traditional Delivery Model

A project “delivery model” is the means by which a public purpose infrastructure project is designed, constructed, operated, maintained, and financed. Each of these components of a project can be handled by the City directly, or contracted to the private sector. And, the components that are contracted can be bundled together in various combinations.

The procurement approach for capital projects traditionally used by the City is the Design-Bid-Build (DBB) approach. This model entails the City contracting with a consulting engineer for the development of detailed design drawings and specifications. Then, a small number of separate construction tender packages would be issued and awarded on low-bid basis. The WWTP would be operated and maintained by City staff. Coordination of tenders and construction inspection would be done under contract by the design engineer.

Notable with this model is lack of connection between the designer, the builder and the operator of the WWTP. For this project, a multiple-tender approach has been selected to reduce exposure to construction cost escalation by getting a portion of the work into the construction market as early as possible. This means that several smaller separate tenders for construction packages would be introduced into the market sequentially.

The City has used this model for hundreds of projects and has the capacity and expertise to fulfil its project role in DBB for several small to mid-size projects annually. However, the WWTP project, due to its size, is expected to overwhelm the capacity of the City’s engineering and purchasing resources to the extent that Project delivery could be significantly delayed and/or more routine (but nonetheless important) projects would suffer.

2.3 Alternative Delivery Models

Any delivery model other than the traditional DBB model is considered an "alternative model". Approximately one dozen alternative delivery models have been considered to some extent for the WWTP project. Several have been screened out as the analysis proceeded. The five models that have been given detailed consideration are as follows.

Table 2 - Delivery Models Given Detailed Consideration

1. Design-Bid-Build (DBB)	Traditional model	
2. Construction Manager at Risk (CMAR)	Alternative models	
8. CMAR (brownfield portion) + DB (greenfield portion)[1]		
6. Design-Build-Operate-Maintain (DBOM)	P3 models	
7. Design-Build-Finance-Operate-Maintain (DBFOM)		

All of the alternative models, among other features, improve the connection between the designer and the builder. The DBOM and DBFOM models are considered public-private partnerships as defined by the P3 Policy because of the greater risk transfer to the contractor (as compared to DBB) and the long term role of the contractor in project operations and maintenance (and financing, in the case of DBFOM). In these models, the contractor will operate and maintain the plant for approximately 27 years after construction is complete. In Models 1, 2, and 8, the contractors' obligations are largely complete once construction is completed, with the City operating and maintaining the plant once construction is complete.

Table 3 - High Level Allocation of Risk and Responsibility in Delivery Models

Areas of Responsibility / Risk	1 DBB	2 CMAR	8 CMAR + DB		6 DBOM	7 DBFOM
Ownership	City	City	City		City	City
Standard Setting	City	City	City		City	City
Oversight & Rate Setting	City	City	City		City	City
Design	City	City	City	Contractor	Contractor	Contractor
Construction	Shared[2]	Shared	Shared	Contractor	Contractor	Contractor
Operation	City	City	City		Contractor	Contractor
Maintenance / Renewal	City	City	City		Shared	Contractor
Long Term Financing[3]	City	City	City		City	Shared
Funding (who pays)	City	City	City		City	City, PPP Canada

Model 8 is a combination of CMAR for the upgrade of the existing WWTP infrastructure and DB for the new nutrient removal portion of the Project. Some key things to note from the table above are:

- The City retains ownership of the WWTP with all delivery models contemplated;
- The City retains responsibility for setting sewer rates in all models contemplated; and
- In no model, including DBFOM, does the private sector fund the project; all costs are ultimately born by City of Regina utility ratepayers (all models) and the federal government (DBFOM only).

[1] Numbering of delivery models presented is used to maintain consistency with previous analysis and communications

[2] "Shared" means the risk is shared between the City and the Contractor

[3] It is expected in DBFOM that the contractor will provide financing for a portion of the project and the City will be responsible for the remainder.

Each delivery model is described briefly below.

Construction Manager at Risk (CMAR)

This model would involve the City appointing a construction manager that would work with the owner's engineer and the City in design advancement and at some point in the process would bid either a guaranteed maximum price or target cost for the construction. The Construction Manager may self-deliver a portion of the work, and may be required by the City to tender a portion of the work to ensure that a portion of the project is competitively procured. This model is different from DBB in the following key ways:

- It delegates considerable administrative responsibility to the construction manager and thereby is less demanding on City resources;
- It allows for a more integrated design-construction approach (although not as integrated as the DB-style models) which may lead to lower capital costs and/or smoother construction progress;
- It achieves some degree of capital cost-certainty for the City (although not to the same extent as the DB-style models.

As with DBB, the City would pay the capital costs as construction proceeds, and will have paid out 100% of the capital costs when construction is complete.

Fixed Price Design-Build (DB)

This model involves selecting a design-builder based on a date and cost certain price for construction of the Project. The competition would be based on a performance specification developed by the City and the owner's engineer. The model is different from DBB in the following key ways:

- The City is responsible for developing a performance specification instead of detailed design and tender documents; and
- The competitive procurement process creates a design competition among the bidders for the best overall solution (with the competition primarily limited to capital cost).

The capital costs may be paid during construction as progress is made, on significant milestone achievements, or at substantial completion. The latter has been assumed as it provides a strong incentive for the DB contractor to complete construction and put the infrastructure into service.

Unlike the other delivery models examined, this model was deemed suitable for use on only a portion of the overall Project: that being the brand new nutrient removal treatment process. It was deemed unsuitable for the overhaul of the existing WWTP infrastructure because of the interface risk between the DB contractor and the City, which would be operating the existing WWTP during the overhaul.

Design-Build-Operate-Maintain (DBOM)

Under this model a contractor with bundled responsibility to design, build and then operate and maintain the Project for a period of approximately 27 years would be selected based primarily on the net present value of the total capital and O&M cost that is bid. They key differences from DBB are as follows:

- The City is responsible for developing a performance specification instead of detailed design and tender documents;
- The procurement amounts to a competition not just on design and capital costs, but on long term operations and maintenance costs as well; and
- The model requires that the City transfer existing WWTP staff to the contractor.

The capital costs may be paid during construction as progress is made, on significant milestone achievements, or at substantial completion. The latter has been assumed as it provides a strong incentive for the DBOM contractor to complete construction and put the infrastructure into service.

Design-Build-Finance-Operate-Maintain (DBFOM)

Under this model a contractor with bundled responsibility to design, build, partially finance and then operate and maintain the Project for a period of approximately 27 years would be selected based primarily on the net present value of the total capital and O&M cost that is bid. This model is the same as DBOM with the exception of the provision of private financing.

The portion of the capital that is not financed by the contractor is paid to the contractor by the City either on a milestone basis during construction or upon substantial completion. The latter has been assumed as it provides a strong incentive for the DBFOM contractor to complete construction and put the infrastructure into service.

This model is eligible for a contribution of up to 25% of the capital cost of the Project by PPP Canada, a federal crown corporation.

2.4 Key Features and Pros/Cons of Delivery Models

The following table summarizes some key features and pros and cons of the delivery models.

Procurement Model	Summary of Key Features and Pros/Cons
1. Design-Bid-Build (DBB) (multiple tenders) This model entails the City contracting for the development of detailed design drawings and specifications from the "owner's engineer". Then, a small number of separate construction tender packages would be issued and awarded on low-bid basis.	The traditional approach, modified by issuance of several staged tenders rather than a single tender. City input into design. Competition on construction price. No cost certainty. Potential to avoid some cost escalation exposure. High demands on City during design and construction – City fulfils role of Project Manager. City operates the WWTP. Interface risk during construction. No PPP Canada funding.
2. Construction Manager at Risk (CMAR) This model would involve the City appointing a construction manager that would work with the owner's engineer and the City in design advancement and at some point in the process would bid either a guaranteed maximum price or target cost.	Allows for some degree of construction cost certainty and the benefit of constructor input into the design. City input into design. Potential to avoid some cost escalation exposure but perhaps less than Model 1 since Construction Manager (CM) will want to delay fixing price. Some cost certainty. Competition on some of the construction price. No design competition. High demands on City during design, construction, but lower than Model 1 as some authority during construction delegated to CM. City operates the WWTP. Interface risk during construction. No PPP Canada funding.
5. Design-Build (DB) This model involves selecting a design-builder based on a date and cost certain price for construction of the Project. The competition would be based on a performance specification developed by the City and the owner's engineer. *Determined to be suitable for greenfield portion of Project only. May be used in conjunction with Models 1 or 2.*	Benefit of constructor input to design. No City input into design. High demands on City for short period to develop performance specification. Low demands on City thereafter until construction complete. Construction cost certainty achieved early, when bids received. Competition on construction price. No long term cost certainty. Design competition. City operates the WWTP. Highest risk of all Models that ease and economy of O&M is not adequately addressed in the design. Interface risk during construction. No PPP Canada funding.

Procurement Model	Summary of Key Features and Pros/Cons
6. Design-Build-Operate-Maintain (DBOM) Under this model a contractor with bundled responsibility to design, build and then operate and maintain the Project for a period of up to 30 years would be selected based primarily on the net present value of the total capital and O&M cost that is bid.	Benefit of constructor and operator input into design. No City input into design. High demands on City for moderate period to develop performance specification and procurement documents. Low demands on City thereafter, including into the operation period. Construction cost certainty achieved early but later than Model 5. Competition on construction price. Competition on O&M price. Partial long term O&M cost certainty. Contractor operates and maintains WWTP. No interface risk during construction. Long term warranty and performance guarantee backed only by company guarantees. No PPP Canada funding.
7. Design-Build-Finance-Operate-Maintain (DBFOM) Under this model a contractor with bundled responsibility to design, build, partially finance and then operate and maintain the Project for a period of up to 30 years would be selected based primarily on the net present value of the total capital and O&M cost that is bid.	Benefit of constructor and operator input into design. No City input into design. High demands on City for moderate period to develop performance specification and procurement documents. Low demands on City thereafter, including into the operation period. Construction cost certainty achieved early but later than Model 5. Competition on construction price. Competition on O&M price. Full long term O&M cost certainty. Contractor operates and maintains WWTP. No interface risk during construction. High probability of PPP Canada funding. Long term warranty and performance guarantee backed by private financing.

3 Screening assessment

3.1 Introduction

As stated by the P3 Policy, a screening assessment means a high level comparison of the public purpose infrastructure or services project against specified criteria to determine potential suitability of P3 delivery models to deliver the project.

3.2 Screening Assessment

At a workshop in April 2012, the Project was screened against a set of standard P3-suitability assessment criteria as shown below.

Table 4 - Screening Criteria

Category	City Criterion	Assessment	Suitable for P3?
Demand	Are the long term operation or service needs and performance requirements relatively stable and/or predictable?	Yes	Yes
Duration and Technological Change	Is the capital asset of an enduring, long-lived nature and is the service life of the asset at least 20 years?	Yes	Yes
	Is there a significant long term maintenance, operation, or service need associated with the capital project	Yes	Yes
	Are the capital asset and service needs sustainable and the risk of technological change minimal over the entire service life of the P3	Yes	Yes
Innovation	Is there scope for innovation in the design of the solution and/or the provision of operation, maintenance, and services, which may lead to cost efficiencies?	Yes	Yes
Legal Barriers	Is the proposed P3 approach or the provision of the service free of any potential legal conflict with legislative or regulatory prohibitions or substantial restrictions (that cannot be changed in the short term)?	Yes	Yes
Market	Are there likely to be at least 3 bidders for the project if it is procured as a P3?	Yes	Yes
	Are there precedent projects (examples of similar projects) in other jurisdictions?	Yes	Yes
	Has the City received unsolicited proposals for P3-style delivery of the project, or similar projects?	No	n/a
	Does the private sector have the expertise and capacity to deliver on the performance specification?	Yes	Yes
Procurement	Is there enough time available for a P3 procurement process?	Yes but minimal slack	Potentially
Availability Payments, Revenue Potential, Affordability	Can payment be tied to measured performance?	Yes	Yes
	Is there a potential revenue opportunity for the private sector partner, which can be also tied to performance?	Yes	Yes
	Does the City have the financial capacity to undertake the	Yes	Yes

Category	City Criterion	Assessment	Suitable for P3?
	project?		
Project Risk	Are there risks associated with traditional procurement that might be better managed by a private partner?	Yes	Yes
Project Size	Is the estimated capital cost significant enough to attract the market?	Yes	Yes
	Can the project be bundled with one or more other similar projects to achieve economies of scale and a larger project size more suitable for P3?	Not necessary	Yes
Specifications	Can the capital asset and related services be defined in a performance or output specification?	Yes	Yes
Land	Is the land for the project being provided by the City?	Yes	Yes
Project Stage	Is the project new build or greenfield?	No – brownfield.	Potentially
Integration	Is the project relatively independent of other City projects, infrastructure, or control systems?	Yes, except for McCarthy Boulevard Pump Station	Yes
Human Resources	Does the project, if delivered by a private partner, obviate any current City staff positions?	Yes. But P3 can be designed to protect staff.	Yes

The key aspect of the Project that requires attention if it is to be delivered as a P3, as revealed by the screening discussion, is that it is not a brand new (or "greenfield") project. The existing WWTP must be maintained in operation during the Project, and it is anticipated that many of the existing assets at the WWTP will be overhauled and reused as part of the upgraded and expanded plant. Furthermore, the City has a workforce at the WWTP and laboratory that has valuable skills and history with the plant, and who must be protected if operations and maintenance responsibility is transferred to a contractor as in a P3.

Nearly all screening questions were answered in the affirmative for the P3 models, meaning that P3 was worthy of further consideration by the City. A high-level analysis of procurement schedules was also conducted during the screening assessment, whereby it was concluded that all models are able to meet the draft permit liquid effluent requirements by the end of 2016 assuming that procurement proceeds in a timely manner.

3.3 Overview of Water/Wastewater P3

Some of the first P3s in Canada were in the water/wastewater sector, most notably the City of Moncton's water treatment plant DBFOM which has been running successfully for over 10 years. However, the vast majority of projects in the sector are delivered as conventional Design-Bid-Build with operations and maintenance conducted by municipal forces.

Jurisdictionally, Alberta stands out as having the most P3 activity with a considerable number of municipal water/wastewater DBOM projects dating back perhaps 10 years. In Ontario, there are many municipalities that contract out the operations and maintenance of water and wastewater systems – although O&M contracts are not considered P3s, they do illustrate that in some markets municipalities have confidence in the private sector to operate their systems (there is also a Provincially-owned O&M contractor in Ontario, similar to SaskWater).

The DB and DBOM models are quite commonly used in North America for municipal water and wastewater projects. Many more examples than those below may be found.

Table 5 – Examples of Operating DBOM Projects

Project	Approx. Capital Cost ($millions)	Owner
New Wastewater Treatment Plant	14	Town of Jasper, AB
Wastewater Treatment Plant Upgrade	11	Town of Okotoks, AB
New Water Treatment Plant	4	Town of Port Hardy, BC
New Wastewater System	23	Town of Sooke, BC
New Wastewater Treatment Plant	16	Lac La Biche County, AB
New Water Treatment Plant	81	City of Seattle (Cedar), WA
New Water Treatment Plant	65	City of Seattle (Tolt), WA
Wastewater Plant Upgrade and New Combined Sewer Overflow Facility	24	City of Holyoke, MA
New Wastewater Treatment Plant	20	City of Cle Elum, WA
New Wastewater Treatment Plant	43	City of Filmore, CA
New Water Treatment Plant	> 100	Lake Pleasant, AZ
New Wastewater Treatment Plant (Awarded, not yet operational)	172	Pima County, AZ
New Wastewater Treatment Plant	170	Spokane County, WA
New Water Treatment Plant	160	San Diego County (Twin Oaks), CA

The DBFOM model has not been used as extensively as the DBOM model. The table below presents all known Canadian examples, and recent research has not revealed any U.S. examples.

Table 6 - Canadian Water Sector DBFOM Projects

Project	Approx. Capital Cost ($millions)	Owner
New Water Treatment Plant	23	City of Moncton, NB
New Wastewater Treatment Plant	16	Province of BC (Britannia)
Wastewater Treatment Plant Upgrade[4]	15	Town of Taber, AB
Cartier (New) Water System	10	Manitoba Water Services Board
Wastewater Treatment Plant	10	Dysart, ON
Evan Thomas Water / Wastewater Systems (Awarded, not yet operational)	40	Province of Alberta

[4] We understand that the privately financed amount in this project is quite a small proportion of the overall capital cost.

Project	Approx. Capital Cost ($millions)	Owner
New Biosolids Management Facility (Awarded, not yet operational)	45	City of Greater Sudbury, ON

The latter two projects were awarded in 2012 and are being supported by the P3 Canada Fund with 25% federal government contributions towards the capital cost. A number of Canadian municipalities are considering DBFM/DBFOM models in the sector, notably the Capital Regional District (Victoria, BC) for a $200M Biosolids Energy Centre project. The City of Abbotsford, BC decided to pursue a DBFOM for a $200M water supply project in 2011; however, the electorate voted not to proceed.

Although there are few examples of DBFOMs in the water/wastewater sector, the large number of successful DBFOMs in other sectors (such as transportation and accommodation) and the strong track record with water/wastewater DBOM suggest that there is no reason why the DBFOM model cannot be used successfully in the water/wastewater sector. It is expected that as municipal interest in the P3 model increases, so will the use of the DBFOM model for water and wastewater projects, since the vast majority of Canadian water and wastewater infrastructure in Canada is municipally owned.

4 Strategic assessment

4.1 Introduction

As stated by the P3 Policy, a strategic assessment is a more detailed examination than the screening assessment and includes an examination of the risks, costs, market of service providers, and objectives and constraints to identify, at a strategic level, if a project is suitable for a public-private delivery model.

In this case, the intent of the strategic assessment was to examine not just P3 models, but all models under consideration. This has been accomplished for the Project through:

- A "market sounding" to determine the capacity of the market to participate in various delivery models;
- A qualitative risk assessment to identify the Project's risks and assess the relative risk-mitigation benefits of various delivery models; and
- A multi-criteria analysis to qualitatively assess the delivery models on a number of weighted criteria derived from Project objectives and constraints.

For the sake of simplicity, only the models that were not eliminated through the strategic assessment process are described herein.

4.2 Market Sounding

A Stage 1 "market sounding" was completed in August 2012 with eight firms that would be expected to have interest in some or all of the delivery models under consideration. The firms interviewed included water/wastewater specialty firms (designers and operators), general contractors (constructors), and P3 developers (equity investors/financing arrangers). Based on the interviews, it is determined that all models are well understood by the participants and are likely to attract the competition of the relevant market sectors assuming that standard/best practices are utilized for each model.

A Stage 2 market sounding was completed in December 2012 which focussed primarily on the DBOM and DBFOM models. This re-confirmed the interest of the market in both of these models and solicited input that is used in the value for money assessment (Section 5) and will be used to inform development of the procurement documents for these models, should one of them be selected.

Overall, it was determined that any of the models under consideration can be expected to attract sufficient competition from the marketplace, and therefore market interest is not a governing factor in selection of the delivery model for the Project.

4.3 Qualitative Risk Assessment

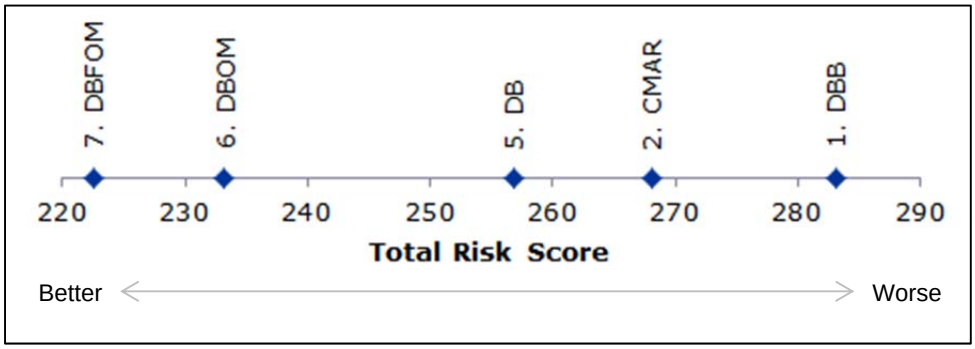
All infrastructure projects face risks in the design, construction, and operating phases. The larger the project, the bigger the potential cost of these risks. Examples of typical project risks are construction delay, construction cost overrun, design errors, and operational failures. In a traditional DBB, most of the project risk would be borne by (or "retained" by) the City. Each alternative model presents a different project risk profile due to the different allocation of risk between the City and a contractor, the varying ability of the City or the contractor in each case to mitigate (or manage) the risk. One of the key considerations in delivery model selection is reducing project risk, which in turn makes costs more certain.

A qualitative risk workshop was conducted to:

- Identify key project risks that may distinguish the delivery models under consideration;
- Stimulate discussion of the relative merits of the delivery models by the City's project team;
- Assess the probability and impacts of the risks, qualitatively, for each delivery model; and
- Prepare the project team for a future quantitative risk assessment to be done as part of the Value for Money Assessment.

Approximately 50 different project risks were considered, with the workshop panel providing a consensus view on the probability of each risk occurring, and the impact if it occurred. From this data, a total project risk score was calculated for each delivery model. The total risk scores provide a basis for comparing the overall risk profiles of the delivery models. The higher the total risk score, the higher the overall project risk profile. Plotted on a continuum, the results are as follows.

Figure 1 - Results of Qualitative Risk Assessment - Total Risk Scores[5]



Based on this, it may be interpreted that DBB presents the highest overall project risk, and DBFOM the lowest. The risk profile is different for each delivery model because of the different allocation of responsibilities and risks between the City and the contractor, as defined in typical contract documentation. These findings are informative on their own, and also feed into the multiple criteria assessment.

4.4 Multi-Criteria Assessment

A qualitative assessment of the delivery models was conducted using a weighted-criteria technique (multi-criteria assessment, or MCA). Assessment criteria were developed based on previous documentation, workshop sessions, and discussions with City staff, and organized into four criteria categories as shown below.

[5] The total risk score assumes that all risks have equal weights. A sensitivity analysis confirmed that the order of the models shown holds under a test designed to reveal whether the positioning of DBOM and DBFOM is robust. More detailed weighting of the risks is done in the quantitative risk assessment as part of the Value for Money assessment.

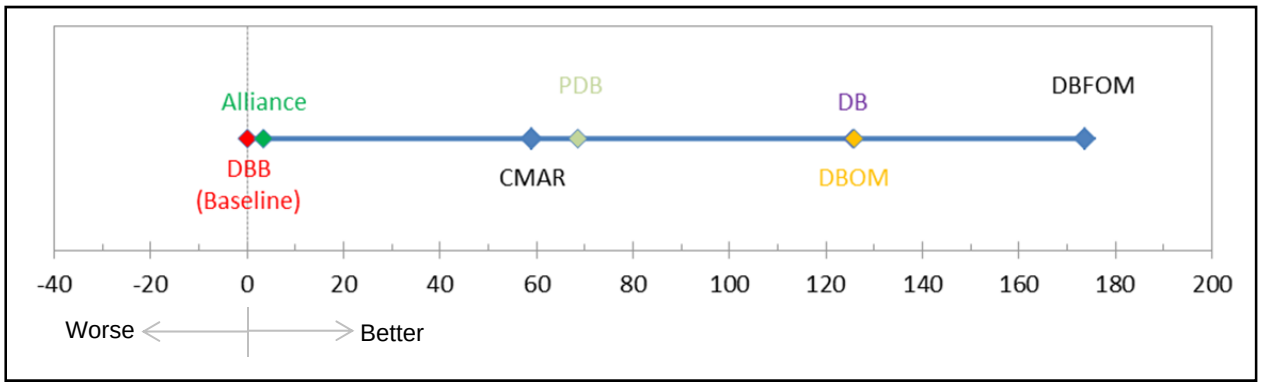
Table 7 - MCA Criteria (Procurement Criteria)

Category & Category Weighting	No.[6]	Criterion	Criterion Relative Weight Within Category ("Importance")
City Resource Capacity	14	Minimize demand on existing City resources for procurement	High
	24	Minimize design-related demands on City resources	High
	25	Minimize construction-related demands on City resources	High
	15	Solve WWTP O&M resourcing challenges	High
25.0%			
Economic	2	Minimize exposure to construction cost escalation	High
	3	Maximize capital cost certainty (i.e. degree of cost certainty)	High
	4	Earliest capital cost certainty (degree of certainty varies per criteria 3)	Low
	5	Maximize O&M cost certainty over 20+ years	Low
	6	Optimize whole-of-life costs (between capital and O&M)	Low
	23	Maximize flexibility for future expansions and upgrades or other changes	Low
	8	Maximize scope for innovation (i.e. design, construction, operation)	Med
	9	Maximize competitive pressure on capital costs	High
	10	Maximize competitive pressure on O&M costs	High
	11	Maximize costs covered by other levels of government	High
40.0%			
Alignment With Managerial Goals & Strategy	12	Ensure a robust and easy to operate WWTP	High
	13	Avoid deferring major maintenance	Med
	17	Transfer design risk (rather than embrace it)	Med
	18	Transfer construction risk (rather than embrace it)	Med
	19	Transfer O&M risk (rather than embrace it)	Med
	22	Maintain labour support for project	High
25.0%		_	
Social	21	Maintain public support for project	High
10.0%			

Each model was assessed against the 21 criteria on a comparative basis relative to the baseline DBB model. The key output of the analysis is an overall ranking of delivery models relative to DBB, as shown below.

[6] The criterion numbers allow reference to previous versions of the matrix and therefore are not consecutive

Figure 2 – Multi-Criteria Analysis Results: Delivery Model Rankings[7]



These results indicate that all of the alternative models are believed to address the criteria better than DBB, with DBFOM having the greatest benefit. The general scoring outcome is that the more that a delivery model allows the transfer of project responsibility and risk to a contractor, the better it meets the City's criteria.

It is noted that despite their overall high scores, the two P3 models scored lower than DBB in the "social" category due to potential public concern with the transfer of WWTP operating responsibility. The concern is not the transfer itself (i.e. the ability to undertake or the effectiveness of the transfer), but rather a potential reduction in public support for the project if delivered as a P3.

4.5 Conclusions of Strategic Assessment

Following is a distillation of the key findings of the qualitative analysis:

1. Screening against typical P3-suitability criteria confirmed that the Project could be delivered effectively using P3 delivery models.
2. A qualitative risk assessment determined that traditional DBB presents the highest project risk, and DBFOM the lowest project risk.
3. A multiple criteria analysis determined that DBFOM is superior to all other models in meeting the City's procurement criteria.

Based strictly on the qualitative assessment, DBFOM is the preferred model This does not include consideration of the relative estimated cost of the models, which is addressed in the Value for Money assessment.

The P3 models are only feasible if the City is willing to transfer operational responsibility for the WWTP to a contractor for a 27 year period post-construction completion. On a qualitative basis, DBFOM is superior to DBOM because the contractor-provided financing provides a strong and liquid security for the long term performance of the contractor. DBOM relies on weaker security such as performance bonds and parent company guarantees, but nevertheless has been used successfully and is a viable option. It may be possible to strengthen the security of a DBOM with methods such as extended holdbacks or requirements for relatively small (compared to DBFOM) amounts of private financing – these measures would raise the cost of the DBOM and have not been explored.

The distinction between CMAR and the CMAR + DB hybrid is that the latter is likely to result in capital cost savings over the former and is less demanding on City resources. There is concern with the long

[7] The Alliance and PDB models were screened out of consideration during the strategic assessment and are not discussed herein.

term quality of DB-built projects, but as with DBOM, the model has been used extensively for wastewater projects and is a viable option.

On a strategic basis, the recommended delivery models would be DBFOM (if the City is willing to transfer operations responsibility) and CMAR + DB (if the City wishes to retain operations responsibility). Therefore, these two models are carried forward into the Value for Money analysis.

5 Value for Money Assessment

5.1 Overview of Value for Money Assessment

Value for Money (VFM) assessment entails the comparison of the net present values of the risk-adjusted project cost estimates over the project term. The key steps are as follows:

1. Estimation of all costs for each delivery model:
    - Procurement
    - Design
    - Construction
    - Operation
    - Minor/Routine Maintenance
    - Major Maintenance / Rehabilitation
    - Financing

2. Cash flow modelling over the procurement/design/construction/operating period, the timing of which may vary between the delivery models.

3. Estimation of risk costs for each delivery model.

4. Combination of cash flow and risk modelling results to arrive at the risk-adjusted net present value cost of each delivery model.

5. Comparison of risk-adjusted net present value (NPV)[8] costs to calculate VFM.

Each of these steps is briefly described in the following sections.

5.2 Cost Estimates

Based on the preliminary design, AECOM has estimated the capital, operating, and maintenance costs of the Project over a 30 year period, assuming the DBB delivery model is used. Costs for procurement (which differs between models) have been estimated by AECOM, Deloitte, and the City. Financing costs are based on current market information.

The capital and operations and maintenance costs have been adjusted to reflect expected variations in costs between delivery models. The DB and DBFOM are expected to introduce some cost savings due to the nature of competitive process and bundling of responsibilities in these models. The DBFOM has an additional cost, that of the incremental cost (i.e. interest rate) of contractor-provided private financing as compared to City debt financing.

For the DBFOM model, the amount of contractor-provided financing has been set to $103 million (approximately 50% of the capital cost), an amount sufficient to ensure market interest and large enough to secure the long term performance of the contractor based on a high level “handback test”. This

[8] Most cost figures in this report are presented as net present values (NPVs). NPVs are suitable *only* for comparison of alternatives (such as comparing delivery models) and must not be used for any other purpose, and specifically must not be used as budget estimates or estimate of nominal “as-spent” costs.

requires that the City make a payment for the balance of the capital cost at substantial completion. In all of the other models, the City would pay 100% of the capital cost at substantial completion.

The cash flow model calculates the estimated net present value[9] of project costs (as of March 31 2013[10]) for each delivery model over the period commencing October 2012 and ending March 2044. This approximately 32-year period covers the procurement, design, construction, and operating of the Project. The *Cities Act* limits a DBFOM to 30 years from the time that the contractor takes over operation of the WWTP[11]. This was the overriding criteria in selecting the term of a DBFOM and therefore is the term used for VFM analysis.

5.3 Risk Estimates

Risk costs for the Project have been estimated through a workshop process to develop an estimate of the risk that is retained by the City, and transferred to the contractor, in each model. The ten largest risks (for the DBB model) identified through the workshop process are as follows.

Table 8 - Ten Largest Quantified Project Risks

Risk	Description
Resource capacity	City is not able to adequately support the procurement
Facility design	Design contains errors or omissions that are not discovered until the construction period, i.e. contractor-initiated change order risk
Major maintenance / rehabilitation	Major maintenance is deferred
Staffing	Unable to recruiting and retain qualified WWTP operating staff
Delay by owner (City)	Facility not constructed on time due to City-induced delays
Unknown condition of existing assets	There are unknown defects in the existing WWTP components that are intended to be reused
Construction – operation coordination	Risk associated with operating the WWTP during the construction of the upgrade/expansion
Early expansion	WWTP capacity needs to expanded sooner than anticipated
Scope changes during construction	Changes to the design are demanded by the operator (City in the case of DBB) during construction
Construction delay	Facility not constructed on time for all reasons other than City-induced delay

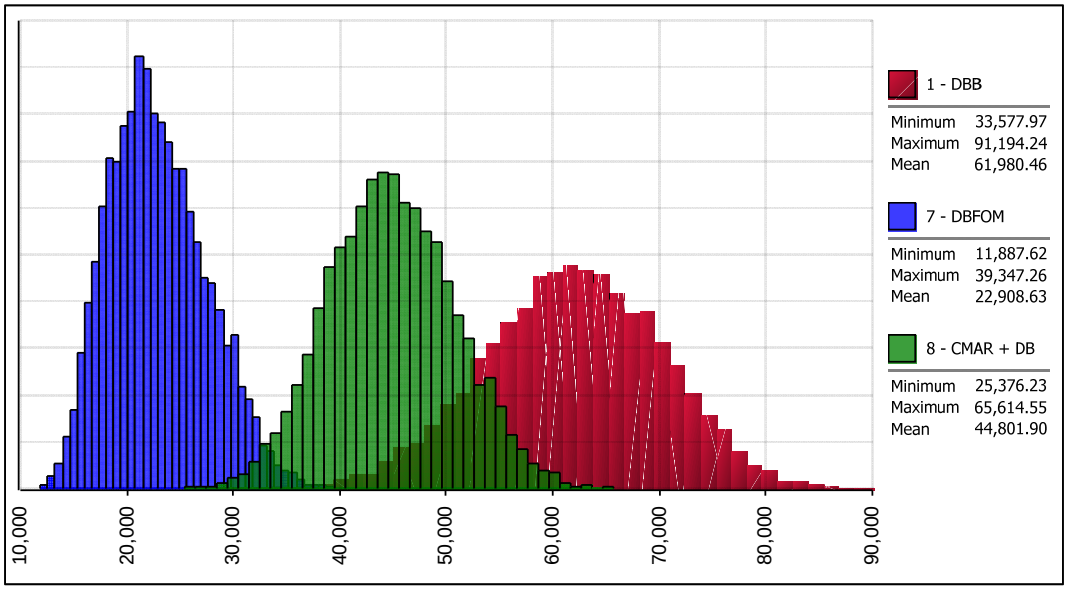
The estimated cost of each quantified risk takes the form of a risk distribution with a range of possible outcomes ranging from best case to worst case. To add the risks together into an estimate of total project risk, a Monte Carlo simulation is used. The figure below presents the total estimated project risk cost distribution (as NPV) for each delivery model.

[9] The city's cost of long term debt (3.818%) is used as the discount rate to calculate NPVs.

[10] This date is selected for NPV purposes as it is estimated to be the date by which the City will have made a final determination of delivery model.

[11] The contractor will take over operation of the WWTP soon after the award of the contract. The design and construction period is approximately 3 years, leaving approximately 27 years of operation after construction is complete.

Figure 3 - Estimated Total Project Risk Costs For Each Delivery Model (NPV, $thousands)



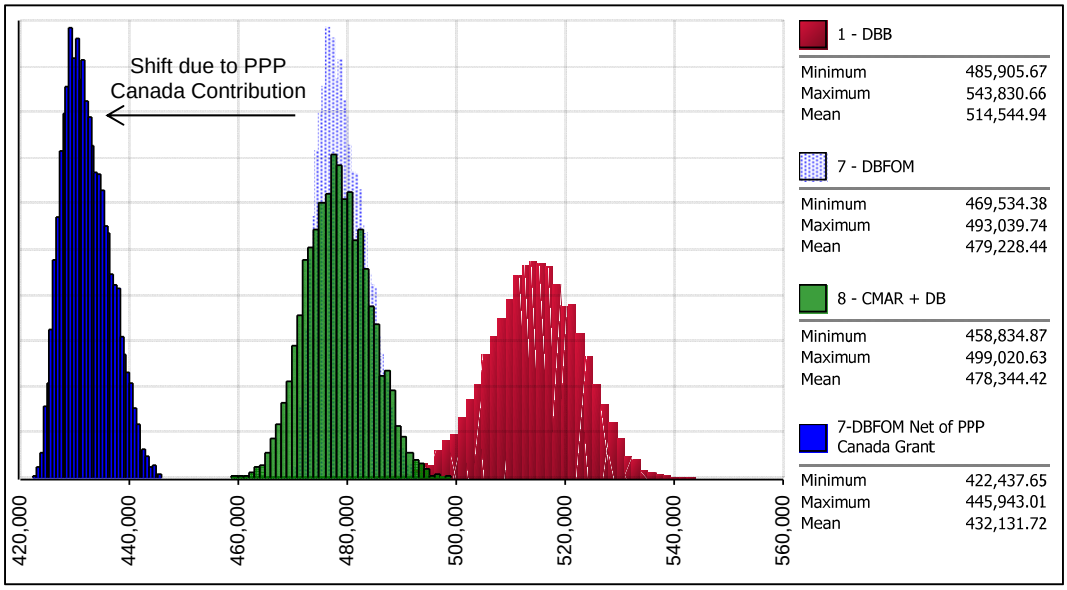
The figure illustrates, for example, that the estimated NPV risk cost for the DBB delivery model (in red) could be as low as $33.6 million and as high as $91.2 million. The figure also illustrates that the two alternative models are expected to reduce the total project risk, since their distributions are to the left of the DBB distribution.

The risk cost distribution is tallest and narrowest for DBFOM, meaning that the total risk costs are more predictable than the wider distributions..

5.4 Value for Money Estimates

The cost estimates and risk cost estimates are added together to arrive at the estimated risk-adjusted net present value cost of each delivery model. The results are in the form of risk distributions that illustrate the possible range of project cost outcomes, from the best case through to the worst case outcome.

Figure 4 - Total Risk-Adjusted Project Cost Estimates ($NPV, thousands)



The figure illustrates, for example, how the estimated NPV cost of the DBB delivery model (in red) could be as low as $485.9 million or as high as $543.8 million. Echoing the strategic assessment, both alternative models show benefit over DBB (because their cost distributions are positioned to the left of DBB along the cost axis). The relative cost-certainty of the models is also illustrated, with narrow distributions being more cost-certain.

VFM is illustrated visually on the figure above. It is typically reported on a percentage basis using the expected value (the mean value of the distribution) of the total risk-adjusted project costs. On this basis, the preliminary project VFM is as follows.

Table 9 - Preliminary Value for Money Estimates (NPV, $thousands)

	1 - DBB	8 - CMAR + DB	7 - DBFOM
Total Project Base Cost	452,872	434,059	460,173
Retained Risk	60,905	43,087	12,686
Risk Premium	767	1,198	6,369
Total Risk-Adjusted Project Cost	514,545	478,344	479,228
"Project VFM"		**7.0%**	**6.9%**

This is the “Project VFM” that does not take into account the benefit of a contribution from PPP Canada. It is the Project VFM that PPP Canada will evaluate to make its funding determination. PPP Canada will only consider funding the DBFOM model for its risk transfer benefits. The VFM shown for DBFOM is in the expected range and is likely to be sufficient to attract PPP Canada funding.

The VFM from the City’s perspective, however, *does* take a PPP Canada contribution into account. The contribution at 25% of eligible costs as defined by PPP Canada is estimated to be $51.2 million at the

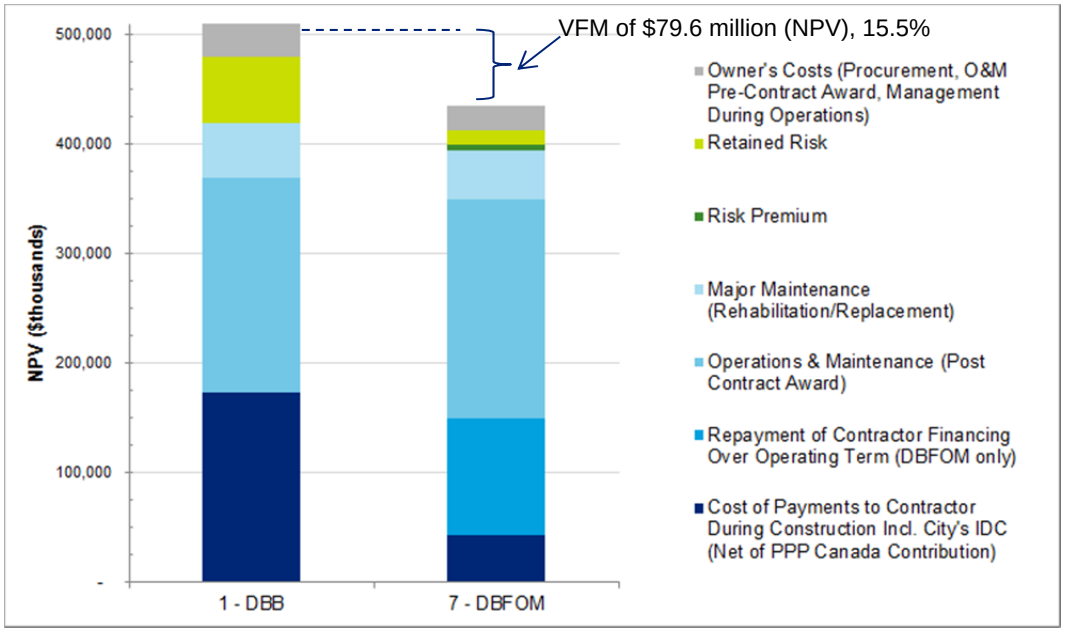
time of construction completion[12], or $44.3 million in net present value terms. The table below presents the VFM from the City's perspective. The figure above illustrates the impact as well.

Table 10 - Impact of PPP Canada Contribution on VFM (NPV, $thousands)

	1 - DBB	8 - CMAR + DB	7 - DBFOM
Total Project Base Cost	452,872	434,059	460,173
Retained Risk	60,905	43,087	12,686
Risk Premium	767	1,198	6,369
Total Risk-Adjusted Project Cost	514,545	478,344	479,228
PPP Canada Grant			44,307
Total Cost Net of PPP Canada Grant	514,545	478,344	434,921
"VFM from City's Perspective"		**7.0%**	**15.5%**

The VFM from the City's perspective, taking the PPP Canada contribution into account, is highest for DBFOM. The impact of the PPP Canada contribution is referred to by PPP Canada as the "incrementality" of the grant. The chart below illustrates the VFM of the DBFOM model.

Figure 5 - VFM From City's Perspective for DBFOM Model (Expected Value of Risk Estimates)



5.5 Conclusions of Value for Money Assessment

Both of the alternative models are estimated to provide VFM as compared to traditional DBB. DBFOM provides the greatest VFM, assuming that PPP Canada makes a contribution of 25% of eligible costs. Otherwise, the estimated VFM is similar.

[12] The amount of the request to PPP Canada is higher, reflecting the contribution that would be required if the capital cost is at the upper range of the cost estimate (i.e. +15%). See Section 5.7.

5.6 Total Capital Liability

Models 1 and 8 have the City paying the contractor for the full amount of construction by the time construction is complete. In Model 7, the City pays a portion of the construction costs at substantial completion, with the balance financed by the contractor and paid back over the operating term. The total capital liability is the amount that the City is required to either:

- Fund from reserves; and/or
- Finance by issuing debt, with repayment funded from user fees over the operating period; and/or
- Finance through the DBFOM contactor, with repayment funded from user fees over the operating period.

The table below estimates the total capital liability for each model, taking into account the PPP Canada grant for the DBFOM model. The risk estimate related to capital cost is included in the totals, reflecting the amount of contingency that is expected to be spent for each delivery model.

Table 11 - Total Capital Liability (nominal, as-spent dollars, $millions)

	1 - DBB	8 - CMAR + DB	7 - DBFOM
Progress Payments	184.1	71.6	-
+ Financing Fees, and IDC on Progress Payments	13.4	5.3	-
+Substantial Completion Payments	-	104.5	100.0
=Total Capital Funding Requirement	**197.5**	**181.3**	**100.0**
- PPP Canada Grant	-	-	51.2
= Capital Funding Requirement Net of Grant	**197.5**	**181.3**	**48.8**
+ Contractor-Provided Financing	-	-	103.5
+ Expected Value of Construction Cost-Related Risk	38.8	19.2	14.9
=Total Debt/Financing Liability	**236.3**	**200.5**	**167.2**

The DBFOM model has the lowest total capital liability by virtue of the PPP Canada grant and reduced risk cost. These liabilities reflect the demand that the Project will put on the City's debt capacity. The lower demand of the DBFOM may be a key deciding factor in the selection of delivery model, depending on the City's available debt capacity.

It could also be possible that the higher capital liability of the other models would result in a reduction in the City's credit rating, leading to higher debt costs (the analysis to explore this has not been done). This would make DBFOM even more favourable from a financial and VFM standpoint.

5.7 Amount of P3 Canada Fund Support Request

Any pledge of support from the P3 Canada Fund will be capped at a specific dollar amount, despite the basis for the amount being a 25% contribution of eligible costs. Therefore, it is prudent to make the request for funding based on the upper end of the capital cost estimate (i.e. plus 15 percent). In this case, 25% of eligible costs is estimated to be $58.7 million ($nominal, as-spent). The resulting VFM using the upper end of the cost estimate from the City's perspective, taking the PPP Canada contribution into account, is 16.5%.

6 Closing

6.1 Conclusions

Based on the findings of the screening analysis, strategic assessment, and value for money assessment, the following key conclusions are made.

1. DBFOM is the preferred delivery model as it provides the greatest strategic benefit, and has the highest VFM and lowest debt capacity impact of all models (assuming it attracts a PPP Canada grant of 25% of eligible costs).

2. Without a PPP Canada contribution, DBFOM is estimated to provide a Project VFM very similar to CMAR+DB. Since DBFOM was preferred over CMAR+DB from a strategic standpoint, DBFOM is preferred to CMAR+DB even without a PPP Canada contribution.

The DBFOM model requires transfer of operating responsibility to a contractor. If the City is unwilling to do this, then:

3. CMAR+DB is the preferred delivery model, having strategic and VFM benefits over DBB.

6.2 Recommendations

Based on the forgoing analysis and the conclusions drawn, the following key recommendations are made.

1. A “business case” should be developed for submission to PPP Canada in application for a grant from the P3 Canada Fund for 25% of eligible costs. The business case must be submitted to PPP Canada no later than March 31, 2013, although earlier submission would be beneficial.

2. The City should determine whether transfer of operating responsibility to a contractor under a DBFOM contract is acceptable as this is a key determinant in the final selection of delivery model.

3. If the City is willing to transfer operating responsibility:

    a. If a PPP Canada grant of 25% of eligible costs can be obtained, the DBFOM model should be pursued.

    b. If the PPP Canada grant is not secured, the DBFOM should still be considered, as it has strategic benefits over CMAR+DB.

4. Otherwise, the CMAR + DB model should be pursued.

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