Deloitte.

City of Regina
Wastewater Treatment Plant Expansion & Upgrade Project

Delivery Model Assessment

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Table of contents

1 Introduction 1
1.1 Introduction 1
1.2 Scope of Work 1
1.3 Limitations 2

2 Strategic Assessment 3
2.1 Introduction 3
2.2 P3 Screening Assessment 3
2.3 Market Sounding 3
2.4 Multi-Criteria Analysis 4
2.5 Conclusions of Strategic Assessment 5

3 Value for Money Assessment 6
3.1 Overview of Value for Money Assessment 6
3.2 Cost Estimates 6
3.3 Risk Estimates 7
3.4 Value for Money Estimates 7
3.5 Conclusions of Value for Money Assessment 9
3.6 Total Capital Liability 10
3.7 Amount of P3 Canada Fund Support Request 10

4 Closing 11
4.1 Conclusions 11
4.2 Recommendations 11

Tables

Table 1 – P3 Policy - Stages of Delivery Model Assessment 1
Table 2 - Delivery Models Considered in Strategic Assessment 3
Table 3 - Delivery Models Carried Into VFM Assessment 5
Table 4 - Adjustment of Baseline Cost Estimates for Different Delivery Models 6
Table 5 - Preliminary Value for Money Estimates (NPV, $thousands) 8
Table 6 - Impact of PPP Canada Contribution on VFM (NPV, $thousands) 9
Table 7 - Total Capital Liability (nominal, as-spent dollars, $millions) 10

Figures

Figure 1 – Multi-Criteria Analysis Results: Delivery Model Rankings..... 4
Figure 2 - Total Risk-Adjusted Project Cost Estimates ($NPV, thousands)..... 8
Figure 3 - VFM From City's Perspective for DBFOM Model (Expected Value of Risk Estimates)..... 9

Appendices

Appendix A – Overview of Delivery Models

Appendix B – P3 Screening Assessment

Appendix C – Market Sounding Findings

Appendix D - Overview of Canadian Water/Wastewater P3

Appendix E – Multi-Criteria Analysis

Appendix F – Contract Term for DBOM/DBFOM

Appendix G – Risk Analysis

Appendix H – Value for Money

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

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 ii) 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.

1.3 Limitations

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2 Strategic Assessment

2.1 Introduction

The strategic assessment is a qualitative assessment of delivery models for a project at a strategic level. This has been accomplished for the Project through:

- An initial screening assessment to determine if Public-Private-Partnership (P3) models may be suitable for the Project;
- A qualitative risk assessment to identify the Project's risks and assess the relative risk-mitigation benefits of various delivery models;
- A "market sounding" to determine the capacity of the market to participate in 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.

The list of models considered in the strategic assessment evolved over the course of the assessment. Overall, at least12 different models have been considered (through the process documented herein as well as some separate analysis led by AECOM). The models carried into the strategic assessment are as follows.

Table 2 - Delivery Models Considered in Strategic Assessment

<table>
<tr><td>1. Traditional Design-Bid-Build (DBB) (multiple tenders)</td><td colspan="2">Traditional model, baseline for analysis</td></tr>
<tr><td>2. Construction Manager at Risk (CMAR)</td><td colspan="2" rowspan="5">Alternative models</td></tr>
<tr><td>3. Alliance</td></tr>
<tr><td>4. Progressive Design-Build (PDB)</td></tr>
<tr><td>5. Fixed Price Design-Build (DB)</td></tr>
<tr><td>6. Design-Build-Operate-Maintain (DBOM)</td><td rowspan="2">P3 models</td></tr>
<tr><td>7. Design-Build-Finance-Operate-Maintain (DBFOM)</td></tr>
</table>

2.2 P3 Screening Assessment

The Project was screened against the criteria in the City's P3 Policy to assess at a high level whether or not a P3 model may be beneficial for delivery of the Project. Nearly all screening questions were answered in the affirmative for the P3 models (see Appendix B), 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.

2.3 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 prime objective was to establish the extent to which the delivery models are likely to attract competition in the marketplace because competition is crucial to realize value from any of the models. 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 with the exception of the Alliance 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 confirmed the interest of the market in both of these models (O&M contractors are generally interested in either model) and solicited input that will be used to develop the procurement documents for these models, should one of them be selected. Appendix C contains the key findings of the Stage 2 market sounding.

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. Appendix D provides an overview of the use of DBOM and DBFOM models in the water/wastewater sector.

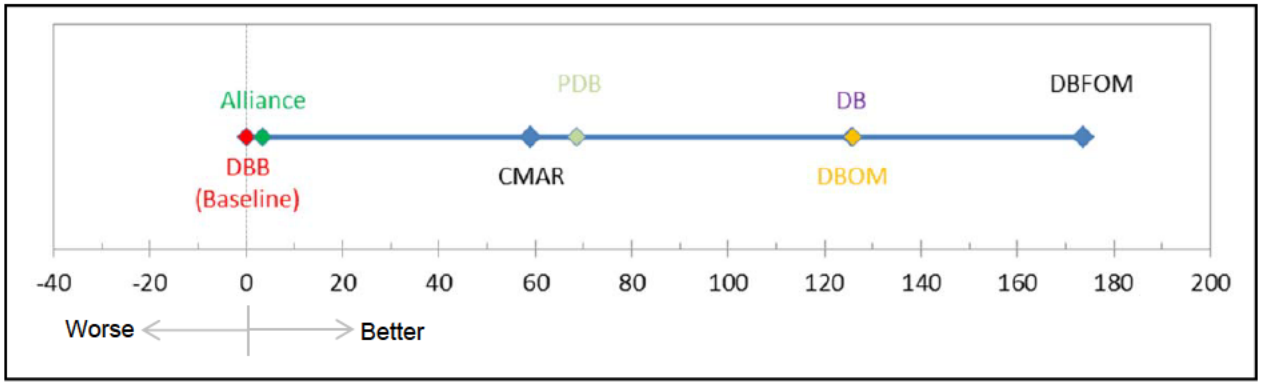
2.4 Multi-Criteria Analysis

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

- City Resource Capacity — 25% of weighting
- Economic — 40% of weighting
- Alignment with Managerial Goals and Strategy — 25% of weighting
- Social — 10% of weighting

Appendix E contains the memorandum outlining the MCA analysis. 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.

Figure 1 – Multi-Criteria Analysis Results: Delivery Model Rankings



These results indicate that all of the alternative models are believed to address the criteria better than DBB, with Alliance having a slight benefit and 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, but rather the potential reduction in public support for the project if delivered as a P3.

The MCA analysis led to a refinement of the PDB and DB models as they were found not to be suitable for the upgrading of existing infrastructure at the WWTP, but beneficial for the new nutrient removal portion of the Project which is envisioned to be an offline "greenfield" project with minimal interface with the existing infrastructure. PDB or DB may therefore be used in conjunction with another model to complete the overall Project.

2.5 Conclusions of Strategic Assessment

The strategic assessment eliminated the following from consideration:

- DBB (all alternative models expected to be superior);
- Alliance (marginal benefit expected, weak market of service providers, high demands on City resources); and
- PDB (not applicable to full Project, inferior to DB due to demands on City resources).

The following models are carried forward into the Value for Money (VFM) assessment.

Table 3 - Delivery Models Carried Into VFM Assessment

<table>
<tr><td>1. Traditional Design-Bid-Build (DBB) (multiple tenders)</td><td colspan="2">Baseline for analysis only</td></tr>
<tr><td>2. Construction Manager at Risk (CMAR)</td><td colspan="2" rowspan="2">Alternative models</td></tr>
<tr><td>8. CMAR (brownfield) + DB (greenfield)[1]</td></tr>
<tr><td>6. Design-Build-Operate-Maintain (DBOM)</td><td rowspan="2">P3 models</td></tr>
<tr><td>7. Design-Build-Finance-Operate-Maintain (DBFOM)</td></tr>
</table>

The P3 models are only feasible if the City is willing to transfer operational responsibility for the WWTP to a contractor for a 25 to 30 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. The City would allow a short list of prequalified nutrient removal processes to be used in the DB portion, to reduce process selection risk. There is concern with the long 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. The other models were carried forward as well as a matter of interest.

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

3 Value for Money Assessment

3.1 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 costs to calculate VFM

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

3.2 Cost Estimates

The cost estimates assume a DBB delivery model and have been developed by AECOM. The cost estimate that is the basis for this report and the Value for Money assessment is the Predesign Phase Capital Cost Estimate Draft Rev 1, of $207.4 million. The estimate is considered to have a margin of +/- 15%.

The capital and operations and maintenance costs have been adjusted to reflect expected variations in costs between delivery models as follows. The DB, DBOM, and DBFOM are expected to introduce some cost-saving "efficiencies" due to the nature of competitive process and bundling of responsibilities in these models.

Table 4 - Adjustment of Baseline Cost Estimates for Different Delivery Models

Model	Capital	O&M	Major Maintenance
1 – DBB	Baseline	Baseline	Baseline
2 – CMAR	No adjustment	No adjustment	Baseline
8 - CMAR + DB	No change on brownfield portion, 20% capital cost savings on greenfield portion expected	No adjustment	Baseline
6 – DBOM	15% capital cost savings expected	10% savings on energy and chemicals expected	5% savings expected

Model	Capital	O&M	Major Maintenance
7 – DBFOM	15% capital cost savings expected	10% savings on energy and chemicals expected	10% savings expected

It has been assumed that any labour efficiency that may be introduced in the DBOM and DBFOM models would be offset by the operating margin required by the contractor.

For the DBFOM model, the amount of contractor-provided financing has been set to $103 million (just over 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 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[2] of project costs (as of March 31 2013[3]) 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 DBOM or DBFOM to 30 years from the time that the contractor takes over operation of the WWTP. This was the overriding criteria in selecting the term of a DBOM/DBFOM and therefore the term used for VFM analysis. See Appendix F for more information.

3.3 Risk Estimates

Risk costs for the Project have been estimated through a series of workshops. Approximately 50 specific risks have been considered on a qualitative and quantitative basis to develop an estimate of the risk that is retained by the City, and transferred to the contractor, in each model. Risks transferred to the contractor are either absorbed (in profit margin and additionally in the case of DBFOM, equity and debt returns) or priced as a risk premium. Risk costs are estimated as ranges, from best case to worst case. Appendix G contains key findings of the risk analysis.

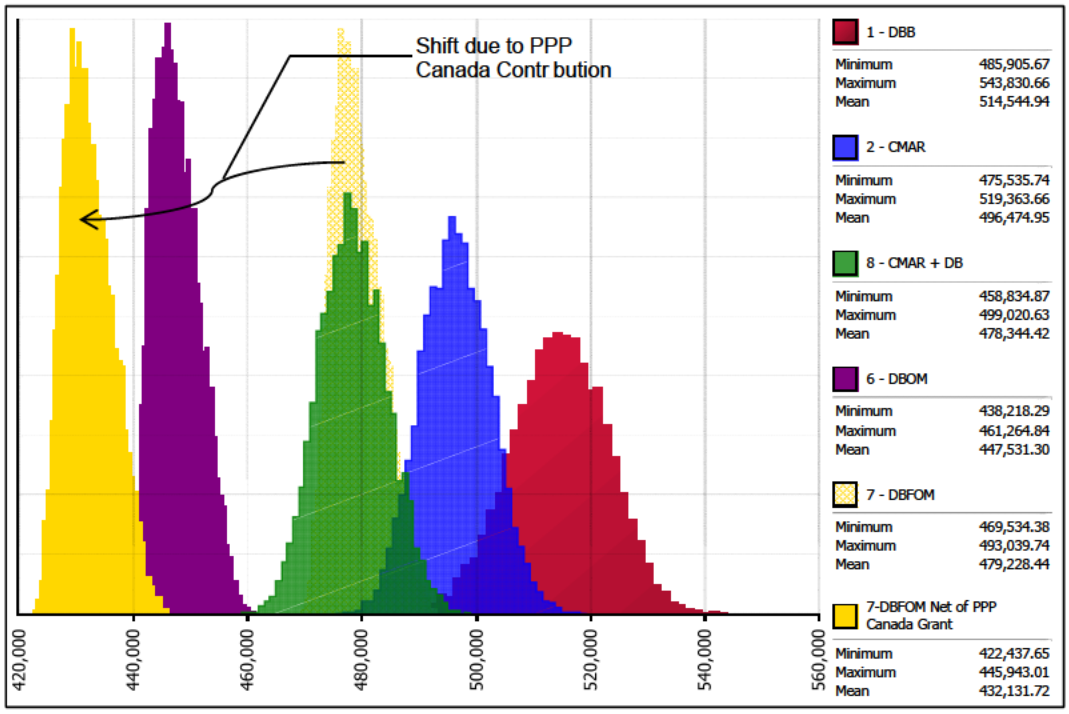
3.4 Value for Money Estimates

The cost estimates and risk cost estimates are combined 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. More information on the VFM analysis is included in Appendix H.

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

[3] 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.

Figure 2 - 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 $486 million or as high as $544 million. Echoing the strategic assessment, all 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 5 - Preliminary Value for Money Estimates (NPV, $thousands)

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	434,059	429,439	460,173
Retained Risk	60,905	43,860	43,028	11,081	12,693
Risk Premium	767	418	1,202	6,944	6,359
Total Risk-Adjusted Project Cost	514,545	496,601	478,288	447,464	479,224
"Project VFM"		**3.5%**	**7.0%**	**13.0%**	**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. The VFM shown for DBFOM is in the expected range and is likely to be sufficient to attract PPP Canada funding[4].

[4] A sensitivity analysis on Project VFM was conducted. Project VFM for DBFOM remains positive in all sensitivity scenarios with the exception being the case where the efficiencies noted in Table 4 are set to 0%; however, VFM is positive if the efficiencies are ½ of the values in Table 4. It is not at all unreasonable to expect the efficiencies in Table 4 to materialize, and on the basis of this sensitivity analysis the Project

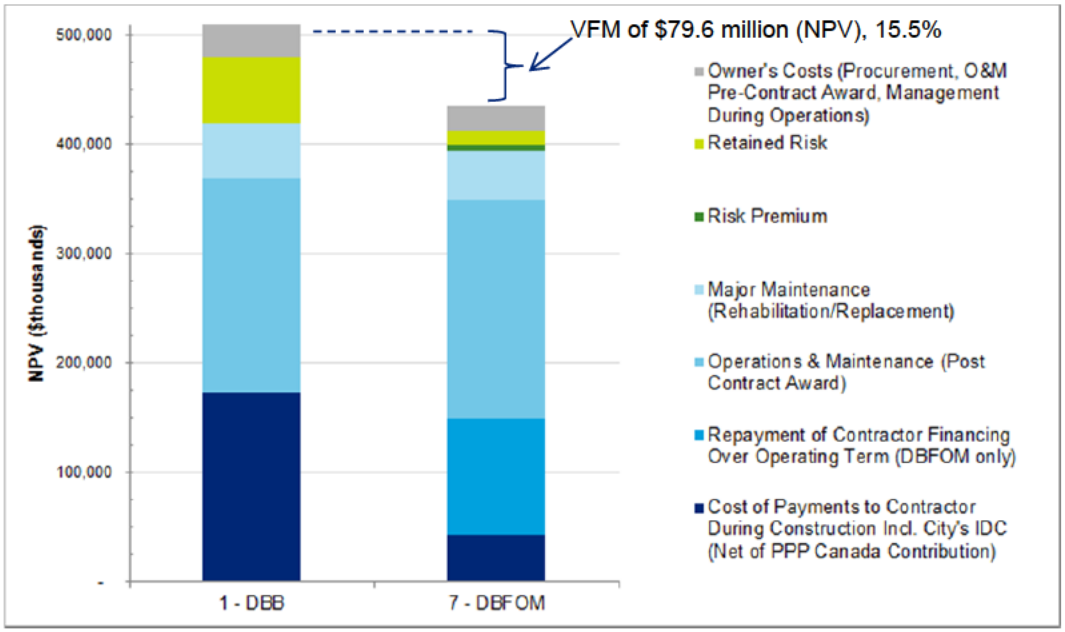
The VFM from the City's perspective, however, *does* take a PPP Canada contribution into account. The contribution at 25% of eligible costs as defined by PPP Canada is estimated to be $51.2 million at the time of construction completion[5], or $44.3 million in net present value terms. The table below presents the VFM from the City's perspective. The figure above illustrates the impact as well.

Table 6 - Impact of PPP Canada Contribution on VFM (NPV, $thousands)

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	434,059	429,439	460,173
Retained Risk	60,905	43,734	43,087	11,151	12,686
Risk Premium	767	417	1,198	6,942	6,369
Total Risk-Adjusted Project Cost	514,545	496,475	478,344	447,531	479,228
PPP Canada Grant					44,307
Total Cost Net of PPP Canada Grant	514,545	496,475	478,344	447,531	434,921
"VFM from City's Perspective"		3.5%	7.0%	13.0%	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 3 - VFM From City's Perspective for DBFOM Model (Expected Value of Risk Estimates)



3.5 Conclusions of Value for Money Assessment

All 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. Without a PPP Canada grant, DBOM provides the greatest VFM of all the models.

VFM is considered "robust" and likely to be realized under a range of efficiencies, a range of private financing costs, and a range of capital cost escalation rates.

[5] 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%).

Comparing the VFM of DBOM versus DBFOM, the primary difference stems from the incremental cost of private financing in the DFBOM. There is a benefit from this cost that we do not believe is fully reflected in the VFM results, that being the long term liquid security that the private financing in a DBFOM provides and the corresponding commitment of the contractor that it obtains. In the DBOM model, there is some risk that the O&M contractor will abandon the contract should it encounter difficulties – while we are not aware of any examples where this has happened (we have not researched this point), most experience with DBOM, in the U.S. for example, is for shorter operating terms than contemplated for the Project. The decision between DBOM and DBFOM must take into account the strength of the model structure to maintain risk transfer, not just VFM estimates.

Among the models that do not require transfer of operating responsibility to the contractor, the CMAR + DB model provides greatest VFM.

3.6 Total Capital Liability

Models 1,2,8, and 6 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 7 - Total Capital Liability (nominal, as-spent dollars, $millions) Numbers were updated prior to the report going to Council. Summary is more accurate.

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Progress Payments	184.1	182.7	71.6	-	-
+ Financing Fees, and IDC on Progress Payments	13.4	10.7	5.3	1.9	-
+Substantial Completion Payments	-	-	104.5	185.6	100.0
=Total Capital Funding Requirement	**197.5**	**193.4**	**181.3**	**187.5**	**100.0**
- PPP Canada Grant	-	-	-	-	51.2
= Capital Funding Requirement Net of Grant	**197.5**	**193.4**	**181.3**	**187.5**	**48.8**
+ Contractor-Provided Financing	-	-	-	-	103.5
+ Expected Value of Construction Cost-Related Risk	45.0	24.3	22.2	16.1	17.3
=Total Debt/Financing Liability	**242.5**	**217.7**	**203.5**	**203.6**	**169.6**

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.

3.7 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).

4 Closing

4.1 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 (the latter two points 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 (i.e. the multiple criteria analysis), DBFOM is preferred to CMAR+DB even without a PPP Canada contribution.

3. DBFOM has a much stronger form of long term security than DBOM, which may not be fully reflected in the VFM analysis.

4. DBOM is likely preferred if a PPP Canada grant is not secured, due to strategic and VFM benefits. Its impact on debt capacity is similar to CMAR and CMAR + DB. How much of a VFM advantage DBOM truly offers, due to conclusion #3 above, may require additional analysis to establish.

Both DBOM and DBFOM models require transfer of operating responsibility to a contractor. If the City is unwilling to do this, then:

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

4.2 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.

Appendix A – Overview of Delivery Models

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.

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.

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)[6]		
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.

[6] Delivery model numbering presented is used to maintain consistency with previous analysis and communications

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[7]	Shared	Shared	Contractor	Contractor	Contractor
Operation	City	City	City		Contractor	Contractor
Maintenance / Renewal	City	City	City		Shared	Contractor
Long Term Financing[8]	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).

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.

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

[8] 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.

Fixed Price Design-Build (DB)

This model, which is being used by the City for the Mosaic Stadium Replacement, 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 form 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 design 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 DBFOM 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.

Key Features and Pros/Cons of Delivery Models

Procurement Model Description	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.
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.

Demand on City Resources

All models make demands of the City, but the timing, intensity, and nature of the demands are different, summarized as follows.

	Procurement / Planning	Design	Construction	Operation
1. Traditional Design-Bid-Build (DBB) (multiple tenders)	Low	High	High	High
2. Construction Manager at Risk (CMAR)	Moderate	High	Moderate	High
5. Fixed Price Design-Build (DB)	Moderate	Low	Moderate	High
6. Design-Build-Operate-Maintain (DBOM)	High	Low	Low	Low
7. Design-Build-Finance-Operate-Maintain (DBFOM)	High	Low	Low	Low

Appendix B – P3 Screening Assessment

Results of screening analysis conducted at April 3, 2012, delivery model workshop. See May 2, 2012 memo *WWTP Upgrade Project – Summary of Delivery Model Workshop* (Deloitte) for more information.

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 with little 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 project?	Yes	Yes
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	Yes

Category	City Criterion	Assessment	Suitable for P3?
		Boulevard Pump Station	
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

Appendix C – Stage 2 Market Sounding Findings

Market Sounding

Market sounding has been conducted in two phases for the Project. Phase 1 explored the general interest of the market in a wide range of models and the results were used primarily to eliminate the Alliance model from further consideration. Knowing that all models were generally attractive to the market, Phase 2 explored key issues related to DBOM and DBFOM, with a focus on the latter.

There is a well-developed and highly specialized market of firms, both Canadian and international, that undertake projects in the municipal water/wastewater sectors. The delivery models employed by these firms include DBB, O&M, DB, DBOM, occasional DBFOM, and regulated utility (private ownership) models. These firms were the primary focus of the Phase 2 market sounding, because the views of P3 developers / equity investors outside of the water sector are well understood and do not vary considerably from sector to sector, although a small number of such firms was included for completeness. The firms are not named because they were assured confidentiality in exchange for frank feedback.

Market Sounding Participants' Project Roles and Project Interest

	Typical / Desired DBO/DBFO Roles					Project Interest	
	Design	Build	Operate	Equity	Bid Lead	DBO	DBFO
Firm 1*	✓					✓✓	✓✓
Firm 2				✓	✓		✓✓
Firm 3*	✓		✓	✓	✓	✓✓	✓✓
Firm 4*			✓	✓	✓		✓✓
Firm 5*	✓		✓				
Firm 6*			✓	✓	✓	✓	✓✓
Firm 7				✓	✓		✓✓
Firm 8				✓	✓		✓✓
Firm 9	✓	✓	✓	✓	✓	✓✓	✓✓
Firm 10*	✓		✓	✓	✓	✓	✓✓
Firm 11*	✓		✓		✓	✓✓	✓✓
Firm 12	✓	✓		✓	✓	✓✓	✓✓
*water / wastewater service specialty firms	✓ primary interest, likely role of firm in project					✓✓ strong interest ✓ some interest	

Based on the interviews, a number of key findings have been identified based on aggregating the common views of the participants, and noting where opinions diverged. Other key findings of the market sounding are taken into consideration throughout this document, with reference to "the market of service providers" or "the market".

Key Findings of Market Sounding

Topics	Key findings
Interest in Project	It is evident that there is considerable market interest in the Project as either a DBOM or DBFOM. Each company has a different outlook on the private financing component depending on their corporate focus – pure financial investors are only interested in the DBFOM model. All but one of the companies interviewed expressed their interest in the Project and would seriously consider an opportunity to participate in a procurement process for a DBOM or DBFOM in 2013.

Topics	Key findings
Innovation	There is significant potential for innovation, given the range of applicable wastewater treatment processes, especially in the area of nutrient removal. To maximize innovation, the City should not be overly prescriptive with respect to the treatment process. However, if there are treatment processes that the City does not wish to consider, they should be identified at the outset of the procurement so as not to waste time and effort. There is also innovation potential with respect to the extent and manner in which the existing WWTP infrastructure is reused.
Risk Transfer	A standard allocation of risk according to contemporary Canadian P3 practice is generally acceptable and appropriate. The key project-specific risks of concern to the market sounding participants are latent defects in the existing WWTP infrastructure, change in environmental regulation, and permit compliance risk during construction. These are discussed separately below.
Risk: Latent Defects in Existing Infrastructure	This is the key Project risk of concern to the interviewees. A sensible sharing of this risk between the City and the Contractor is unanimously seen by the interviewees as needed to avoid high risk premiums in bid prices that the City may never realize any value from. A comprehensive condition assessment is also unanimously seen as critical information for proponents, as is proponent access to the WWTP during the RFP period for inspection and assessment. A number of approaches to sharing latent defect risk were discussed with interviewees. In general, a risk share structured around a condition assessment that proponents can rely on, and specified on an asset-by-asset basis (rather than a blanket basis), is favoured. There was also general acceptance of an initial multi-year "discovery period" during which the City retains latent defect risk, after which the risk is transferred to the Contractor. A specified liability cap (dollar amount) for latent defect risk is another approach that would be accepted by proponents: this has the advantage of being simpler, but in the end it amounts to the City almost fully retaining the risk. One interviewee suggested that this risk, depending on the existing condition and age of the assets, and the risk-sharing approach decided upon, may drive them towards favouring an all-new WWTP which does not utilize the existing infrastructure at all. Based on the feedback received on this topic, it is clear that the approach that the City takes to share this risk could affect the attractiveness of the Project to the market, and/or the value received. Determining the most appropriate approach likely requires a comprehensive condition assessment that will allow an asset-by-asset assessment of the risk and an asset-by-asset approach to risk sharing.
Risk: Changes in Environmental Regulation	A number of interviewees noted that they would expect protection from changes in environmental regulation that stem not just from alterations of the City's Permit to Operate a Sewage Works, but broader environmental regulation that may have influence on operation and maintenance of wastewater treatment plants in general. An example of this non-permit-specific change in regulation are the broad monitoring and reporting regulations introduced in Ontario after the Walkerton drinking water contamination incident.
Risk: Permit Compliance During Construction	A number of interviewees noted that while they were willing and able (and would in fact need to) to take over WWTP operations during the design and construction period, the degree to which permit compliance risk during this period can be transferred may be limited. The City would have to retain any such risk associated with the condition of the assets when transferred, influent quality variations, the design of the existing plant, etc., during this period. It is not until the upgrade and expansion is complete that the Contractor would be able to assume all compliance risk.
Procurement Schedule	The preliminary schedule provided in the market sounding guide, which has a seven month RFP period, was generally seen to be appropriate with some interviewees seeing the RFP period as a bit too long. The concern with a long RFP period is that it can drive up bid costs. There was a suggestion to add a very early technical submission addressing the proponents' selected wastewater treatment process to get sign-off that the City will accept the process, although there was disagreement as to the ability of proponents to put forth a proposed process any sooner than midway through the RFP period.

Topics	Key findings
Assuming City's Labour Force	The need to take on existing City WWTP and laboratory staff is not a concern to the interviewees. Most O&M providers have experience with such transactions and report no major problems. P3 developers have confidence in the ability of O&M providers to do so. The skills and familiarity of City staff with the WWTP are generally seen as an asset. A selection process whereby the Contractor does not necessarily have to take all current staff would help proponents mitigate HR risk and could improve pricing. (In this case the City would have to offer non-selected staff employment elsewhere). Several interviewees noted that standard employment eligibility screening may be needed before they can take on employees, e.g. trade ticket currency, criminal record checks, and drug testing. There is near-consensus that a two-month period should be sufficient to undertake the staff transition. On some P3 projects, the financial close period has been used to make the transition, raising the possibility that the Contractor could take over WWTP O&M immediately after financial close. However, some proponents may be reluctant to expend the time and effort prior to financial close.
DBFOM Financing	The stated minimum amount of private financing required to attract the market to a DBFOM varies by interviewee. Although $50 million was cited several times as an absolute minimum, there is some consensus that for this project the $100 million minimum rule of thumb for a standard 90:10 debt:equity financing applies. A private financing opportunity much less than $100 million can be expected to reduce the field of interested proponents somewhat. The interviewees generally agreed that the Project as a DBFOM could be expected to attract financing similar in price to that of other recent P3s that have closed in the market, with long term debt spreads of 185 to 230 bps likely. One P3 developer appeared to have greater technology risk aversion (or lack of familiarity with water/wastewater) and suggested that spreads could range between 240 to 260 bps. The City of Regina's strong credit rating was noted as a positive factor. Short term debt spreads of approximately 140 bps are expected. There is consensus that debt spreads can readily be held for 90 days under current market conditions and longer holds are possible in the view of some interviewees. And, while spread reset mechanisms are generally favoured by P3 developers, there is some agreement that the complexity of these mechanisms may be inappropriate for a municipal project. There was strong support for a quick selection of Preferred Proponent and limiting the financial close period to 60 days. It was noted that delayed award can impair not only debt spread, but construction prices. Several interviewees noted that lower than typical leverage may be required by lenders if too much latent defect risk is transferred to the Contractor. One interviewee noted that despite the City's credit rating, the City's position could change over time and that they would take comfort if the Province would guarantee the payment of any lump sum that may be payable to the Contractor in the event of early termination.
O&M Term	Given a range of 20 to 30 years, interviewees generally would accept any term in the range with an overall preference for longer terms. This applies both to O&M providers, and to financing providers. There was consensus that 20 years is too short if the City wishes to transfer a significant level of lifecycle risk.

In summary, the market sounding revealed that there is strong interest in the Project if procured as a traditional DBB, a DBOM, or a DBFOM. Market interest does not appear to be a limiting factor for selection of a procurement model.

Appendix D – Overview of Canadian Water/Wastewater P3

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Memo

Date:	September 19, 2012
To:	Mr. Rob Court, P.Eng. Manager, Environmental Engineering City of Regina
c:	File 824603 – 1000014
Subject:	WWTP Upgrade Project Delivery Model Assessment Overview of Canadian Water/Wastewater P3

Introduction

This memorandum provides a brief overview of public-private partnerships in the Canadian municipal water/wastewater sector. Delivery models considered P3s for the purpose of this memo are the Design-Build-Operate-Maintain (DBOM) model, and the Design-Build-Finance-Operate-Maintain (DBFOM) model.

Overall Prevalence of P3s in Water/Wastewater

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 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).

Use of the DBFOM Delivery Model

The DBFOM model is not prevalent in Canada. Below is a table of some Canadian water/wastewater DBFOMs. It can be seen that most of the projects are relatively small, in terms of capital cost.

Project	Approx. Capital Cost ($millions)	Owner	Project Commencement (approx.)
New Water Treatment Plant	23	City of Moncton, NB	1998
Britannia Mine Drainage Treatment Plant	16	Province of BC	2005
Wastewater Treatment Plant Upgrade[1]	15	Town of Taber, AB	2008
Cartier (New) Water System	10	Manitoba Water Services Board	1998
Wastewater Treatment Plant	10	Dysart, ON	
Evan Thomas Water/Wastewater Project	40	Province of AB	In procurement

There are few examples of DBFOM outside Canada either. Below is what we believe is a fairly comprehensive list.

Northern Ireland (UK)	▪ Project Alpha: UK's first DBFOM for water (June 2006) –refurbishment of 5 regional water treatment plants ▪ Project Omega: refurbishment of 4 major wastewater treatment plants
Australia	▪ Barwon Water Biosolids Management Project (awarded 2007) ▪ Campaspe Water Reclamation Scheme (Wastewater Treatment) (awarded 2002) ▪ Sydney Water WTPs: o Prospect Water Filtration Plant (1996 operational) o (Wyuna) Illawarra Water Filtration Plant (1996 operational) o (Wyuna) Woronora Water Filtration Plant (1997 operational) o Macarthur Water Treatment plant (1995 operational) ▪ Mundaring Water Treatment PPP (awarded 2011)
UK	▪ Project Aquatrine – 3 large contracts for water, sewer, drainage services on Ministry of Defense sites (awarded 2005)
US	▪ Keystone Wastewater Treatment (SD) (1999 operational) ▪ Santa Paula Water Reclamation Plant (CA) [$58 million capital cost] (2010 operational)

A DBFOM is currently being planned for the biosolids portion of the Capital Regional District (Victoria, BC) wastewater system project.

Use of the DBOM Model

The DBOM model is more prevalent than DBFOM in Canada and the US. Some DBOM examples in Canada and the US are listed below.

Project	Approx. Capital Cost ($millions)	Owner	Project Commencement (approx.)
New Wastewater Treatment Plant	14	Town of Jasper, AB	2002
New Wastewater Treatment Plant	13	Town of Banff, AB	2001
Wastewater Treatment Plant Upgrade	11	Town of Okotoks, AB	2005

[1] 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	Project Commencement (approx.)
New Water Treatment Plant	4	Town of Port Hardy, BC	2000
New Wastewater System	23	Town of Sooke, BC	2004
New Wastewater Treatment Plant	16	Lac La Biche County, AB	Under construction
New Water Treatment Plant	81	City of Seattle (Cedar), WA	1997
New Water Treatment Plant	65	City of Seattle (Tolt), WA	2004
Wastewater Plant Upgrade and New Combined Sewer Overflow Facility	24	City of Holyoke, MA	2005
New Wastewater Treatment Plant	20	City of Cle Elum, WA	2005
New Wastewater Treatment Plant	43	City of Filmore, CA	2006
New Water Treatment Plant	> 100	Lake Pleasant, AZ	2003
New Wastewater Treatment Plant (under construction)	172	Pima County, AZ	2010
New Wastewater Treatment Plant	130	Spokane County, WA	2009
New Water Treatment Plant	160	San Diego County (Twin Oaks), CA	2005

Market of P3 Contractors

There is a ready market of service providers with interest and capability to pursue such projects. Both Canadian and international firms are represented. As an example and as evidence, the Evan Thomas DBFOM project in Alberta recently received RFQ responses from the following teams:

- Black & Veatch/SNC-Lavalin
- EPCOR
- Forum/CH2M Hill
- Hochtief/Deassau/Flatiron
- Integrated Team Solutions (a joint venture between EllisDon and Fengate Capital)
- Plenary
- Mountain Water Solutions
- Maple Reinders

Opposition to Water/Wastewater P3s

P3s in the water/wastewater sector are opposed by some special interest groups, most notably organized labour. Following is a list of projects that were started by their municipal owners as P3s, but aborted during the planning or procurement process in response to such opposition.

- **Resort Municipality of Whistler WWTP Upgrade (DBFOM)** – aborted in 2005 after shortlisting four proponents due to counter-petition. BC Municipal Act requirement for approval of electors for the project was a major factor.

- **Greater Vancouver Regional District Seymour Water Treatment Plant (DBO)** – aborted in 2001 after shortlisting three proponents.
- **City of Abbotsford Stave Lake Water Supply (DBFOM)** – aborted in 2011 prior to commencing procurement process due to referendum results. BC Municipal Act requirement for approval of electors for the project was a major factor.

The rejection of the DBFOM in Abbotsford, despite a $66M grant from PPP Canada, is evidence of the potential effectiveness of anti-P3 campaigns. Such campaigns may rely on use of illegitimate examples and deliberate misinformation and usually ignore mention of successful projects.

Failed P3s

A wastewater O&M contract in Hamilton, Ontario is often cited a "failed P3". Whether the project was truly a success or failure continues to be the subject of debate. However, we do know that the contract was sole-sourced and as such did not follow contemporary P3 procurement practices.

Successful P3s

Deloitte is confident that the following projects (taken from the tables above) are considered successful by their owners, based on personal discussion with the municipal or provincial owners and/or public information provided by the owners.

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	15	Town of Taber, AB
Cartier (New) Water System	10	Manitoba Water Services Board
Wastewater Treatment Plant	10	Dysart, ON
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 Water Treatment Plant	81	City of Seattle (Cedar), WA
New Water Treatment Plant	65	City of Seattle (Tolt), WA

Appendix E – Multi-Criteria Analysis

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Memo

Date:	September 17, 2012
To:	Mr. Rob Court, P.Eng. Manager, Environmental Engineering City of Regina
c:	File 824603 – 1000014
Subject:	WWTP Upgrade Project Delivery Model Assessment Multi-Criteria Analysis Process and Results

Introduction

As part of the Strategic Assessment, a Multi-Criteria Analysis (MCA) has been conducted. The MCA is a qualitative assessment of delivery models based on a number of weighted criteria that are scored relative to a base case. The base case delivery model is the Design-Bid-Build using multiple tenders. The MCA methodology used is the same as the "Triple Bottom Line (TBL)" methodology established for the assessment of wastewater treatment processes for the Project. This memorandum briefly documents the MCA analysis and results. It is the intent that the information presented herein be considered in the overall strategic assessment.

Assessment Criteria Categories

Assessment criteria were developed based on previous documentation, analysis, workshop sessions, and discussions with City staff. Twenty-one criteria have been organized into four criteria categories as follows.

- City Resource Capacity 25% of weighting
- Economic 40% of weighting
- Alignment with Managerial Goals and Strategy 25% of weighting
- Social 10% of weighting

The category weightings were approved by staff and to the extent that the categories are consistent with the treatment process TBL categories, the weightings are the same (i.e. Economic criteria are 40% of the weighting, and Alignment with Managerial Goals and Strategy are 25% of the weighting).

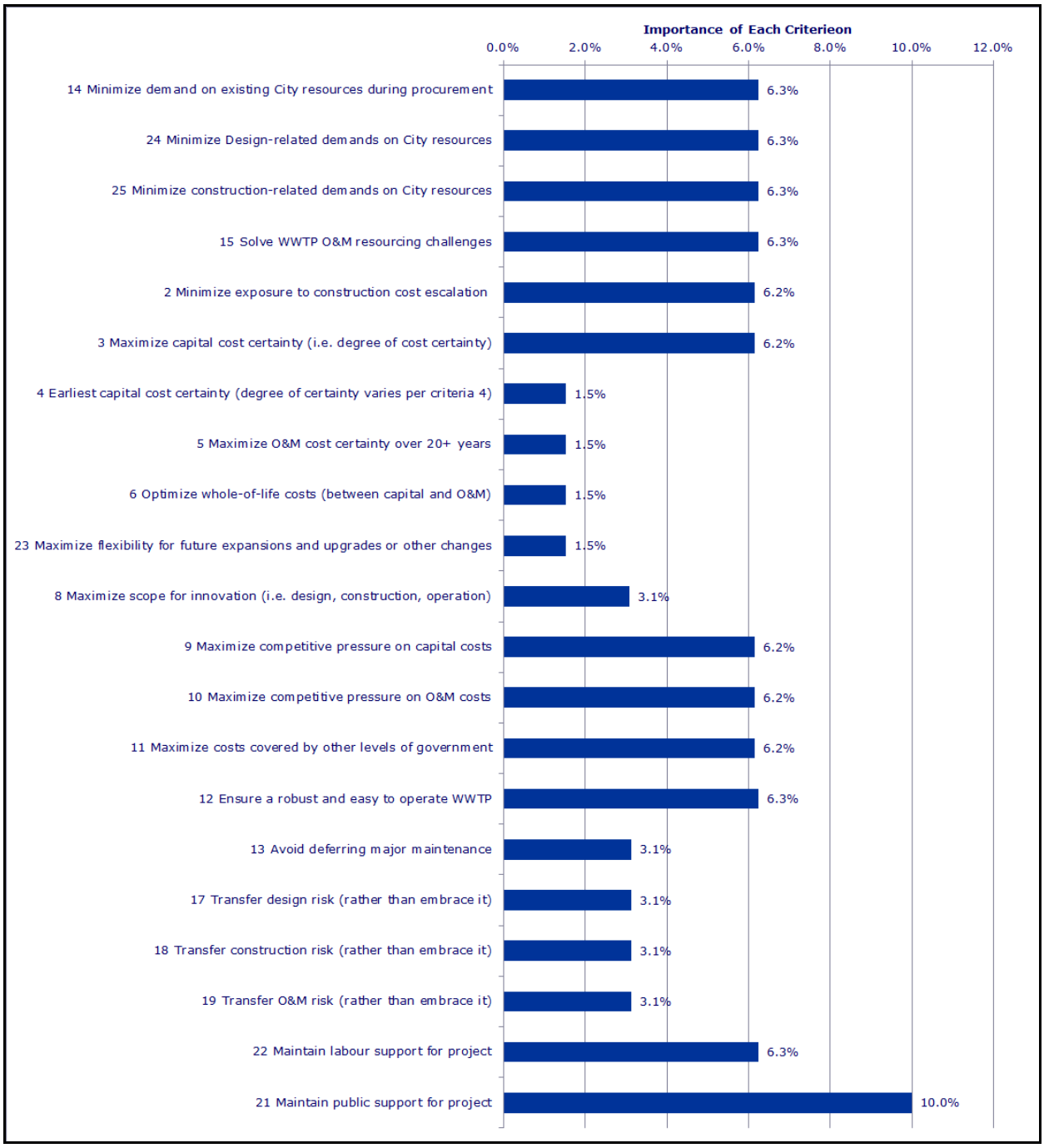
Assessment Criteria Weightings

The 21 criteria, organized into the four categories, are presented below. As with the TBL analysis, each criterion is assigned a relative weight within the category (Low, Medium, or High) which correspond to weightings within the category of 1, 2, or 4. The importance ratings shown were approved by City staff.

Category	No.[1]	Criterion	Criterion Relative Weight Within Category
City Resource Capacity	14	Minimize demand on existing City resources 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 4)	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%			

The category weightings and criterion weightings within the categories establish the relative contribution of each criterion to the overall MCA scoring, as shown in the chart below.

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

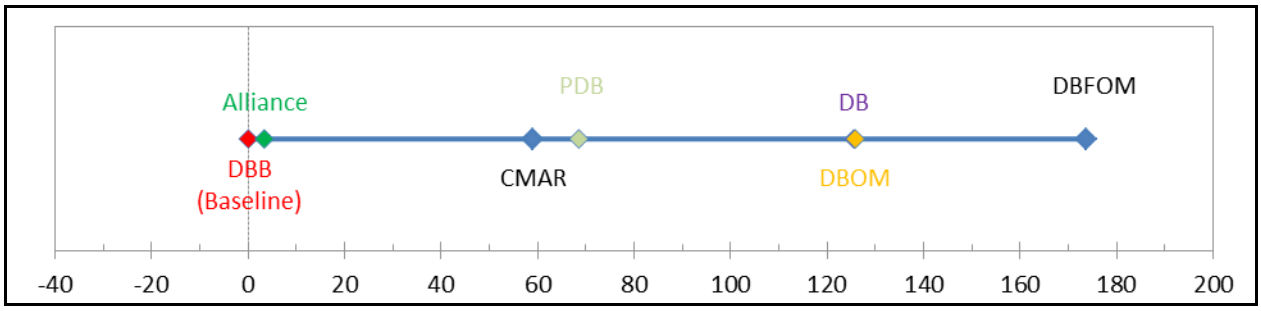


Criterion Scoring

Each criterion was scored against the base case by the Advisory Team (i.e. AECOM and Deloitte) in a workshop setting to arrive at consensus on the relative merits of each delivery model relative to the base case DBB. Consistent with the TBL, scores were assigned on a scale of +4 to -4 with positive scores being progressively better than the base case, and negative scores being progressively worse than the base case. A score of zero is assigned if the delivery model being assessed is the same as (i.e. no worse and no better) than the base case DBB. The resulting detailed scoring matrix is provided in Appendix A.

Overall Results

The methodology calculates an overall score for each delivery model relative to the base case DBB delivery model. Positive results indicate that a delivery model better meets the criteria than the base case, and negative results indicate that a delivery model is not as good as the base case at meeting the criteria. The numeric scores are relative only and have no absolute meaning. The results are presented graphically as follows:



These results indicate that all of the alternative models are believed to address the criteria better than DBB, with Alliance having a slight benefit and 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. There is some obvious clustering of models as well.

It is also possible to examine the relative scores within each of the four criteria categories. The graphical results are shown in Appendix B. The key finding are that in the Resource Capacity and Economic categories, the general order of the models does not change from the above (other than that the Alliance scores worse than DBB in the Economic category). In the Alignment with Managerial Goals and Objectives category, there is strong clustering of DBB/CMAR/DB followed by PDB/Alliance, with DBOM and DBFOM scoring progressively better. And, in the Social category, DBOM and DBFOM score negatively (due to potential public concern with contracted O&M) , while all other models are the same as DBB.

Sensitivity Analysis

The sensitivity to the overall results of different category weightings was tested, with graphical results provided in Appendix C. The general conclusion is that even with significant changes in the category weightings, the general order of the models does not change from the baseline shown above, other than that the Alliance scores slightly worse than DBB if the Economic category is given higher weighting.

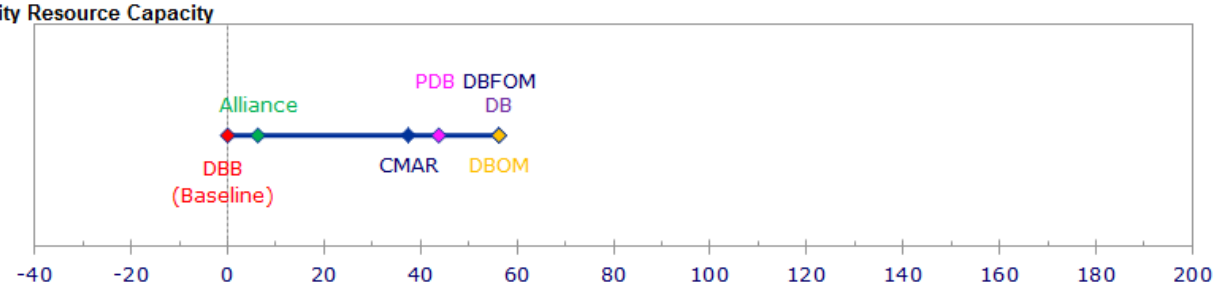
Appendix A – Scoring of Delivery Models

Cateogry		Criterion	Criterion Relative Weight Within Category	BASELINE Model 1 DBB	Model 2 CMAR	Model 3 Alliance	Model 4 PDB	Model 5 DB	Model 6 DBOM	Model 7 DBFOM
City Resource Capacity	14	Minimize demand on existing City resources during procurement	High	0	2	-2	2	3	-2	-3
	24	Minimize Design-related demands on City resources	High	0	1	1	2	3	4	4
	25	Minimize construction-related demands on City resources	High	0	3	2	3	3	4	4
	15	Solve WWTP O&M resourcing challenges	High	0	0	0	0	0	3	4
25.0%										
Economic	2	Minimize exposure to construction cost escalation	High	0	2	-2	1	2	-2	-2
	3	Maximize capital cost certainty (i.e. degree of cost certainty)	High	0	1	0	2	3	3	4
	4	Earliest capital cost certainty (degree of certainty varies per criteria 4)	Low	0	2	2	2	4	1	1
	5	Maximize O&M cost certainty over 20+ years	Low	0	0	0	0	-1	3	4
	6	Optimize whole-of-life costs (between capital and O&M)	Low	0	0	0	0	-2	2	4
	23	Maximize flexibility for future expansions and upgrades or other changes	Low	0	0	0	0	0	-2	-4
	8	Maximize scope for innovation (i.e. design, construction, operation)	Med	0	1	1	2	3	4	4
	9	Maximize competitive pressure on capital costs	High	0	-1	-1	-2	4	3	3
	10	Maximize competitive pressure on O&M costs	High	0	0	0	0	0	3	4
	11	Maximize costs covered by other levels of government	High	0	0	0	0	0	1	4
40.0%										
Alignment wwith Managerial Goals and Strategy	12	Ensure a robust and easy to operate WWTP	High	0	0	0	0	-2	1	2
	13	Avoid deferring major maintenance	Med	0	0	0	0	0	2	4
	17	Transfer design risk (rather than embrace it)	Med	0	0	1	2	3	4	4
	18	Transfer construction risk (rather than embrace it)	Med	0	1	2	2	3	4	4
	19	Transfer O&M risk (rather than embrace it)	Med	0	0	0	-1	-1	3	4
	22	Maintain labour support for project	High	0	0	0	0	0	-4	-4
25.0%										
Social	21	Maintain public support for project	High	0	0	0	0	0	-2	-2
10.0%										

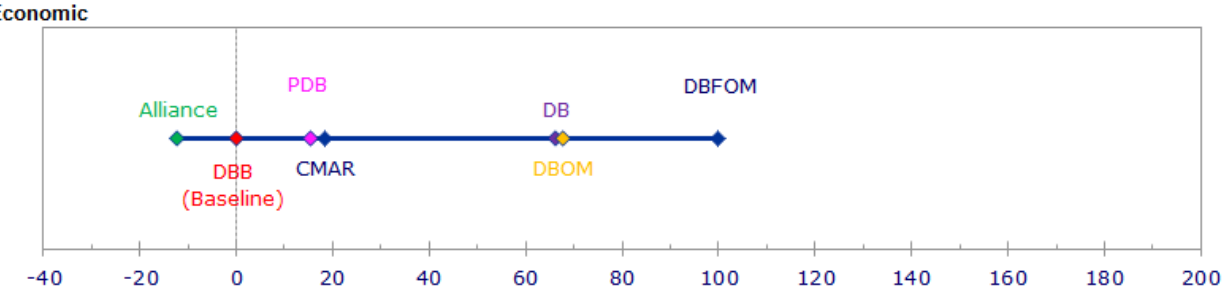
Cateogry		Criterion	Scoring comments
City Resource Capacity	14	Minimize demand on existing City resources during procurement	2 and 4 alleivate some effort due to ther party involvement. 5 is fastest and requires fewest decisoins. 3,6,7 require more time to procure the contractor/alliance partner
	24	Minimize Design-related demands on City resources	self explanatory
	25	Minimize construction-related demands on City resources	self explanatory
	15	Solve WWTP O&M resourcing challenges	3 and 4 transfer O&M responsibility completely, but 4 has better security to ensure that contractor doesn't abandon contract
25.0%			
Economic	2	Minimize exposure to construction cost escalation	3,6,7 expected to delay entry into construction market. PDB similar to CMAR except requires entire project to be designed so not quite as fast to market. 3,6,7 are latest
	3	Maximize capital cost certainty (i.e. degree of cost certainty)	2 and 4 eventually get a fixed price. 1 and 3 price not known till done. 5 6 7 have fixed price. With 5 and 6, some risk that there's post-DB capital costs to rectify deficiences. With 7, fixed price is highly guaranteed.
	4	Earliest capital cost certainty (degree of certainty varies per criteria 4)	1,6,7 expected to be quite similar in terms of overal timeframe, but 1 doesn't have certainty until construction complete so 6,7 are better. 2,3,4 can get to certainty earlier than 1 6 7 (although the degree of certainty is not as good as 5 6 7 which is reflected in the criteria above)
	5	Maximize O&M cost certainty over 20+ years	1 to 4 no certainty but owner input to design and operations. 5 has minimal owner design input so least certain, but assumption is that DB will be somewhat prescriptive to provide City projection in this regard.. 6 7 cost is known upfront, but 7 much better security on price than 6
	6	Optimize whole-of-life costs (between capital and O&M)	Capital at risk in 7 thought to force true optimization of capital and operating. Similar objectives in 6 but reduced pressure since no capital at risk. 5 forces attention on reducing captial, perhaps to sub-optimal level.
	23	Maximize flexibility for future expansions and upgrades or other changes	1 2 3 4 5 City has unferttered control. 6 and 7 have to deal with incumbent contractor. More complex in 7 since have to deal with lenders, not just contractor.
	8	Maximize scope for innovation (i.e. design, construction, operation)	2 3 4 have additional party at table to add to innovation potential. 5 adds competition on capital. 6 adds competition for O&M, so does 7 but view that financiers may introduce conservatism and limit innovation as compared to 6.
	9	Maximize competitive pressure on capital costs	1 has tender competition on construction packages. 2 3 will have some amount of self-delivered construction, non-competative. 4 amounts to a sole-source DB so less competative than 1 2 3. 5 has competition on integrated design & construction with focus on lowest cost. 6 7 have competion on integrated design & construction but tempered by concern with long term O&M, including conservatism of financiers in Model 7
	10	Maximize competitive pressure on O&M costs	Only 6 7 have competition on O&M costs. Believe that financiers in Model 7 will force greater conservatism in pricing relative to 6.
	11	Maximize costs covered by other levels of government	some chance that PPP Canada will cover some DBOM costs. DBFOM nearly certain to get funding.
40.0%			
Alignment wwith Managerial Goals and Strategy	12	Ensure a robust and easy to operate WWTP	1 2 3 4 same due to same party influencing design (City). In 5, the DB contractor has no vested interest in long term robustness, but limited impact based on assumption that DB will be somewhat prescribed to protect City against this Contractual obligation to operate for a fixed cost forces more discipline in 6 and 7.
	13	Avoid deferring major maintenance	1 2 3 4 5 the same. 6 City is only partially locked in, will consult with contractor on major maintenance. 7 is fully locked in.
	17	Transfer design risk (rather than embrace it)	3 transfers a bit of risk due to pain-shares risk compared to 1 and 2. 4 doesn't completely transfer risk due to consulative process with DB contractor. 5 6 7 transfer fully but 5 is worse as contractor is not around for the long run.
	18	Transfer construction risk (rather than embrace it)	1 transfers some risk to constructor. 2 transfers some additional risk to CM. 3 by definition has City sharing this risk. 4 has some transfer, 5 6 7 full transfer but in 5 contractor is not around for the long term to rectify problems discovered later
	19	Transfer O&M risk (rather than embrace it)	7 fully transfers, 6 has lesser security so not quite as good (easier for contractor to walk away). 4 and 5 may introduce some additional retained risk since contractor is not around for the long term
	22	Maintain labour support for project	contracting of O&M will likely cause labour opposition
25.0%			
10	21	Maintain public support for project	1 2 3 4 5 public will have no particular interest in delivery model. There may be concern about 6 and 7 triggered by likely labour opposition
10.0%	14		

Appendix B – Baseline Analysis, Scoring Within Categories

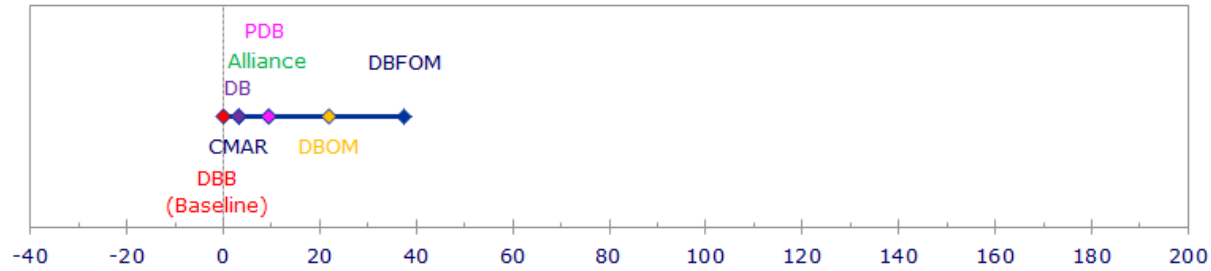
City Resource Capacity



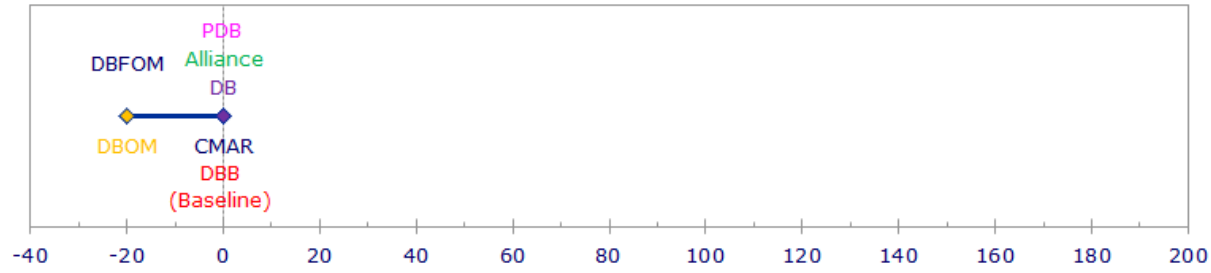
Economic



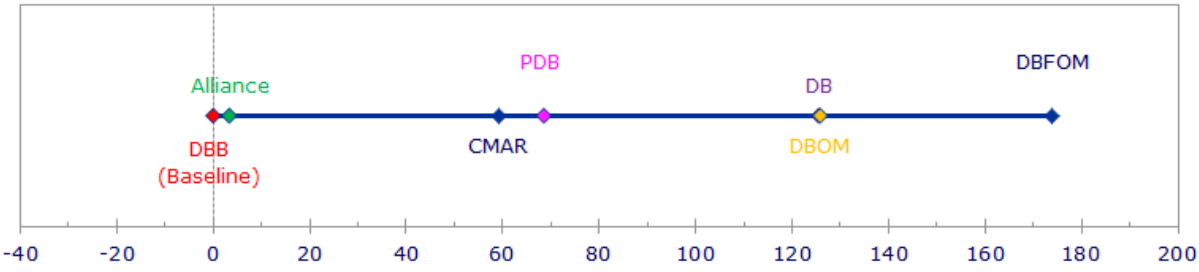
Alignment With Managerial Goals and Objectives



Social



Total Score

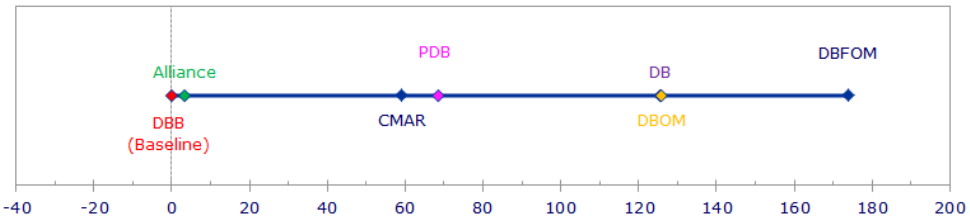


Appendix C – Sensitivity Analysis, Changes in Category Weightings

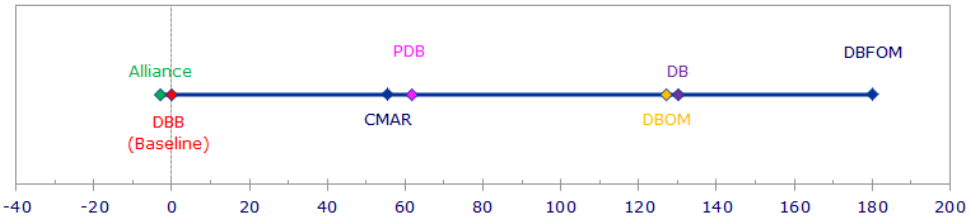
Major Category Weightings Sensitivity

	Capacity	Economic	Alignmen	Social	TOTAL	
Baseline	25%	40%	25%	10%	100%	
Var 1	20%	50%	20%	10%	100%	*give more weight to financial factors*
Var 2	37.50%	37.50%	20%	5%	100%	*give more weight to capacity and financial factors*
Var 3	20.00%	70.00%	5%	5%	100%	*Financial is major concern*
Var 4	70.00%	20.00%	5%	5%	100%	*Capacity is major concern*

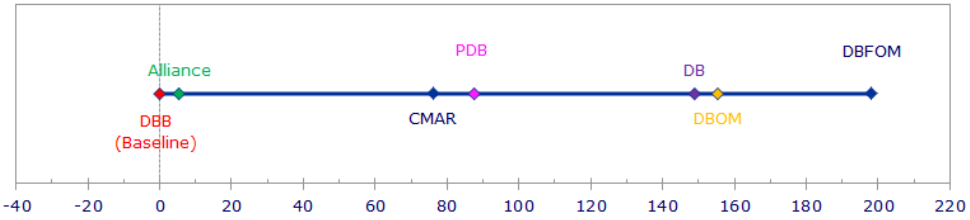
Baseline



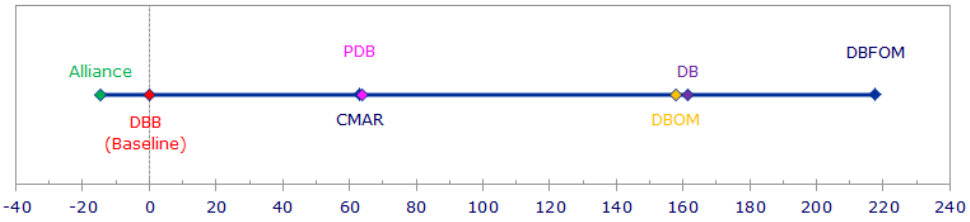
Var 1 give more weight to financial factors



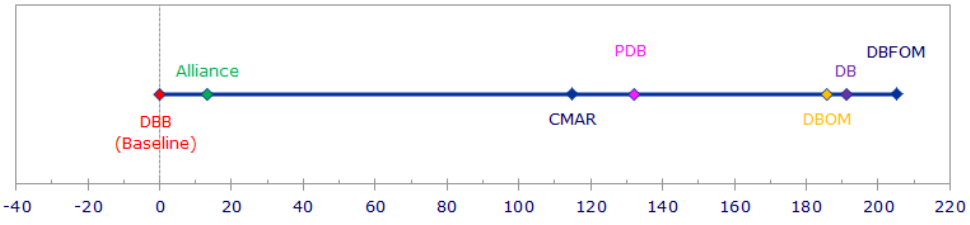
Var 2 give more weight to capacity and financial factors



Var 3 Financial is major concern



Var 4 Capacity is major concern



Appendix F – Contract Term for DBOM/DBFOM

Deloitte.

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Memo

Date:	December 14, 2012
To:	Mr. Rob Court, P.Eng. Manager, Environmental Engineering City of Regina
c:	File 824603 – 1000014
Subject:	WWTP Upgrade Project Recommended DBFOM Contract (or "Concession") Term

Introduction

The typical post-construction operating term of a financed P3 project (e.g. DBFOM) in Canada is 30 years, resulting in total contract lengths varying from 32 to 34 years, taking into account the design/construction period as well as operations. A term of 20 to 30 years has generally been assumed in development of the DBFOM delivery model in all analysis to date. All financial analysis to date has assumed a 30-year operating term post-construction completion as a "default".

This memo outlines the considerations in selecting a contract term of between 20 and 30 years and recommends a contract term.

Preliminary Schedule

The preliminary high-level procurement schedule for a DBFOM is as follows:

Period		Key Milestones	Estimated Date
Procurement		Selection of Preferred Proponent	December 2013
		Financial Close	February 2014
Design & Construction		Commence Design & Construction	March 2014
	Interim Operating	Take-over of Existing Plant Operations	April 2014
		Construction Completion	December 2016
Long-Term Operating		Commencement of Capital Payments & O&M Payments	January 2017
		Last Month of Service	TBD

Considerations in Selecting Contract Term

The table below sets out the key considerations in selecting the term for the Regina WWTP project if implemented as a DBFOM.

Consideration	Discussion	Conclusion
Legislative restrictions	Division 2 of the Cities Act states: *A council may grant a right to a person to provide a public utility service in all or part of the city for not more than 30 years.* The City Solicitor advises that the 30 year period for measurement against this restriction would start at the commencement of the Interim Operating Period (see above).	Total of Interim Operating and Long-Term Operating periods may not exceed 30 years. This is a governing criteria.
City financing policy	We are not aware of any City policy that dictates the term of long term debt incurred for infrastructure financing.	Not a governing criteria.
O&M market preferences or limitations	Based on market sounding feedback, any term between 20 and 30 years is attractive to the market. Longer or shorter terms are also possible.	Not a governing criteria.
Private finance preferences or limitations	Any term between 20 and 35 years is attractive.	Not a governing criteria.
The lifecycle of major replacement subcomponents of the Project, to ensure that at least one refresh of each is included within the term and thereby ensure that there is transfer of significant "lifecycle" cost risk in the P3 delivery models.	Based on its concept plan for the WWTP, AECOM advises that significant lifecycle reinvestment is likely required at year 25 of the Long Term Operating period, so a Long Term Operating period longer than 25 years is appropriate. While actual bid designs will be different, there's no reason to expect a significantly different lifecycle investment timing profile.	The Long-Term Operating period should be maximized within the constraint of the legislative restriction. This is a governing criteria for achieving long term value in a P3.
The operating term necessary to ensure that full accountability for the performance of the treatment process is transferred to the P3 contractor.	While the suitability of the process would likely be known quite early, its long term performance can only be proven by the passing of time. All terms under consideration are sufficiently long.	Not a governing criteria .
The potential ability to avoid an expansion of treatment capacity within the term.	There is insufficient information to determine when, if ever, the WWTP will need to be expanded. Expectations are that new development will need to be handled by a new, separate, WWTP, and so this consideration is a minor one.	Not a governing criteria.
Affordability – Impact on Rates	Matching the term of the financing to the life of the asset is beneficial, which favours longer terms. This also leads to lower annual costs and lower utility rates.	Not a governing criteria.
Value for Money	Shorter terms reduce the total financing costs over the project term, and are sometimes required to achieve Value for Money. Preliminary value-for-money assessment shows positive VFM at a 30-year term, so there is no need to shorten the term in pursuit of VFM.	Not a governing criteria.

Recommendation

Given the above, the recommended concession term is 30 years from the time that the contractor takes over interim operations of the WWTP, which is governed by the legislative restriction. This amounts to a total contract length of 30 years plus two months (362 months), the two months being an allowance after financial close to allow the contractor to organize and assume employment of the City workforce (during which time it is not providing a "public utility" service.

Period	Key Milestones	Estimated Date	Duration	
Procurement	Selection of Preferred Proponent	December 2013	2 months	
	Financial Close	February 2014		
Design & Construction	Design & Construction	March 2014	34 months	
Interim Operating	Take-over of Existing Plant Operations	April 2014	32 months (2.7 years)	Total of 30 years providing a "public utility" service
	Construction Completion	December 2016		
Long-Term Operating	Commencement of Capital Payments & O&M Payments	January 2017	328 months (27.3 years)	
	Last Month of Service	May 2044		

It may be possible for the contractor to assume management of the WWTP immediately after financial close under a management contract using City staff while still employed by the City, eliminating the two month allowance. The benefits of this have not been fully explored. In addition, a legal opinion as to whether the City or the contractor is providing the "public utility" service in such a case is needed.

Appendix G – Risk Analysis

Qualitative Risk Assessment

A qualitative risk workshop was conducted in July 2012 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.

Seven delivery models were assessed, including DBB and DBFOM. A register of project risks (approximately 50 risks) was assembled based on risk registers from past project assessments and modified to reflect Project and City-specific characteristics and issues. The definition of the risks evolved during the workshop through discussion. One additional risk was identified and added during the workshop. Several of the risks, upon discussion, were identified as not relevant to the project and/or to the distinguishing of delivery models as they were similar to other risks, or as very minor concerns, and as such were not assessed during the workshop. 27 risks were fully assessed by ascribing qualitative probabilities and impacts. Appendix D contains more information on the qualitative risk assessment.

Qualitative Risk Assessment Results

The figure below provides a graphical overview of the risk assessment results using a red-yellow-green colour scale where red represents relatively high risk and green represents relatively low risk. The lowest possible risk score is 1 (probability=rare, impact=negligible), and the highest is 25 (probability=expected, impact=extreme).

Overall Qualitative Risk Assessment Results[9]

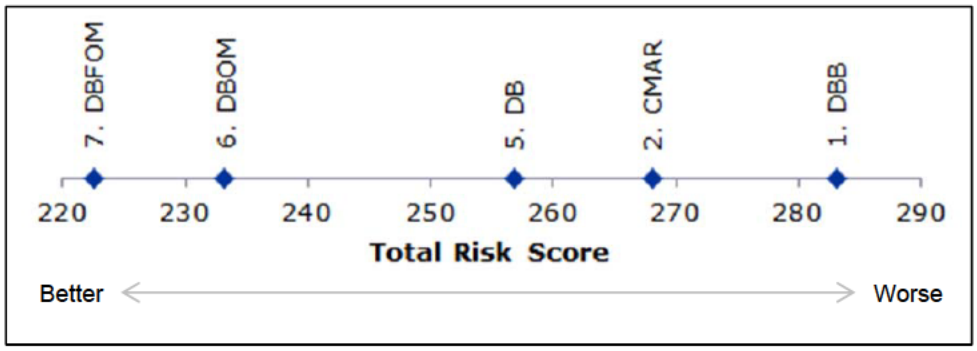
Phase	Risk	1 - DBB	2 - CMAR	5 - DB	6 - DBOM	7 - DBFOM
Planning and Procurement	Approval by Council	6	6	8	14	17
	Market capacity	9	9	9	9	9
	Resource capacity	18	13	9	14	17
	Financial markets	6	6	10	10	12
	Unclear project documentation	9	9	12	15	15
	Wastewater flow and quality projections	5	5	5	8	8
Design	Wastewater treatment process selection	8	8	12	11	8
	Facility design risk	12	10	9	8	8
	Design exceeds requirements	10	11	5	10	9
	Scope changes during design - scope creep	13	13	8	8	7
Construction	Delay by Owner	10	8	7	7	7
	Delay	14	8	7	4	3
	Construction cost	10	9	6	4	3
	Scope changes during construction	13	13	8	4	4
	Contractor default	10	10	10	10	10
	Construction / Operation Coordiation	16	16	17	9	10
Operations & Maintenance	Latent defects in new infrastructure	9	9	9	8	6
	Staffing	16	16	16	6	6
	Equipment failure	9	9	11	7	4
	Change in regulation	11	11	11	11	11
	Operating costs (other than power and chemicals)	8	8	8	5	5
	Power and Chemical Productivity	9	9	9	6	5
	Effluent quality	7	7	7	6	6
	Sludge quality	5	5	5	6	6
	Early expansion	10	10	10	10	10
	Major maintenance/rehabilitation	17	17	17	9	5
	Unknown condition of existing assets (latent defects)	14	14	14	14	14
TOTAL		283	268	257	233	223

The results illustrate that the greatest risk with the P3 models was perceived to be in the planning and procurement stages, primarily due to unfamiliarity with the model that would have to be overcome (by Council and by staff). In terms of the actual project delivery, these models are viewed to present lower risk due to the transfer of responsibility to a Contractor. Some of the risk in the planning and procurement stage reflected in the table above will be mitigated or eliminated at the point in time where the delivery model is finally selected.

[9] On this figure, the colour scale is applied across the entire matrix, i.e. each colour represents the same numeric risk rating across all of the delivery models

The total unweighted risk score is calculated for each delivery model. The risk score reflects the risk from an overall project perspective, and does not distinguish between a risk that is retained by the City versus transferred to contractors. 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.

Results of Qualitative Risk Assessment - Total Risk Scores



Based on this, it may be interpreted that DBB presents the highest overall project risk, and DBFOM the lowest. Relative weighting of the risks could change this conclusion but sensitivity conducted on the results (giving significantly more weight to risks that were assessed high for DBOM and DBFOM) did not change the relative order of the models, indicating that the order of the models shown above is a robust result.

The relative risk profiles of the different delivery models inform criteria 17,18, and 19 in the multiple criteria assessment. They are also the starting point for the quantitative assessment of risk costs.

Risk Estimates (Risk Quantification)

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.

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

Risk	Description
Early expansion	WWTP capacity needs to expanded sooner than anticipated
Scope changes during construction	Changes to the design are demanded by the operator (City I the case of DBB) during construction
Construction delay	Facility not constructed on time for all reasons other than City-induced delay

The following table provides the individual risk estimates in order of magnitude (based on the DBB model). The "expected value", as opposed to the minimum or maximum estimates, are shown.

Quantified Risks (Expected Value) Ordered From Highest to Lowest (Based on DBB Model) (NPV, $thousands)

No.	Name	Description
05	Resource capacity	Risk that City does not adequately resource the procurement through to substantial completion
15	Facility design risk	Design contains errors or omissions that are not discovered until construction period. (contractor-initiated change order risk)
46	Major maintenance/rehabilitation	risk that major maintenance / rehabilitation is deferred
31	Staffing	Risk associated with recruiting and retaining qualified operating staff
20	Delay by Owner	Facility not constructed on time - due to Owner (e.g. due to its internal approval regime)
48	Unknown condition of existing assets (latent defects in existing assets)	Risk that defects in the existing parts of the plant are discovered during the maintenance period.
29	Construction / Operation Coordination	Risk associated with operating WWTP while upgrade/expansion is being done

17(1)(d)

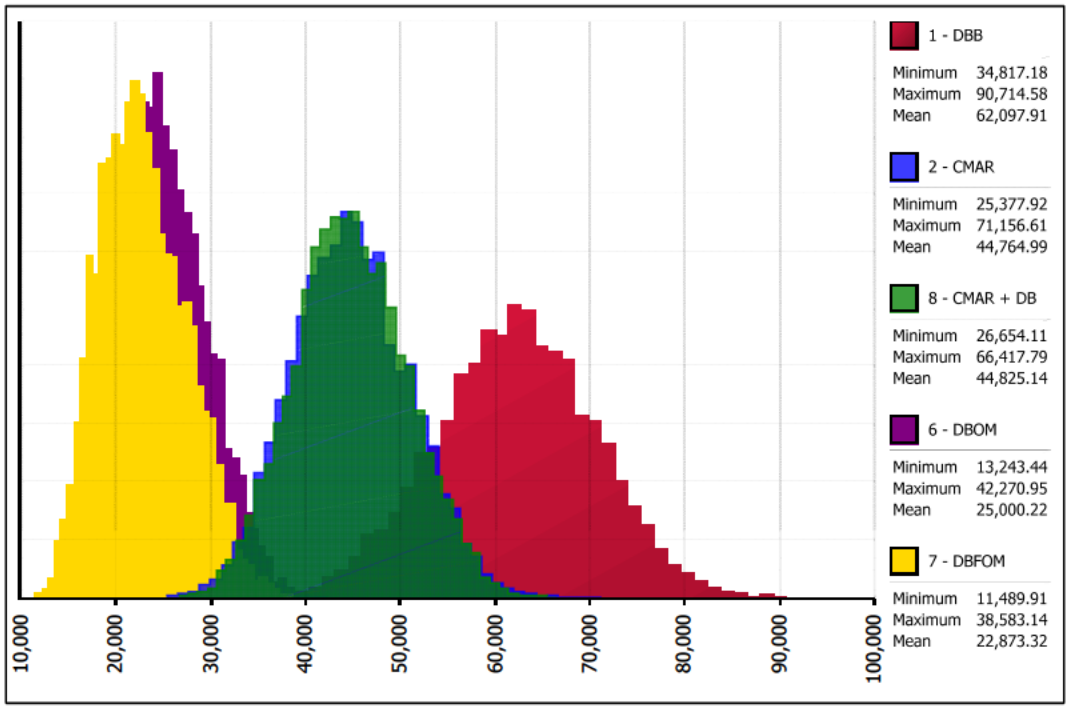
No.	Name	Description	17(1)(d)
44	Early expansion	Risk that WWTP capacity needs to be expanded sooner than anticipated	
23	Scope changes during construction	Change orders by Operator during construction	
21	Delay	Facility not constructed on time - not caused by Owner	
32	Equipment failure	earlier-than-expected equipment failure earlier than planned life	
14	Wastewater treatment process selection	Risk that selected treatment process does not meet discharge permit requirements	
16	Design exceeds requirements	"Goldplating" - facilities are better than needed to meet performance specification. i.e. "nice to haves" are included in the project. Does not encompass lifecycle optimization decision.	
22	Construction cost	Total construction costs exceed expectations/budget - quantities, prices, complexity, weather. "Construction risk". Excludes costs associated with latent defects in existing infrastructure.	
24	Contractor default	General contractor bankruptcy	
07	Unclear project documentation	Risk that the project documentation (design/spec or performance specification) poorly defines project scope and/or risk allocation or is poorly coordinated.	

No.	Name	Description	17(1)(d)
09	Wastewater flow and quality projections	Projections are inaccurate… realized flow and quality is different	
34	Operating costs (other than power and chemicals)	operating costs (labour, supplies) higher than anticipated (and excluding inflation effects)	
30	Latent defects in new infrastructure	Risk that construction defects are found after the warranty period expires	
17	Scope changes during design - scope creep	Owner alters project scope while design is in progress.	

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 (in net present value terms[10]) for each delivery model.

[10] The net present value numbers presented herein are suitable only for comparison of alternatives and must not be used for any other purpose, and in particular **must not be used as budget estimates** or estimates of nominal "as-spent" costs.

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 $37.1 million and as high as $86.0 million. The figure also illustrates that all alternative models are expected to reduce the total project risk, since their distributions are to the left of the DBB distribution.

The risk cost distributions are taller and narrower for DBOM and DBFOM, meaning that the total risk costs are more predictable than the wider distributions. It may also be observed that the risk costs estimates are very similar for Models 2 and 8, and for Models 6 and 7.

When reported on a point basis (rather than as a risk distribution), expected value (the mean value of the distribution) is typically used. On this basis, the risk costs are presented as percentages of the relevant cost base for the capital phase of the Project (the time encompassing procurement through the end of construction) and the operations and maintenance phase of the Project in the following tables.

Capital Phase Expected Total Project Risk Cost (NPV, $thousands)

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Capital Phase Cost Base	186,269	189,049	169,412	168,155	199,024
Capital Phase Risk Cost	38,776	20,836	19,205	14,006	14,853
Risk %	20.8%	11.0%	11.3%	8.3%	7.5%

The reduction in overall project risk that is expected to be achieved through the alternative delivery models (Models 2,8,6 and 7) is evident. Similar risk reduction is expected for the operations and maintenance phase as follows.

Operations & Maintenance Phase Expected Total Project Risk Cost (NPV, $thousands)

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
O&M Phase Cost Base	178,338	181,726	181,726	161,387	162,659
O&M Phase Risk Cost	25,313	25,543	27,062	12,176	9,042
Risk %	14.2%	14.1%	14.9%	7.5%	5.6%

The same information for the entire project (i.e. both phases) is as follows.

Total Project Expected Risk Cost (NPV, $thousands)

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Proj Cost	452,872	452,323	434,059	429,439	460,173
Total Risk	62,098	44,765	44,825	25,000	22,873
Risk %	13.7%	9.9%	10.3%	5.8%	5.0%

Overall Conclusions

The risk assessment illustrates that the project is estimated to have potentially significant risk costs, on the order of $62 million when expressed as net present value, or 14% of the lifecycle cost. This is a significant amount and justifies consideration of methods to reduce it. All of the alternative models are expected to reduce this risk cost.

Appendix H – Value for Money Assessment

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Memo

Date:	January 22, 2012
To:	Mr. Rob Court, P.Eng. Manager, Environmental Engineering City of Regina
c:	File 824603 – 1000014
Subject:	WWTP Upgrade Project Delivery Model Assessment Preliminary Value for Money Assessment, Updated Based on Preliminary Design Costs

Introduction

Deloitte and AECOM (the "Advisory Team") have been engaged by the City of Regina ("the City") to undertake an assessment of project procurement options for City of Regina's WWTP project (the "Project"). The assessment is to be carried out in compliance with the City's P3 Policy, since P3 delivery models are included in the range of alternatives. There are three stages of analysis as described by the P3 Policy: Screening Analysis, Strategic Analysis, and Value for Money (VFM) Assessment. The Screening Analysis was completed in April 2012, confirming that P3 delivery models may be suitable for the Project.

A wide range of delivery models have been considered for the Project. From an original list of 12, the potential models were narrowed down through Strategic Analysis (as reported on September 18, 2012) to the following candidates:

Non-P3 Models
Model 2 - Construction Management at Risk (CMAR)
Model 8 - A hybrid of CMAR for refurbishment of existing WWTP infrastructure and Design-Build (DB) for new infrastructure (primarily the nutrient removal infrastructure).

P3 Models
Model 6 - Design-Build-Operate-Maintain (DBOM)
Model 7 - Design-Build-Finance-Operate-Maintain (DBFOM)

These four models, in addition to the baseline Traditional Design-Bid-Build (DBB, Model 1) are carried forth into the Value for Money assessment described herein to assist in making the final determination of the preferred procurement model. The numbering above is maintained for consistency with previous communications.

The value for money herein is described as "preliminary" to contrast it with what may eventually be calculated as a "final" value for money after the City awards a contract. There will likely be several updates of the VFM analysis in the interim.

Overview of Value for Money Assessment Process

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
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 costs to calculate VFM

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

Cost Estimates

The preliminary value for money is based on AECOM's preliminary cost estimates as documented in the December 2012 predesign capital cost estimate. AECOM has also provided an estimate of the major maintenance costs over a 30-year period (post construction completion) which were not available previously in the concept design, and these costs are now included in the VFM modelling.

The cost estimates assume a DBB delivery model. The costs have been adjusted to reflect expected variations in costs between delivery models as follows:

Table 1 - Adjustment of Baseline Cost Estimates for Different Delivery Models

Model	Capital	O&M	Major Maintenance
1 – DBB	Baseline	Baseline	Baseline
2 – CMAR	No adjustment	No adjustment	Baseline
8 - CMAR + DB	No change on brownfield portion, 20% capital cost savings on greenfield portion expected	No adjustment	Baseline
6 – DBOM	15% capital cost savings expected	10% savings on energy and chemicals expected	5% savings expected
7 – DBFOM	15% capital cost savings expected	10% savings on energy and chemicals expected	10% savings expected

Private financing costs have been estimated based on recently-closed Canadian P3 transactions. Models 6, 7, and 8 entail private financing. It is assumed for the baseline DBFOM that the City makes a capital

contribution of $100 million at construction completion, with the remainder of the capital cost financed by the contractor[1].

The City's cost of financing is based on recent communications to the City from CIBC. City financing is entailed in Models 1, 2, 6, and 8. Although City financing costs are modelled so that cash flows can be calculated, they have no impact on the VFM assessment because the discount rate used to calculate NPVs is equivalent to the City's cost of financing[2].

The cost of procurement also varies between models. Estimates have been made for the cost of internal and external resources for all models.

Cash Flow Modelling

Using the adjusted cost estimates as input, cash flow models for each delivery model have been developed which have the costs incurred as expected over the procurement, construction, and operations periods. The time period modelled for comparison commences October 1st, 2012 and ends March 31st, 2044, and reflects a 326 month Long Term Operating period[3] for the DBFOM model. The preliminary procurement schedules as documented in the May 2, 2012 memo "Summary of Delivery Model Workshop" are the basis for the cash flow timing.

The cash flow model calculates the total estimated project costs in net present value terms (as of March 31 2013[4]), and also calculates sub-component NPVs such as capital, operations, and maintenance.

[1] This capital contribution is determined by maximizing the contribution that preserves at least $100M for private financing to ensure market interest (the actual amount estimated is $103.5M). A "handback test" shows that if the City withheld all payments to the contractor in the last 5 years of the operating period, the cash withheld would be approximately $177M. The estimated nominal cost all of the major maintenance required over 30 years if assuming none of the required maintenance is completed until the end is approximately $135M. Therefore, even in a worst case major maintenance scenario, the City would have sufficient liquid security to cover the necessary works.
[2] The use of the government project owner's "cost of capital" as the discount rate for VFM analysis is the standard approach in most jurisdictions in Canada, and is endorsed by Deloitte.
[3] See December 14th 2012 memo "Recommended DBFOM Contract (or "Concession") Term" for a discussion of project term. The cash flow model cannot easily accommodate the design & construction period that is 2 months longer than the interim operating period as documented in the memo, so a slight simplification has been made in the model thus reducing the Long Term Operating period to 326 months from 328. This will have no appreciable effect on the comparison of delivery models.
[4] 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.

Table 2 - Project Cost Bases (Net Present Values, $thousands)[5]

	1- DBB	2 -CMAR	8 - CMAR+DB		6 - DBOM	7 - DBFOM
Cost Base			CMAR Portion	DB Portion		
Procurement	13,132	16,284	6,120	3,047	3,759	5,054
Capital	173,137	172,765	67,741	92,503	164,396	193,970
Operations & Maintenance	167,028	166,508	170,206	-	175,034	175,812
Major Maintenance	49,398	50,332	50,332	-	46,928	44,798
Operations During D&C	38,860	34,716	31,546	843	35,123	37,860
City Mgmt During O&M	11,317	11,719	11,719	-	4,198	2,679
Total	**452,872**	**452,323**	**337,665**	**96,394**	**429,439**	**460,173**
			434,059			

The table above presents the total estimated project NPVs prior to risk adjustment. Procurement costs for DBB and CMAR are significantly higher because for those models the Procurement category includes design costs. Design costs are borne by the contractor in the DB, DBOM, and DBFOM models and the costs are included in the Capital category for those models. The impact of the cost of private financing is also evident above, with the higher cost in the Capital category for DBFOM over DBOM being due to the cost of private financing. The cost of operations during design and construction (D&C) is different for each model because the anticipated timing of switchover from current O&M costs to future plant O&M costs is different (note: O&M is anticipated to be lower for the upgraded plant). City management during O&M is lower for DBOM and DBFOM because it is a contract management effort rather than an active management effort.

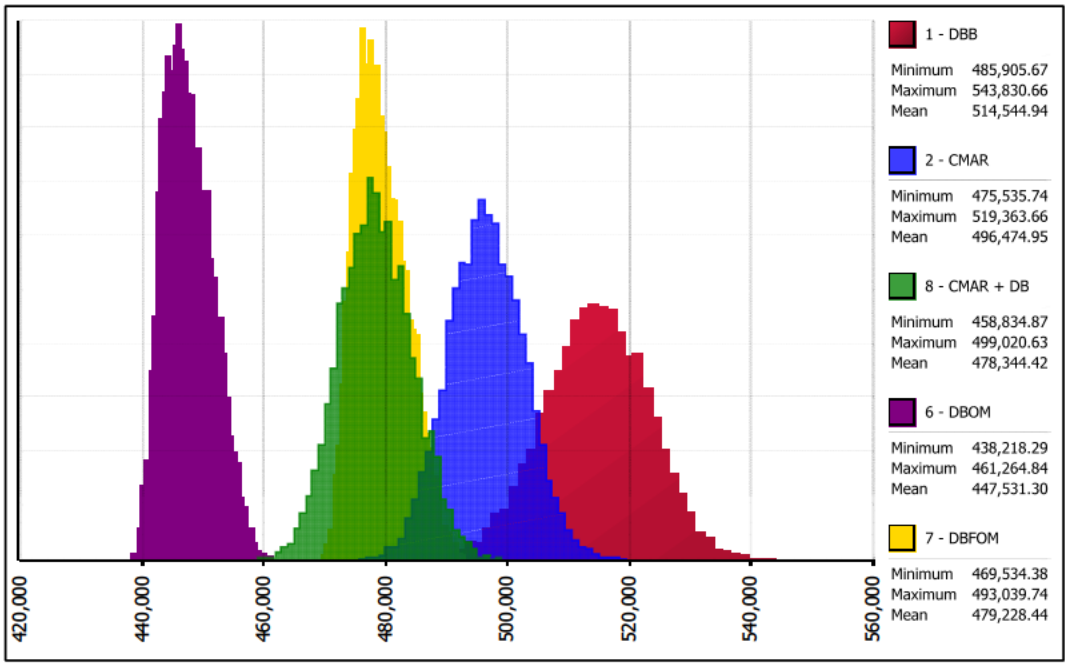
Risk Quantification

A risk quantification workshop was conducted in November 2, 2012. The workshop process and findings are documented in a separate memorandum. In brief, the project risk matrix initially developed for the qualitative risk assessment was refined with a confirmation and adjustment of risk probability and augmented with an estimation of risk impacts in dollar terms for the worst case, best case, and expected/typical outcome scenarios. The result is an estimated risk cost distribution for each quantified risk that is based on the discussion and consensus of the project team and its collective professional experience and project-specific knowledge.

Based on the estimated risk distributions, the total project risk retained by the City for each delivery model, and the total project risk transferred to the contractor for each delivery model, is calculated. Transferred risk costs are then further examined to estimate whether or not they are likely to be included in the "risk premium" priced by the contractor. The total risk-adjusted project cost to the City (cost base plus retained risk plus risk premium) can then be calculated. The results are in the form of risk distributions that illustrate the possible range of project cost outcomes, from the worst case through to the best case outcomes.

[5] The net present value numbers presented herein are suitable only for comparison of alternatives and must not be used for any other purpose, and in particular **must not be used as budget estimates** or estimate of nominal "as-spent" costs.

Figure 1 - 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 $486 million or as high as $544 million. All 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.

The difference between the DBOM and DBFOM models is due primarily to the additional cost of private financing in the DBFOM model. The DBOM risk assessment did take into account, to some extent, the weaker long term security of the DBOM as compared to the DBFOM; however, the risk assessment generally assumes that the contractual transfer of risk will hold throughout the project term (i.e. that the contractor does not abandon the contract). Since the quality of the long term security in a DBOM is not nearly as strong as in a DBFOM, the benefit of DBOM may not be as high as suggested above. The decision between DBOM and DBFOM must take into account qualitative factors (including the strength of the model structure to maintain risk transfer), not just VFM estimates.

Preliminary Value for Money Estimates

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 value for money is as follows.

Numbers were updated prior to the report going to Council. The summary report is correct.

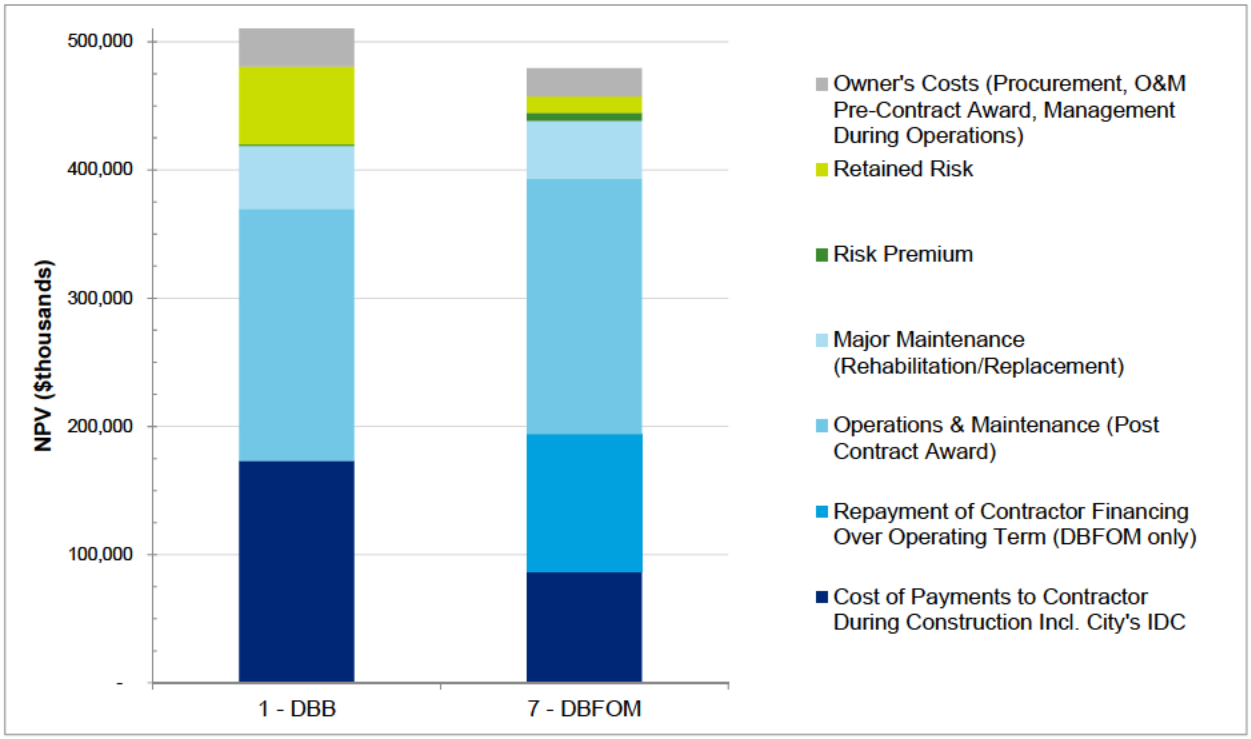
Table 3 - Preliminary Value for Money Estimates (NPV, $thousands)

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	434,059	429,439	460,173
Retained Risk	60,905	43,860	43,028	11,081	12,693
Risk Premium	767	418	1,202	6,944	6,359
Total Risk-Adjusted Project Cost	514,545	496,601	478,288	447,464	479,224
"Project VFM"		**3.5%**	**7.0%**	**13.0%**	**6.9%**

All alternative models display positive VFM and are therefore estimated to provide quantitative benefit over the DBB model. 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[6].

VFM is commonly illustrated in a stacked bar chart as below.

Figure 2 - "Project VFM" For DBFOM Delivery Model



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[7], or $44.3 million in net present value terms. The table below presents the VFM from the City's perspective.

[6] A sensitivity analysis on Project VFM is included in Appendix A. Project VFM for DBFOM remains positive in all sensitivity scenarios with the exception being the case where the efficiencies noted in Table 1 are set to 0%, however VFM is positive if the efficiencies are ½ of the values in Table 1. It is not at all unreasonable to expect the efficiencies in Table 1 to materialize, and on the basis of this sensitivity analysis the Project VFM is considered "robust" and likely to be realized under a range of efficiencies, a range of private financing costs, and a range of capital cost escalation rates.

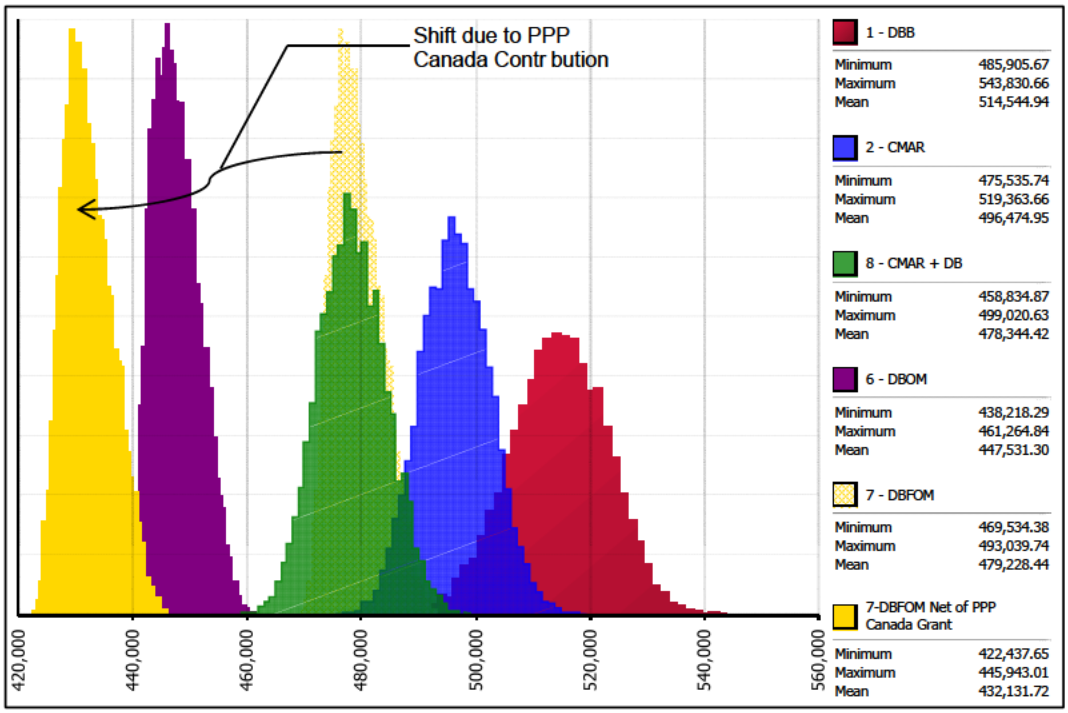
[7] This is the amount of funding applied for should the City submit a funding request for DBFOM to PPP Canada. It would be prudent, however, to calculate the requested amount based on the upper end of the capital cost estimate.

Table 4 - Impact of PPP Canada Contribution on VFM (NPV, $thousands)

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	434,059	429,439	460,173
Retained Risk	60,905	43,734	43,087	11,151	12,686
Risk Premium	767	417	1,198	6,942	6,369
Total Risk-Adjusted Project Cost	514,545	496,475	478,344	447,531	479,228
PPP Canada Grant					44,307
Total Cost Net of PPP Canada Grant	514,545	496,475	478,344	447,531	434,921
"VFM from City's Perspective"		3.5%	7.0%	13.0%	15.5%

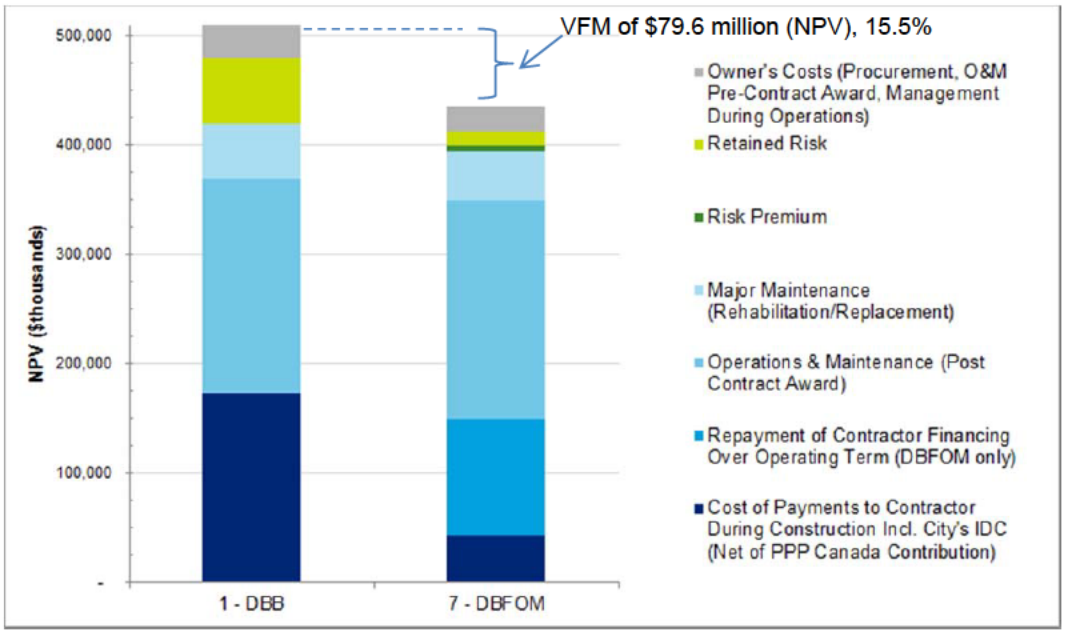
The VFM from the City's perspective, taking the PPP Canada contribution into account, is highest for DBFOM. The figure below illustrates the impact graphically. The impact of the PPP Canada contribution is referred to by PPP Canada as the "incrementality" of the grant.

Figure 3 - Total Risk-Adjusted Project Cost Estimates with Impact of PPP Canada Contribution ($NPV, thousands)



As a bar chart, the VFM from the City's perspective for DBFOM is as follows.

Figure 4 - VFM From City's Perspective for DBFOM Model



Caution on Use of Net Present Values

The preceding analysis uses net present values of the cash flows and risk costs estimated for each delivery model to estimate value for money. The NPV results are only suitable for comparison of options, and should not be used for any other purpose, and in particular should not be used for budgeting purposes or estimating actual cash needs in any given year.

Appendix B provides some analysis of the nominal (i.e. as-spent) capital cashflows and the demands that the various delivery models will place on the City's debt capacity.

Key Findings

Following are the key findings of the VFM analysis.

1. All of the alternative models, which were found previously to have strategic benefits over DBB, also offer quantitative benefits (i.e. "value for money").

2. For the delivery models that do not entail transfer of O&M responsibility to a contractor:
   - CMAR has a benefit due to risk transfer over DBB; and
   - CMAR + DB has a benefit due to risk transfer and expected capital cost savings over DBB.

3. For the delivery models that do transfer O&M responsibility to a contractor:
   - DBOM and DBFOM have a benefit over DBB due to risk transfer and expected capital cost savings;
   - Absent a PPP Canada contribution, DBOM has a cost base benefit over DBFOM as it does not include long term private financing; and

- With a PPP Canada contribution of 25% of eligible costs (i.e. the maximum PPP Canada contribution), the VFM of DBFOM is superior to DBOM.

However, there is a significant difference in the value of long term security in DBFOM that is not available in DBOM, and that this difference does not appear to be fully captured in the risk quantification and the VFM. 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.

Concluding Discussion

Based strictly on the VFM analysis, the delivery model that provides the greatest estimated VFM is DBFOM, assuming that PPP Canada contributes 25% of eligible costs. Absent a PPP Canada contribution, DBOM provides the greatest estimated VFM however the discussion above about the quality of long term security must be considered in accepting this result. Both of these models entail the City transferring operations and maintenance of the WWTP to a contractor. If the City wishes to retain O&M responsibility, the CMAR+DB model provides the greatest VFM.

These findings should be taken into account with the strategic findings to select the preferred delivery model. The quality of the long term security of DBFOM over DBOM should be given particular attention.

APPENDIX A – PROJECT VFM SENSITIVITY ANALYSIS

Baseline Analysis

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	434,059	429,439	460,173
Retained Risk	60,905	43,860	43,028	11,081	12,693
Risk Premium	767	418	1,202	6,944	6,359
Total Risk-Adjusted Project Cost	514,545	496,601	478,288	447,464	479,224
"Project VFM"		3.5%	7.0%	13.0%	6.9%

No Capital or Operating Efficiencies in DBOM and DBFOM

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	457,963	467,035	510,346
Retained Risk	60,943	43,839	44,971	11,932	14,041
Risk Premium	764	418	1,481	7,904	7,488
Total Risk-Adjusted Project Cost	514,580	496,580	504,414	486,871	531,876
"Project VFM"		3.5%	2.0%	5.4%	-3.4%

DBFOM does rely on some "P3 efficiencies" for VFM to be achieved.

½ of the Capital and Operating Efficiencies Estimated in Base Case

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	446,011	448,237	485,265
Retained Risk	60,901	43,793	43,979	11,572	13,402
Risk Premium	762	416	1,346	7,423	6,914
Total Risk-Adjusted Project Cost	514,535	496,533	491,336	467,232	505,580
"Project VFM"		3.5%	4.5%	9.2%	1.7%

A 7.5% capital efficiency in DBOM and DBFOM will provide positive VFM.

Long Term Debt Spread in DBFOM + 1%

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	434,059	429,439	474,385
Retained Risk	60,827	43,905	43,017	11,118	13,113
Risk Premium	768	417	1,205	6,933	6,759
Total Risk-Adjusted Project Cost	514,466	496,645	478,281	447,490	494,257
"Project VFM"		3.5%	7.0%	13.0%	3.9%

VFM remains positive even if long term private financing debt spread increases substantially by 1%. It is quite likely that if the private financing spread went up by this much, the City's spread would as well, and the impact on VFM would be less dramatic than what is illustrated by this table.

Long Term Debt Spread in DBFOM - 1%

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	434,059	429,439	447,119
Retained Risk	60,895	43,904	42,991	11,073	12,223
Risk Premium	760	417	1,201	6,948	6,013
Total Risk-Adjusted Project Cost	514,527	496,644	478,251	447,460	465,355
"Project VFM"		3.5%	7.0%	13.0%	9.6%

DBFOM VFM increases if the private financing debt spread drops. The improvement in VFM would likely not be as dramatic as shown, as the City's debt spread would probably drop as well in such a scenario.

Construction Cost Escalation -1%

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	449,257	448,928	430,560	425,582	454,114
Retained Risk	60,002	43,399	42,290	10,927	12,428
Risk Premium	753	406	1,180	6,817	6,195
Total Risk-Adjusted Project Cost	510,012	492,733	474,030	443,325	472,738
"Project VFM"		3.4%	7.1%	13.1%	7.3%

A drop in cost escalation improves DBFOM's VFM because the DBB model completes construction earlier than DBFOM.

Construction Cost Escalation +1%

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	456,545	455,764	437,612	433,362	466,148
Retained Risk	61,865	44,390	43,697	11,211	12,990
Risk Premium	790	426	1,229	7,066	6,523
Total Risk-Adjusted Project Cost	519,201	500,580	482,539	451,639	485,661
"Project VFM"		3.6%	7.1%	13.0%	6.5%

VFM drops slightly if construction cost escalation is higher than baseline assumption, because the DBFOM model completes construction later than DBB.

Reduced Leverage 85% Debt, 15% Equity

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Project Base Cost	452,872	452,323	434,059	429,439	466,240
Retained Risk	60,799	43,922	43,070	11,077	12,910
Risk Premium	765	420	1,204	6,945	6,513
Total Risk-Adjusted Project Cost	514,436	496,665	478,332	447,461	485,664
"Project VFM"		3.5%	7.0%	13.0%	5.6%

If contractor's or lenders assessment of project risk demands higher debt service coverage, a reduction in leverage from 90:10 to 85:15 reduces VFM somewhat, but VFM remains positive.

APPENDIX B – CAPITAL CASHFLOWS AND DEBT CAPACITY IMPACTS

The financial model used to estimate VFM also provides nominal (i.e. as-spent) cashflow estimates. The following table provides the estimated capital funding requirements (construction costs only, procurement costs excluded) for each delivery model, calculated at the time of construction completion.

Table B-1: Capital Funding Requirements ($nominal as-spent, $millions) Without Use of Reserve Funds

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Progress Payments	184.1	182.7	71.6	-	-
+ Financing Fees, and IDC on Progress Payments	13.4	10.7	5.3	1.9	-
+Substantial Completion Payments	-	-	104.5	185.6	100.0
=Total Capital Funding Requirement	**197.5**	**193.4**	**181.3**	**187.5**	**100.0**
- PPP Canada Grant	-	-	-	-	51.2
= Capital Funding Requirement Net of Grant	**197.5**	**193.4**	**181.3**	**187.5**	**48.8**
+ Contractor-Provided Financing	-	-	-	-	103.5
=Total Debt/Financing Liability	**197.5**	**193.4**	**181.3**	**187.5**	**152.3**

These figures are based on the assumption that the City ***does not*** use reserve funds to fund any of the payments to the contractor. The last line of the table estimates the total liability (City-issued debt for models 1,2,6, and 8 and a combination of City-issued debt and the contractual payment obligation to the contractor for the DBFOM model). This estimate may be compared to the City's unused debt capacity.

The value of the PPP Canada grant is evident in the table. Without the grant, DBFOM would have the highest total debt/financing liability.

Assuming $50 million in reserve funds are available at the time of construction completion, the following table illustrates the impact of the application use of this full reserve amount at construction completion on the total debt/financing liability.

Table B-2: Capital Funding Requirements ($nominal as-spent, $millions) With Use of Reserve Funds

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Progress Payments	184.1	182.7	71.6	-	-
+ Financing Fees, and IDC on Progress Payments	13.4	10.7	5.3	1.9	-
+Substantial Completion Payments	-	-	104.5	185.6	100.0
=Total Capital Funding Requirement	**197.5**	**193.4**	**181.3**	**187.5**	**100.0**
- Reserve Funds	50.0	50.0	50.0	50.0	48.8
= Capital Funding Requirement Net of Reserve	**147.5**	**143.4**	**131.3**	**137.5**	**51.2**
- PPP Canada Grant	-	-	-	-	51.2
= Capital Funding Requirement Net of Grant	**147.5**	**143.4**	**131.3**	**137.5**	**-**
+ Contractor-Provided Financing	-	-	-	-	103.5
=Total Debt/Financing Liability	**147.5**	**143.4**	**131.3**	**137.5**	**103.5**
Reserve Funds Remaining	-	-	-	-	1.2

It can be seen that it is only possible to utilize $48.8 million of reserve funds in the DBFOM model, over and above the PPP Canada grant. It would be possible to apply reserve funds to the project earlier and reduce interest during construction (IDC) in Models 1,2,6, and 8.

The analysis above does not include risk costs or contingency. Prudence calls for making an allowance for the expected risk costs in planning project funding. The total expected risk cost associated with the Project construction is available from the risk quantification analysis and is estimated (in nominal terms at the end of construction) as follows:

Table B-3: Estimated Capital-Related Risk Cost (Expected Value, $millions)

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Total Construction Cost-Related Risk (NPV)	38.8	20.9	19.2	14.0	14.9
Total Construction Cost-Related Risk (Nominal)	45.0	24.2	22.3	16.3	17.3

Adding the expected cost of capital related risk (i.e. treating it as a contingency amount), the resulting capital funding estimate is as follows.

Table B-4: Capital Funding Requirements ($nominal as-spent, $millions) Without Use of Reserve Funds and Including Contingency

	1 - DBB	2 - CMAR	8 - CMAR + DB	6 - DBOM	7 - DBFOM
Progress Payments	184.1	182.7	71.6	-	-
+ Financing Fees, and IDC on Progress Payments	13.4	10.7	5.3	1.9	-
+Substantial Completion Payments	-	-	104.5	185.6	100.0
=Total Capital Funding Requirement	**197.5**	**193.4**	**181.3**	**187.5**	**100.0**
- PPP Canada Grant	-	-	-	-	51.2
= Capital Funding Requirement Net of Grant	**197.5**	**193.4**	**181.3**	**187.5**	**48.8**
+ Contractor-Provided Financing	-	-	-	-	103.5
+ Expected Value of Construction Cost-Related Risk	45.0	24.3	22.2	16.1	17.3
=Total Debt/Financing Liability	**242.5**	**217.7**	**203.5**	**203.6**	**169.6**

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