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Metro Vancouver Lions Gate Secondary Wastewater Treatment Project

Procurement Options Analysis and Value for Money

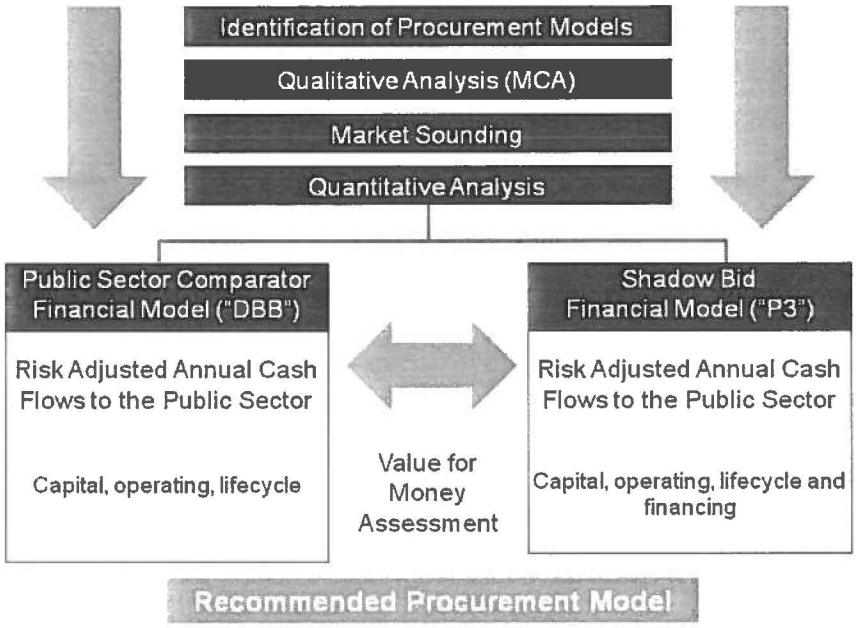
January 2014

Executive Summary

The purpose of this report is to summarize the work conducted with respect to the procurement options and Value for Money (VFM) analyses conducted to support the continuing development of the Lions Gate Secondary Wastewater Treatment Plant (LGSWWTP).

The procurement options analysis and Value for Money assessment presented in this report will support the preparation of Business Cases that will be required as part of the discussions for federal and provincial funding in 2014.

The process undertaken and described in this report is summarized in the exhibit below:



Identification of Procurement Models & Qualitative Analysis

In order to short-list the procurement models under consideration, a qualitative analysis was undertaken considering five models – Design-Bid-Build (DBB), Design-Build (DB), Design-Build-Finance (DBF), Design-Build-Operate (DBO), and Design-Build-Finance-Operate/Maintain (DBFOM). This qualitative analysis was undertaken through a Multi-Criteria Analysis (MCA) that considered the following four primary criteria (along with associated sub-criteria):

- Social/Community – Oriented
- Facility Development and Operations
- Environmental
- Procurement and Financial

Based on the Multi-Criteria Analysis, the following three procurement models were short-listed for further analysis and were ultimately subject to the full Value for Money process:

- **DBB** - Design-Bid-Build (Public Sector Comparator)
- **DB(f)** - Design-Build with financing for an extended warranty
- **DBFOM** - Design-Build-Finance-Operate/Maintain

Market Sounding

The purpose of market sounding was to gain insights from firms active in the delivery of Wastewater Projects in North America on:

1. Interest in Project Participation
2. Specific Project Risks
3. Potential Delivery Models

Twenty two firms were interviewed as part of this process; these firms represent a range of participants in the wastewater industry including developers, operators and financiers.

Market sounding results indicate that there was significant interest in the project, regardless of delivery model, though the preferred delivery model varied between DBB, DBF and DBFOM. Concern was raised about the P3 procurement approval process, citing the impact on procurement timelines and costs on other recent water and wastewater projects in Canada. Although respondents noted that St John's, Capital Region District and Regina may be following a similar procurement timeline as Metro Vancouver, they generally did not see any capacity issues. Finally, a preference was indicated that the water treatment and biosolids be delivered as a single package but the responsibility for the conveyance from the plant boundary to the existing outfall should be retained by Metro Vancouver

Value for Money Analysis (Quantitative Analysis)

The objective of the Value for Money analysis was to assess how the alternate models (DB(f) and DBFOM) compare to the Public Sector Comparator model (DBB) in terms of value to Metro Vancouver over the term of the project and involved the following:

a) Identification of Base Assumptions
b) Identification of Costs (Capital, Operating & Maintenance, Repair and Replacement)
c) Risk Identification and Assessment
d) Efficiencies Identification and Assessment
e) Financial Model Development
f) Value Comparison of Models

Value for Money analysis is part of the quantitative procurement options analysis required as part of the business cases required for federal and provincial funding of large infrastructure projects. VFM analysis is required for any project over $50 million in British Columbia and the methodology for undertaking VFM analysis is prescribed by Partnerships BC. Any request for federal funding for a project over $100 million from either the Building Canada Fund or PPP Canada Fund must include a VFM analysis as part of the project business case.

Base Assumptions

For the purposes of the VFM analysis, Metro Vancouver provided the following base assumptions:

Global Assumption		
Discount rate	[%]	6.00%
Base date	[Date]	1-Jan-14
Inflation during Construction	[%]	3.30%
Inflation during Operations	[%]	2.00%
Start of Operations	[Date]	1-Jan-21
End of Operations	[Date]	31-Dec-45
Term	[Years]	25.0

Identification of Costs (Capital, Operating & Maintenance, Repair and Replacement)

For the purposes of the VFM analysis, Metro Vancouver provided the following costs:

Assumptions		$ Millions
1.	**Capital Costs**	
	Construction	375.0
	Contingencies	100.0
	Professional Fees	$56.0
	Management, Overhead and Utility	$19.0
	Total Project Cost (April 2013 Dollars)	**$550.0**
	Escalation Reserve	$70.0
	Escalated Project Cost (January 2018 Dollars)	**$620.0**
2.	**Annual Operating and Repair and Replacement Costs**	
	Operating Costs	
	Labour	$3.30
	Energy	$2.10
	Chemicals	$0.69
	Insurance	$0.25
	Other	$0.15
	Repair and Replacement Costs	
	Civil	$0.04
	Mechanical	$2.20
	Electrical	$0.87
	Annual Operating & Repair and Replacement Costs ($2020)	**$9.57**

A workshop was held on August 12, 2013 to assess any efficiencies that could be realized in the alternative delivery models. The project team identified the following capital cost efficiencies with respect to the DB(f) and DBFOM models relative to the DBB model:

Efficiency Assessment Results ($million)			
Item	**PSC (DBB)**	**DB(f)**	**DBFOM**
Engineering	$56.0	$43	$43.0
Construction	$375.0	$344.0	$340.0
Metro Vancouver Professional, Legal, and Administration	$19.0	$32.0	$33.0
Additional Contract Costs (Honorarium)	$0.0	$1.0	$1.0
Total	**$450.0**	**$420.0**	**$417.0**
Escalation (mid-point construction)	$70.0	$65.0	$65.0
Contingencies	$100.0	$100.0	$100.0
LGSWWTP Costs	**$620.0**	**$585.0**	**$582.0**
Variation from PSC (DBB)		6%	7%

As indicated above, the DB(f) and DBFOM models achieved capital cost efficiencies of 6 and 7 percent respectively. Operating and maintenance cost efficiencies were determined to be very small

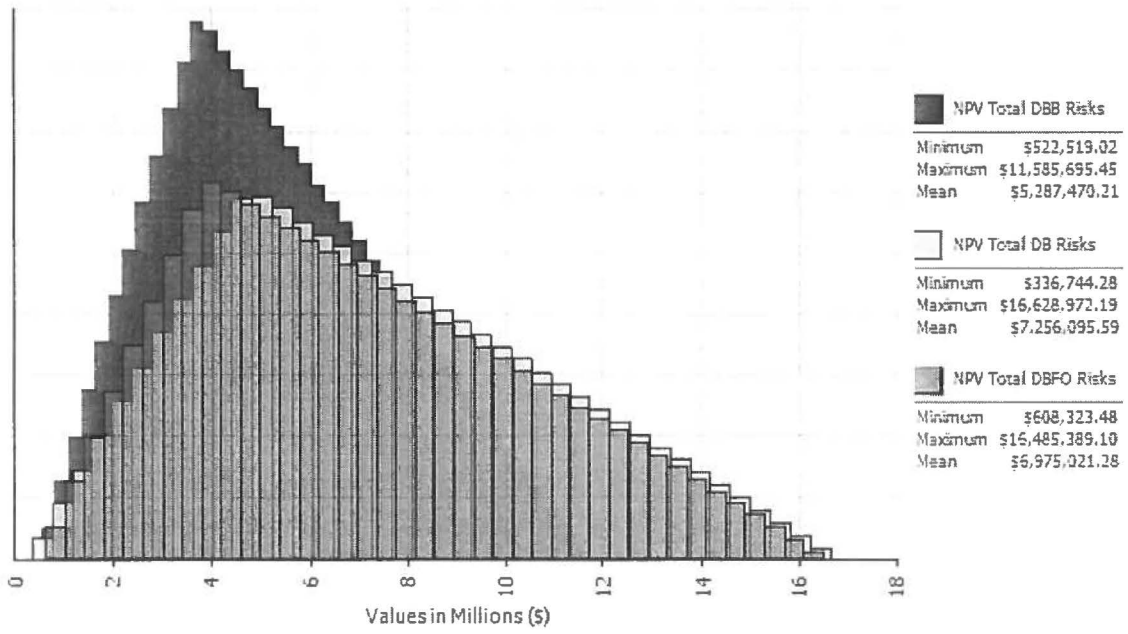
The capital costs after efficiencies per the above exhibit were used in the Value for Money analysis.

Risk Identification and Assessment

A risk workshop was conducted to identify risks specific to each of the three models. Based on the results of the risk workshop, a Monte Carlo analysis was run on these risks to develop a probability distribution curve. Based on a confidence interval of 75%[1], which is consistent with other P3 business cases undertaken nationally, risk adjusted values were developed for capital, operating and repair and replacement costs and used as the risk values in the financial analysis (Financial Model Development stage).

The results of the risk workshop were that risk did not vary significantly between the DB and DBFO models. The exhibit below summarizes the Net Present Value (NPV) of total risks for each of the three models. The exhibit demonstrates how the NPV of risks did not have a material impact on Value for Money.

[1] 75% confidence interval means that based on the probability distribution curve, at this risk number, there is a 75% chance that the actual risk value will be less than this number.



Value for Money Results

To assess Value for Money, a financial model was created for each delivery model based on annual risk adjusted cash flows over the term of the agreement. For the purposes of converting cash flows into a Net Present Value for the VFM analysis, a discount rate of 6.0% was used, which reflects Metro Vancouver's rate used in the evaluation of projects. A summary of the VFM analysis is as follows:

NPV - Costs to Metro Vancouver	Million $'s	DBB	DB(f)	DBFOM	Difference	
Procurement and Contract Management	[Discounted]	43.3	30.7	31.4	*12.6*	*12.0*
Construction						
Capital Costs	[Discounted]	460.4	442.6	440.8	*17.8*	*19.6*
Transferred Risks during Construction	[Discounted]	-	1.9	1.6	*(1.9)*	*(1.6)*
Incremental Financing	[Discounted]	-	1.0	29.5	*(1.0)*	*(29.5)*
Total	[Discounted]	460.4	445.5	471.8	*14.9*	*(11.4)*
Operations						
Operations and Maintenance	[Discounted]	69.9	69.9	70.4	-	*(0.5)*
Repair and Replacement	[Discounted]	31.0	31.0	27.8	-	*3.2*
Transferred Risks during Operations	[Discounted]	-	-	0.4	-	*(0.4)*
Total	[Discounted]	100.9	100.9	98.6	-	*2.3*
Retained Risks						
Construction	[Discounted]	5.6	6.7	6.8	*(1.1)*	*(1.2)*
Operations	[Discounted]	0.8	0.8	-	*(0.0)*	*0.8*
Total	[Discounted]	6.3	7.4	6.8	*(1.1)*	*(0.5)*
Net Present Value	[Discounted]	**611.0**	**584.6**	**608.5**	***26.4***	***2.4***
Value for Money					*4.3%*	*0.4%*

Based on the assumptions provided, the results of the financial modelling show that the DB(f) model and the DBFOM models demonstrate some Value for Money relative to the DBB benchmark. The DB(f) model achieves VFM of about 4.3% ($26.4 million) of the Net Present Value of the costs over the term of the project while the DBFOM is estimated to achieve VFM equivalent to 0.4% ($2.4 million) of the Net Present Value of the costs. The DB(f) model demonstrates the highest value for money of the options evaluated.

Design Build with financing for an extended warranty (DB(f)) component provides the most Value-for-money for procurement of the LGSWWTP design, construction and 25 year operation. Metro Vancouver operates a comprehensive and integrated regional utility system with five wastewater treatment plants and 530 kilometres of regional interceptors serving its member municipalities. Through central control, automation, economies of scale and flexible roaming crew, operational efficiencies are gained that preclude any operational efficiencies potentially provided by a private sector operating contract for the LGSWWTP. The LGSWWTP will be one of the smaller plants in the integrated system. The administrative inefficiencies of a 25 year operational contract for the Lions Gate plant is a further deterrent for a full DBFOM public-private-partnership for the LGSWWTP project.

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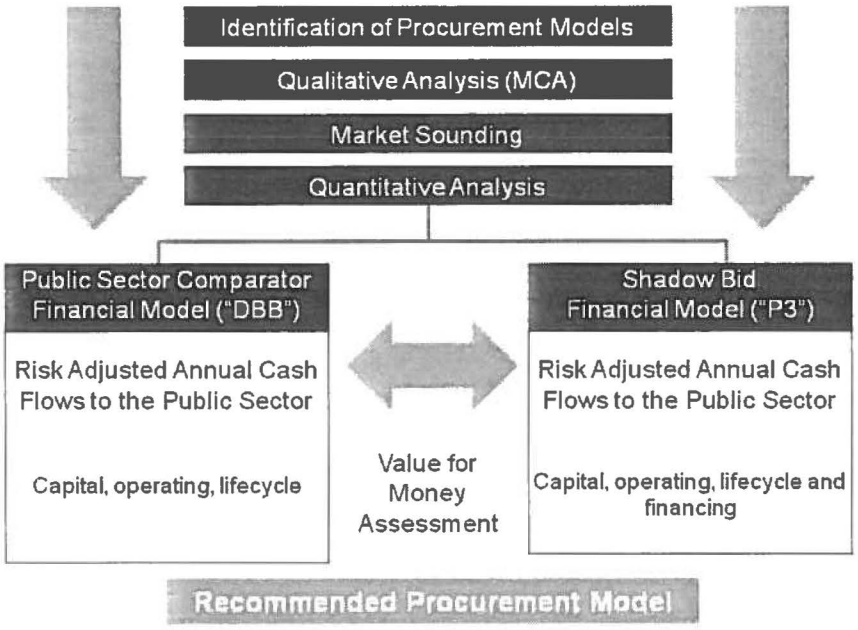

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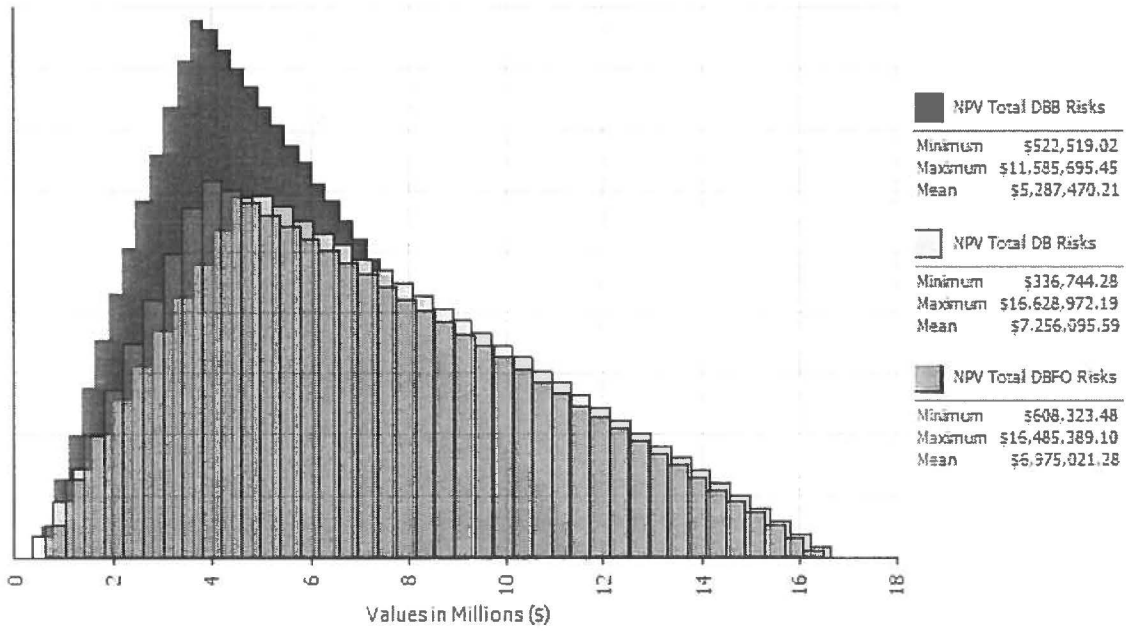

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1 Introduction

1.1 Objectives

The purpose of this report is to summarize the work conducted with respect to the procurement options and Value for Money analyses conducted to support the continuing development of the Lions Gate Secondary Wastewater Treatment Plant (LGSWWTP).

1.2 Background

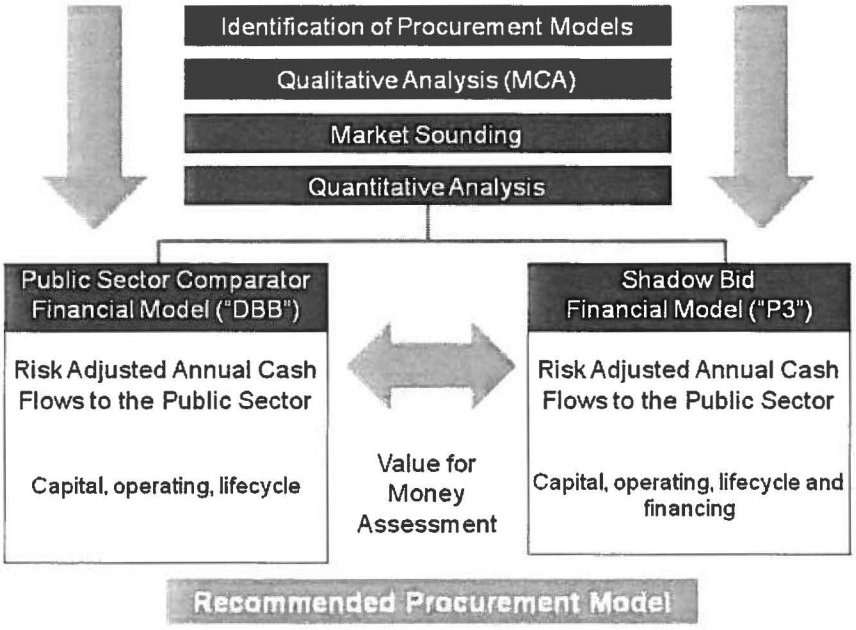
While limited funding discussions with regards to the project have taken place to date, the project definition report has been completed. As part of this report and to support funding discussions pending Metro Vancouver Board Approval, a procurement options and Value for Money analysis has been prepared to support the identification of the procurement model for the LGSWWTP project. It is Metro Vancouver's intention to enter into discussions with federal and provincial agencies to discuss obtaining potential funding in 2014.

The procurement options analysis and Value for Money assessment currently being undertaken as part of the LGSWWTP project definition report will support the preparation of Business Cases that will be required as part of the discussions for federal and provincial funding in 2014.

2 Procurement Options Analysis

2.1 Procurement Options Analysis Process

A summary of the procurement options analysis process is as follows:



Each stage is addressed in more detail below.

2.2 Identification of Procurement Models

The following procurement models have been considered to for delivery of the LGSWWTP:

Procurement Model	Description
Design-Bid-Build (DBB) *Public Sector Comparator	▪ Public sector contracts separately for design and construction ▪ Public sector to operate and maintain plant after completion ➔ Retains risk of design, construction and operations/ maintenance
Design-Build (DB)	▪ Public sector contracts with one party to design and construct plant ▪ Public sector to operate and maintain plant after completion ➔ Public sector transfers risk of design to a single party ➔ Public sector retains risk of operations/maintenance
Design-Build-Finance	▪ Public sector contracts with one party to design and construct the plant.

(DBF)	This party will be responsible to partially funding construction. Full payment to be made upon substantial completion (or a short period thereafter to serve as warranty) ▪ Public sector to operate and maintain plant after completion ➔ Public sector transfers risk of design and asset performance to substantial completion (or shortly thereafter) to a single party ➔ Public sector retains risk of operations/maintenance
Design-Build-Operate/Maintain (DBO / DBM)	▪ Public sector contracts with one party to design, construct, and operate/maintain the plant over an appropriate term (e.g. 25 years). ▪ Public sector pays for construction costs during construction and pays a fixed fee during the operating period for operation/maintenance. ➔ Public sector transfers risk of design and asset performance over term to party ➔ However limited security in place to ensure asset performance as public sector largely pays as costs are incurred.
Design-Build-Finance-Operate/Maintain (DBFOM)	▪ Public sector contracts with one party to design, construct, and operate/maintain the plant over an appropriate term (e.g. 25 years). Private sector party finances a portion of the construction costs over the term of the contract ▪ Public sector contributes a portion of construction costs during construction and pays a fixed fee during operations for the remainder of the construction costs and for operation/maintenance. ➔ Public sector transfers risk of design and asset performance over term to party ➔ The amount of funds subject to long term financing by the private sector services is structured at a level to ensure appropriate security over asset performance.

2.3 Multi-Criteria Analysis (Qualitative Analysis)

In order to short-list the procurement models under consideration, a qualitative analysis was undertaken. This qualitative analysis was undertaken through a Multi-Criteria Analysis framework, which was developed taking into account the objectives for the project. The criteria used are categorized as follows:

- Social/Community – Oriented
- Facility Development and Operations
- Environmental
- Procurement and Financial

Based on this analysis and taking into account the need to assess the DBFOM model for P3 Canada funding, the following procurement models were short-listed for further analysis:

- **DBB -** Design-Bid-Build (Public Sector Comparator)
- **DB(f) -** Design-Build with financing for an extended warranty
- **DBFOM -** Design-Build-Finance-Operate/Maintain

A summary of the MCA analysis is contained in Appendix 1.

2.4 Market Sounding

The purpose of market sounding was to gain insights from firms active in the delivery of Wastewater Projects in North America on:

4. Interest in Project Participation
5. Specific Project Risks
6. Potential Delivery Models

Twenty two firms were interviewed as part of this process; these firms represent a range of participants in the wastewater industry including developers, operators and financiers. A summary of comments are as follows:

- Most of the players have expressed interest in the project under a variety of procurements models, with the preferred delivery model varying between DBB, DBF and DBFOM.
- Although respondents noted that St John's, Capital Region District and Regina may be following a similar procurement timeline as Metro Vancouver, they generally did not see any capacity issues.
- Concern has been raised about the P3 procurement approval process, citing the impact on procurement timelines and costs on other water and wastewater projects
- A preference was indicated that the water treatment and biosolids be delivered as a single package but the responsibility for the conveyance from the plant boundary to the existing outfall should be retained by Metro Vancouver
- Commercial terms should limit the risk passed on with respect to quality and quantity of influent and unit prices (power and chemical)
- Concerns were expressed about geotechnical and conveyance interface risk.
- Security structures that would utilize and optimize security instruments throughout the life of the project were recommended by most respondents, and types of security vary based on specific project requirements.
- Respondents expected Request for Proposals (RFP) bid costs to be the $3 million to $4 million range so an honorarium for unsuccessful bidders is important to ensure that all RFP participants submit an RFP.

The market sounding report can be found in Appendix 2

2.5 Value for Money Analysis (Quantitative Analysis)

The objective of the Value for Money analysis is to assess how the alternate models (DB(f) and DBFOM) compare to the Public Sector Comparator model (DBB) in terms of value to Metro Vancouver over the asset lifecycle. This analysis takes into consideration the following:

1. Value of the project risk allocated
2. Efficiencies of each delivery model that could be realizable
3. Cost of public and private sector financing.

The Value for Monday analysis process involves the following:

g) Identification of Base Assumptions
h) Identification of Costs (Capital, Operating & Maintenance, Repair and Replacement)
i) Risk Identification and Assessment
j) Efficiencies Identification and Assessment
k) Financial Model Development
l) Value Comparison of Models

Further description of the Value for Money process is provided in Attachment 3. Each step is addressed in more detail below.

2.5.1 Identification of Base Assumptions

For the purposes of the VFM analysis, Metro Vancouver provided the following base assumptions:

Global Assumption		
Discount rate	[%]	6.00%
Base date	[Date]	1-Jan-14
Inflation during Construction	[%]	3.30%
Inflation during Operations	[%]	2.00%
Start of Operations	[Date]	1-Jan-21
End of Operations	[Date]	31-Dec-45
Term	[Years]	25.0

A summary of the discussion relating to the Discount Rate is provided in Attachment 4.

2.5.2 Identification of Costs

For the purposes of the VFM analysis, Metro Vancouver has provided the following costs:

Assumptions		$ Millions
1.	**Capital Costs**	
	Construction	375.0
	Contingencies	100.0
	Professional Fees	$56.0
	Management, Overhead and Utility	$19.0
	Total Project Cost (April 2013 Dollars)	**$550.0**
	Escalation Reserve	$70.0
	Escalated Project Cost (January 2018 Dollars)	**$620.0**
2.	**Annual Operating and Repair and Replacement Costs**	
	Operating Costs	
	Labour	$3.30

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	Chemicals	$0.69
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	Repair and Replacement Costs	
	Civil	$0.04
	Mechanical	$2.20
	Electrical	$0.87
	Annual Operating & Repair and Replacement Costs ($2020)	**$9.57**

These costs exclude the capital costs for conveyance and demolition, and the operating costs of hauling & land application or disposal which were included in the initial cost estimate provided, but excluded from the package selected for analysis.

At this time, revenues that may be realized from resource recovery have not been included in the analysis due to uncertainty of the resource markets.

2.5.3 Risk identification and Assessment

Risk identification and assessment is a key component of the VFM process. This involves the following:

	Risk Step	Description
1.	Compilation of risk register	• Comprehensive project risk register compiled with reference to other similar wastewater treatment projects • Project team reviewed, edited and added to risk register based on project specific risks.
2.	Short-listing of risks *Workshops:* *July 11, 2013*	• For purposes of quantification, project team identified those risks that have the highest probability and/or highest impact • Participants from Metro Vancouver and external advisors held a workshop to review these risks and identify risks that would be different between the procurement models.
3.	Risk workshop *Workshops:* *July 17, 2013* *July 18, 2013* *July 30, 2013*	• Participants from Metro Vancouver and external advisors were invited to the 2-day risk workshop, followed by a review workshop – list of attendees in summarized in Appendix 5 • Purpose was to identify probability of risk and the range of values of the risk • For each delivery model, this group determined the following: i) If the risk is retained by Metro Vancouver or transferred ii) Probability of risk occurring iii) Value of risk under three scenarios: a. Perfect Scenario

		b. Likely Scenario c. Outrageous Scenario The results of this risk workshop are contained in Appendix 6.
4.	Risk Analysis	Based on the results of the risk workshop, a Monte Carlo analysis was run on these risks to develop a probability distribution curve. A summary of this analysis if contained in Appendix 7.
5.	Identification of risk tolerance	Based on a confidence interval of 75%[2], which is consistent with other P3 business cases undertaken nationally, risk adjusted values were developed for capital, operating and repair and replacement costs.

2.5.4 Efficiencies Identification and Assessment

In addition to value achieved through risk transfer, certain efficiencies may be achievable over the DBB model. An efficiencies workshop was held on August 12, 2013 to assess any efficiencies that could be realized in the alternative delivery models. The project team developed the following efficiencies:

Efficiencies	Expressed as % of base costs	
	DB(f) compared to DBB	DBFOM compared to DB(f)
Procurement and Contract Management		
Professional Fees	-0.5%	-1.0%
Capital Cost		
Design/Construction Interface	3.0%	1.0%
Foundation	5.0%	
Structural	5.0%	
Equipment	10.0%	
Special Construction	5.0%	
Mechanical	5.0%	
Electrical	5.0%	
Operations		
Repair and Replacement		10.0%
Insurance		-15.0%

[2] 75% confidence interval means that based on the probability distribution curve, at this risk number, there is a 75% chance that the actual risk value will be less than this number.

Efficiency Assessment Results:

Efficiency Assessment Results ($million)			
Item	PSC (DBB)	DB(f)	DBFOM
Engineering	$56.0	$43	$43.0
Construction	$375.0	$344.0	$340.0
Metro Vancouver Professional, Legal, and Administration	$19.0	$32.0	$33.0
Additional Contract Costs (Honorarium)	$0.0	$1.0	$1.0
Total	**$450.0**	**$420.0**	**$417.0**
Escalation (mid-point construction)	$70.0	$65.0	$65.0
Contingencies	$100.0	$100.0	$100.0
LGSWWTP Costs	**$620.0**	**$585.0**	**$582.0**
Variation from PSC (DBB)		6%	7%

A summary of the Efficiency Assessment is provided in Attachment 8.

2.5.5 Financial Modelling

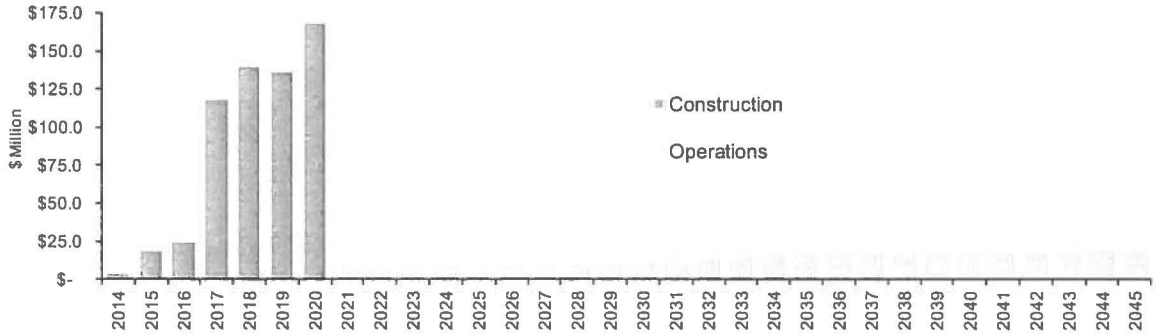
To assess Value for Money, a financial model was created for each delivery model based on annual risk adjusted cash flows over the term of the agreement. For the purposes of the VFM analysis, the following funding assumptions were used[3]:

Funding and Financing Assumptions		DBB	DB(f)	DBFOM
Progress Payments during Construction	[% of Capital]	100%	90%	70%
Gearing (Debt to Equity)	[%]	N/A	100%	88%
Target Equity IRR	[%]	N/A	N/A	12%
Short Term Bank Debt	[%]	N/A	100%	0%
Long Term Bank Debt	[%]	N/A	0%	100%
Short Term Debt Repayment	[Date]	N/A	31-Dec-22	N/A
Long Term Debt Final Repayment	[Date]	N/A	N/A	31-Jan-44
Interest Rate - Short Term	[%]	N/A	4.0%	N/A
Interest Rate - Long Term	[%]	N/A	N/A	5.5%
Commitment Fees	[%]	N/A	2.0%	2.0%
Arrangement Fees	[%]	N/A	1.0%	1.0%

Based on these assumptions, the results of the risk-adjusted cash flows for each model are as follows:

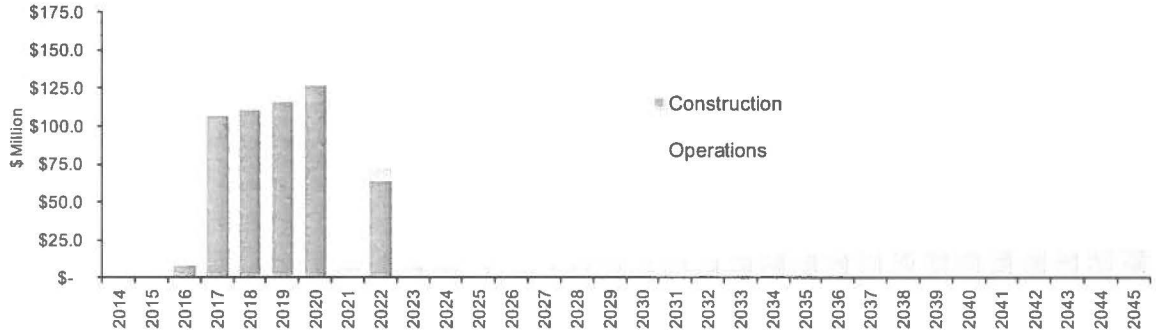
[3] It is assumed that the cost of other statutorily requirement holdbacks such as the builder's lien has been incorporated into the base capital cost estimates. Also no federal or provincial funding, including P3 Canada funding, is considered.

Design-Bid-Build – Metro Vancouver cash flows



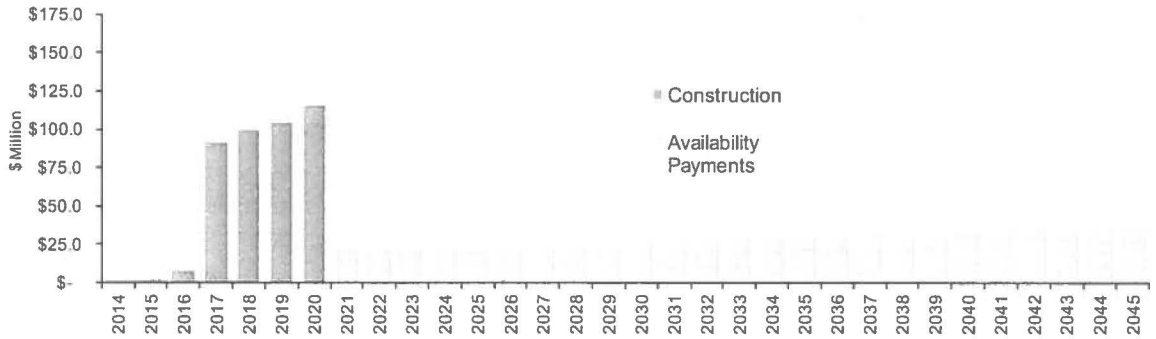
- Construction cash flows start earlier than DB(f) and DBFOM due to the separate design contract
- DBB has the highest cash flows during construction, but the lowest during operations

Design-Build - Metro Vancouver cash flows



- Under the DB(f) model cash flows start later than under DBB, and are lower than DBB due to lower construction cost, and the 10% holdback.
- Cash flows during operations are the same as for DBB, except for the substantial completion payment two years into operations.

Design-Build-Finance-Operate/Maintain - Metro Vancouver cash flows



- Cash flows during construction are the lowest between the models, due to lower capital costs and the 30% hold back (70% progress payments), however the DBFOM has the highest costs during Operations due to the repayment of capital over the term of the agreement.
- Cash flows during operations include the availability service payment (ASP_ for the 25 years of operations, consisting of a capital portion to repay the 30% of capital outstanding, and an operations portion. The availability service payment also includes the incremental financing costs associated with the equity investment and long term debt repayment.

2.5.6 Value for Money Assessment

Annual cash flows from each delivery model need to be converted to a Net Present Value (NPV) to assist comparing the values under each of the delivery models. Cash flows are converted to a NPV using a discount rate selected by the project. There is a range of precedents in P3 projects in Canada regarding discount rates, ranging from using the long term Government risk free rate of borrowing (approximately 3.5%) to a private developers weighted average cost of capital (up to 8.5%). For the purposes of the NPV analysis, a discount rate of 6.0% was used, which reflects Metro Vancouver's rate used in the evaluation of projects. This discount rate is based on Metro Vancouver's cost of borrowing and appropriate risk adjustments. Further description of the Value for Money process and discount rates are provided in Appendices 3 and 4 respectively.

Sensitivity analysis was conducted under different discount rates from, 4.0% to 7.5%, to assess the extent to which different discount rates affect the overall VFM assessment conclusions.

A summary of the VFM analysis is as follows:

NPV - Costs to Metro Vancouver	Million $'s	DBB	DB(f)	DBFOM	Difference	
Procurement and Contract Management	[Discounted]	43.3	30.7	31.4	*12.6*	*12.0*
Construction						
Capital Costs	[Discounted]	460.4	442.6	440.8	*17.8*	*19.6*
Transferred Risks during Construction	[Discounted]	-	1.9	1.6	*(1.9)*	*(1.6)*
Incremental Financing	[Discounted]	-	1.0	29.5	*(1.0)*	*(29.5)*
Total	[Discounted]	460.4	445.5	471.8	*14.9*	*(11.4)*
Operations						
Operations and Maintenance	[Discounted]	69.9	69.9	70.4	-	*(0.5)*
Repair and Replacement	[Discounted]	31.0	31.0	27.8	-	*3.2*
Transferred Risks during Operations	[Discounted]	-	-	0.4	-	*(0.4)*
Total	[Discounted]	100.9	100.9	98.6	-	*2.3*
Retained Risks						
Construction	[Discounted]	5.6	6.7	6.8	*(1.1)*	*(1.2)*
Operations	[Discounted]	0.8	0.8	-	*(0.0)*	*0.8*
Total	[Discounted]	6.3	7.4	6.8	*(1.1)*	*(0.5)*
Net Present Value	[Discounted]	**611.0**	**584.6**	**608.5**	***26.4***	***2.4***
Value for Money					*4.3%*	*0.4%*

Based on the assumptions provided, the results of the financial modelling show that the DB(f) and the DBFOM models demonstrate some Value for Money relative to the Design-Bid-Build benchmark. The DB(f) model demonstrates the lowest NPV of the options evaluated.

The key factors impacting the Value for Money compared with DBB include:

- **Procurement and Contract Management** costs are lower than DBB due to efficiencies and the transfer of some construction management responsibilities to the DB(f) / DBFOM contractor. DB(f) costs are slightly lower than DBFOM due to higher professional fees that need to be incurred during the procurement phase under the DBFOM model due to more onerous contractual requirements.
- **Capital costs** which were lower in the DB(f) model than DBB due to the potential for efficiencies as a result of design innovation and costs savings relating to the foundation, structural components, equipment, special construction, and mechanical and electrical systems. The capital costs for the DBFOM model were even lower than the DB(f) model due to additional efficiencies with the interface between design, construction and operations.
- **Operating costs** were considered to be relatively consistent across the models given Metro Vancouver's extensive experience with operating wastewater treatment plants. Metro Vancouver operates a comprehensive and integrated regional utility system with five wastewater treatment plants and 530 kilometres of regional interceptors serving its member municipalities. Through central control, automation, economies of scale and flexible roaming crew, operational efficiencies are gained that preclude any operational efficiencies potentially provided by a private sector operating contract for the LGSWWTP. The Lions Gate plant will be one of the smaller plants in the integrated system.
- **Repair and replacement capital expenditures** could vary under the DBFOM as compared to the DB(f) and DBB model because the transfer of full project lifecycle risks allows DBFOM proponents to optimize both up-front capital costs and ongoing repair and replacement costs in order to achieve the lowest NPV over the project lifecycle.
- As shown above, the discounted **incremental financing cost** of the DB(f) model was not significant (only 10% was subject to financing over construction), however in the DBFOM model the cost of the long term financing of the 30% of construction cost resulted in a $29.5 million additional cost.

The base case scenario VFM analysis shows that, the DB(f) model demonstrates the most Value for Money, followed by the DBFOM model.

Design Build with financing for an extended warranty (DB(f)) provides the most Value-for-money for procurement of the LGSWWTP design, construction and 25 year operation. Metro Vancouver operates a comprehensive and integrated regional utility system with five wastewater treatment plants and 530 kilometres of regional interceptors serving its member municipalities. Through central control, automation, economies of scale and flexible roaming crew, operational efficiencies are gained that preclude any operational efficiencies potentially provided by a private sector operating contract for the LGSWWTP. The LGSWWTP will be one of the smaller plants in the integrated system. The administrative inefficiencies of a 25 year operational contract for the Lions Gate plant is a further deterrent for a full DBFOM public-private-partnership for the LGSWWTP project.

2.5.7 Sensitivity Analysis

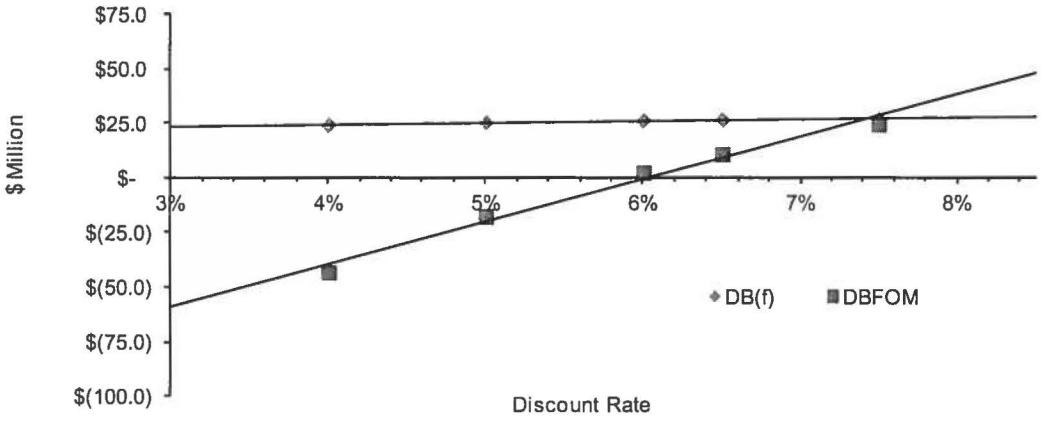
The VFM results are based on a number of base case assumptions. The results may vary depending on the assumptions used. The table below demonstrates the results of scenario analysis of discount rates ranging between 4.0% and 7.5% six scenarios.

NPV - Costs to Metro Vancouver		$Million	DBB	DB(f)	DBFOM	Difference	
Base	*N/A*	[discounted]	**611.0**	**584.6**	**608.5**	***26.4***	***2.4***
# Scenario	*Base*						
1 Discount rate - 4.0%	*6.00%*	[discounted]	707.4	682.9	750.6	*24.5*	*(43.1)*
2 Discount rate - 5.0%	*6.00%*	[discounted]	655.9	630.3	673.4	*25.5*	*(17.6)*
3 Discount rate - 6.5%[1]	*6.00%*	[discounted]	590.2	563.5	579.3	*26.8*	*10.9*
4 Discount rate - 7.5%[2]	*6.00%*	[discounted]	553.5	526.1	528.9	*27.4*	*24.6*

1- Weighted Average Cost of Capital (WACC)

2 - Precedent British Columbia VfM Analysis

Value for Money Discount Rate Sensitivity



The DBFOM model is most sensitive to the discount rate used. The DB(f) model shows Value for Money relative to the DBB under all discount rate sensitivity scenarios. The DBFOM model shows Value for Money at a discount rate above 6%, and shows the most Value for Money at discount rates above 7.5%.

The following table demonstrates the results of scenario analysis of changes to the level of contributions during construction, changes to interest rates, and changes to inflation.

NPV - Costs to Metro Vancouver		$Million	DBB	DB(f)	DBFOM	Difference	
Base	*N/A*	[discounted]	**611.0**	**584.6**	**608.5**	***26.4***	***2.4***
# Scenario	*Base*						
1 Funding during Construction - 50%	*0%*	[discounted]	611.0	584.6	627.4	*26.4*	*(16.4)*
2 Long Term Interest Rate - 5.0%	*5.5%*	[discounted]	611.0	584.6	602.2	*26.4*	*8.7*
3 Long Term Interest Rate - 6.5%	*5.5%*	[discounted]	611.0	584.6	623.1	*26.4*	*(12.1)*
4 Inflation during Construction - 2.0%	*3.4%*	[discounted]	573.3	548.4	570.1	*24.9*	*3.2*
5 DB(f) Increased Lifecycle Costs by 10%		[discounted]	611.0	587.7	608.5	*23.3*	*2.4*
6 Milestone Payments instead of Progress		[discounted]	611.0	595.3	611.7	*15.7*	*(0.7)*

The DB(f) model shows Value from Money relative to the DBB under all sensitivity scenarios; that is not the case for the DBFOM model which in some instances ranks third.

2.5.8 Metro Vancouver Levy Considerations

This section summarizes the total nominal costs over the life of the LGSWWTP under the three models analyzed. Costs have been categorized into municipal financing costs, operating costs and availability service payments incurred by Metro Vancouver to finance the construction and fund the operations of the LGSWWTP.

Under the DBB, DB(f) and DBFOM scenarios, in order to finance the portion of capital and operating costs incurred directly by Metro Vancouver, it is assumed that Metro Vancouver will manage its financing requirement through the issuance and repayment of debt, resulting in a stream of principal and interest payments to be incurred by Metro Vancouver. The financing process used to derive the analysis in this section was modelled after the anticipated treasury process to be used by Metro Vancouver. The financing assumptions are:

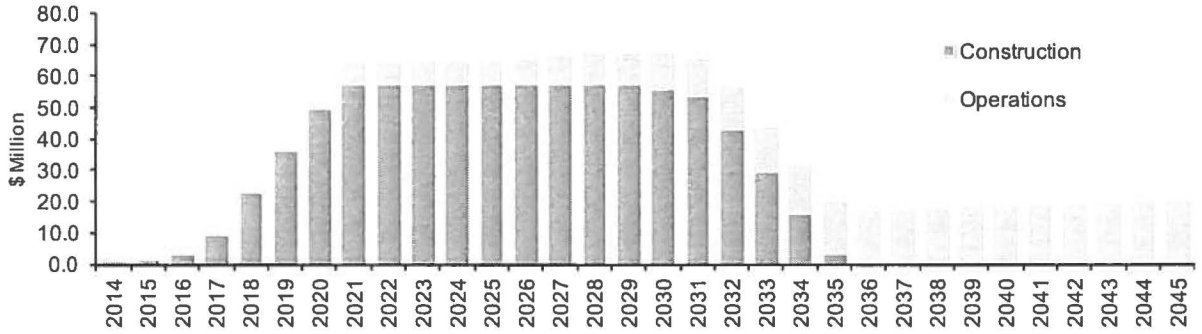
- Annual upfront drawdown of debt
- Annual interest rate – 4%
- Annual principal repayment – 5%
- Debt is retired after 15 years.

The following table summarizes the total nominal principal and interest payments on Metro Vancouver debt (this is assumed to be the sole financing source for the DBB and DB(f)), availability service payments (only applicable under the DBFOM model) and operating costs to be incurred by Metro Vancouver of over the life of the LGSWWTP under the three models analyzed.

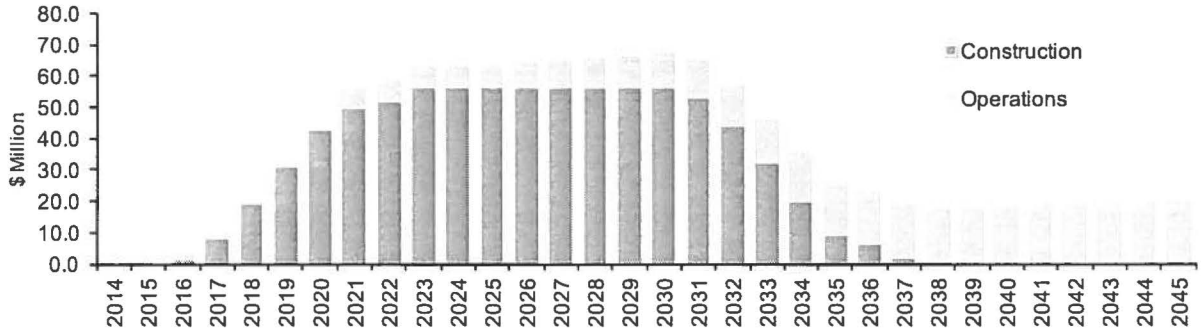
Total Nominal Costs to Metro Vancouver	Million $'s	DBB	DB(f)	DBFOM	Difference	
Capital						
Principal	[nominal]	457.2	445.7	310.0	*11.5*	*147.2*
Interest	[nominal]	386.7	377.0	262.2	*9.7*	*124.5*
Availability Payment - Capital	[nominal]	-	-	464.4	-	*(464.4)*
Total	[nominal]	843.9	822.6	1,036.5	*21.3*	*(192.7)*
Operations and Maintenance	[nominal]	364.0	363.0	350.5	*1.0*	*13.5*
Total Nominal Costs	[nominal]	**1,207.9**	**1,185.6**	**1,387.0**	***22.3***	***(179.1)***

The three graphs to follow summarize the stream of cash flows to Metro Vancouver on a nominal or undiscounted basis over the 32 year period analyzed for the project. Construction cash flows represent principal and interest payments on capital costs financed by Metro Vancouver debt.

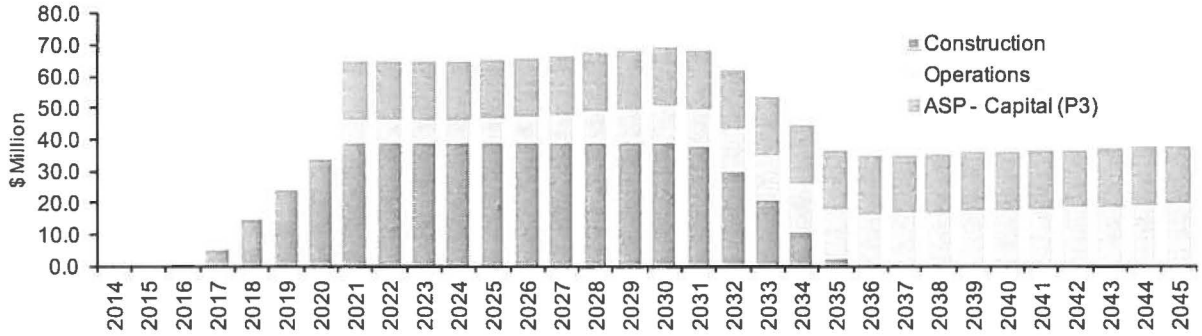
Design-Bid-Build - Metro Vancouver cash flows including Metro Vancouver financing costs



Design-Build-Finance - Metro Vancouver cash flows including Metro Vancouver financing costs.



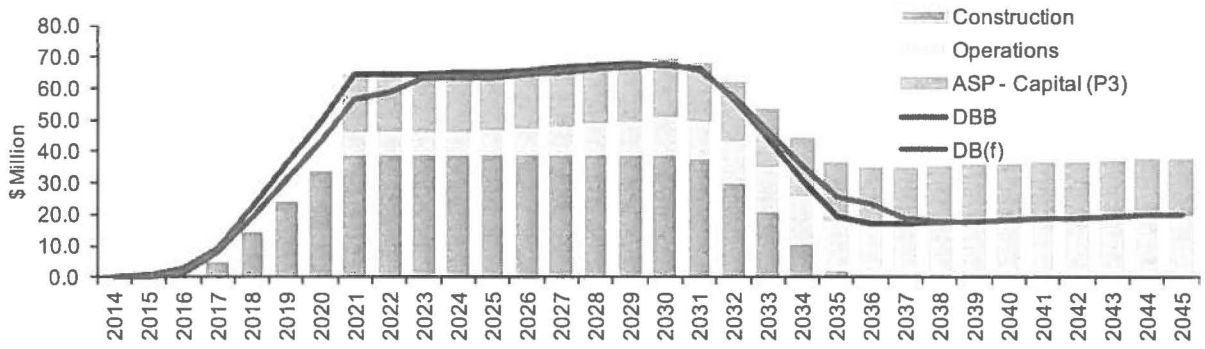
Design-Build-Finance-Operate/Maintain - Metro Vancouver cash flows including Metro Vancouver financing costs.



It should be noted in the DBFOM graph above that the Operations cash flows consist wholly of the operating portion of the ASP.

The chart below contrasts the DBFOM cash flows (columns) with the DBB and DB(f) cash flows (lines) on a nominal or undiscounted basis.

DBFOM compared to DBB and DB(f) - Metro Vancouver cash flows including Metro Vancouver financing costs.



From 2016 to 2020 above, the blue (DBB) and red (DB(f)) lines are above the Construction cash flows under the DBFOM model. While cash flows incurred by Metro Vancouver under the DBB and DB(f) would be incremental to the DBFOM in the first 5 years under these assumptions, DBFM cash flows would be higher than these two models in the later years.

Appendix 1 Multi Criteria Analysis

KPMG
cutting through complexity

Metro Vancouver Lions Gate Secondary Wastewater Treatment Project

Multi Criteria Analysis
Summary of Results

Contents

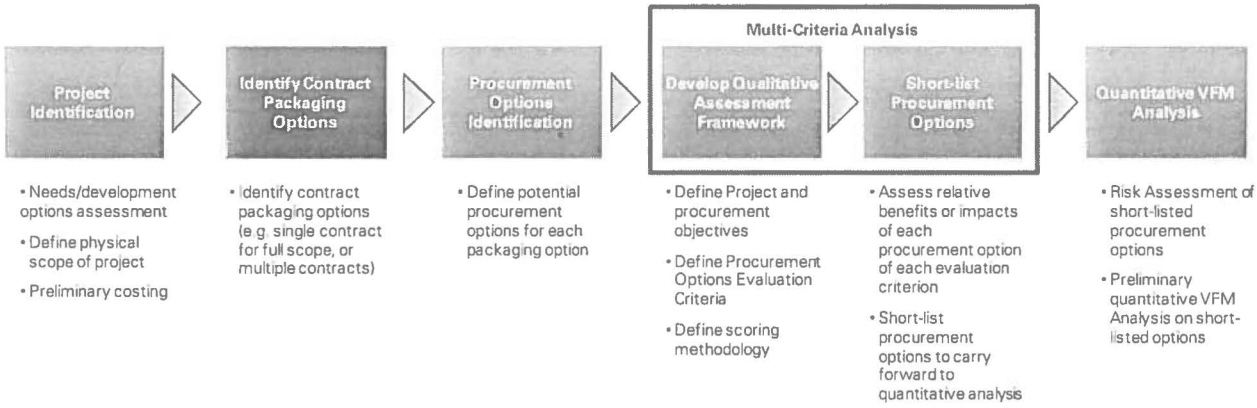
1 Introduction

1.1 Objectives

The objective of the multi-criteria analysis (MCA) is, through a qualitative assessment, to short-list the procurement options that best meet the project objectives and demonstrate potential value for money to the public.

The short-listed options will be carried forward for the full quantitative Value-for-Money (VFM) Analysis. The figure below illustrates how the MCA fits into the overall VFM Assessment of P3 projects.

Figure 1.1 Value-for-Money Analysis Process



The procurement options identified as potentially feasible are summarized below:

Option 1 - Design-Bid-Build (DBB): Metro Vancouver would design (through consultants) and construct (through a General Contractor) under separate sequential contracts. Metro Vancouver would be responsible for initial construction costs, recapitalization and ongoing O&M costs.

Option 2 - Design-Build (DB): Metro Vancouver would prepare detailed functional requirements and issue a request for proposal for a design consultant and general contractor as a team to design and construct the required facility under a single contract. Metro Vancouver would be responsible for initial design and construction costs, recapitalization and ongoing O&M costs.

Option 3 - Design-Build-Finance (DBF): Similar to Design-Build except that the contractor is also responsible for financing the project. A DBF contract may be paid for based on achievement of specified construction milestones or upon final completion of construction. In either case, short term private construction financing must be arranged by the contractor. DBF can also be used as a means of providing an extended warranty by keeping a portion of the total cost held back for a deemed warranty period.

Option 4 - Design-Build-Operate (DBO): Under the DBO model, Metro Vancouver prepares output-based requirements and procures the services of a consortium, which would form a team responsible for design, construction, operations and maintenance of the required facility. The length of the agreement would be 25+/- years and would include performance-based availability payments by Metro Vancouver.

Option 5 - Design-Build-Finance-Operate (DBFOM): A DBFOM is similar to a DBO, with the additional requirement that the contractor finance some or all of the capital cost of the project. The capital and O&M payments combined are an "availability" payment that is subject to deductions for non-performance. The consortium is responsible for returning the property/asset to Metro Vancouver at the end of the term in a pre-determined condition.

2 Multi-Criteria Analysis

In order to identify a short-list of options that would be carried forward to a detailed quantitative analysis, qualitative evaluation criteria need to be developed as part of a framework upon which these options will be evaluated. It is important that the evaluation criteria address the overall project objectives.

2.1 Project Objectives

The specific project objectives are identified in Table 2.1.

Table 2.1: Project Objectives

	Project Objectives
1	Provide Robust Secondary Waste Water Treatment for the North Shore
2	Enhance Local Community Integration of the Project
3	Promote Metro Vancouver's Sustainability Policy Objectives
4	Promote Integrated Resource Recovery
5	Minimize Costs to Ratepayers

2.2 Procurement Evaluation Criteria

A list of criteria that may be considered for the analysis for the LGWWTP is provided below:

Table 2.2: Procurement Evaluation Criteria

Evaluation Criteria	Description
Social/Community-Oriented Criteria ***Relates to Project Objective #2***	
Community Impacts	• Procurement option offers greater certainty of meeting community impact objectives (i.e. aesthetic), and minimizes operational risks which include: inherent health and safety risks, risk of odour nuisances, and risk of other nuisances (such as noise, vibration, dust)
Community Integration	• Allows Metro Vancouver to meet its community integration objectives which include: physical access, educational opportunities, public amenities, and narrative potential
Community partnership	• Project maximizes community partnership planning flexibility
Stakeholder Acceptance	• The procurement approach is supported by key stakeholders and the public
Facility Development and	

Operations ***Relates to Project Objective #1***	
Staff Recruitment and Retention	• The procurement option allows for recruitment, training, and retention of qualified and competent staff
Staff Relationships	• The procurement option can facilitate positive relationships with existing staff, their collective agreements, and staff in other Metro Vancouver departments
Flexibility – Development Phase	• Procurement option provides flexibility for changes in functionality, technology and/or regulations during development phase (cost, schedule and other considerations)
Flexibility – Operations Phase	• Procurement option provides flexibility for changes in functionality, technology and/or regulations during operations phase (cost, schedule and other considerations)
Level of control over system	• Procurement option protects MV's ability to interface with existing systems and protect public interest during design, construction, and long-term operations.
Customer service	• Procurement option will result in the required levels of services being delivered to Metro Vancouver
Environmental Criteria	
Environmental Sustainability	• Procurement option incentivizes environmental sustainability / innovation above baseline specification.
Resource Recovery	• Procurement option allows MV to maximize resource recovery opportunities
Regulatory Compliance	• Procurement option maximizes ability of project and all parties to meet all regulatory requirements and allow MV to adapt to meet changes in requirements in the future
Permitting	• Procurement option allows for Municipal permits to be obtained on a timely basis
Procurement and Financial Criteria	
Cost of design and construction	• Procurement option offers earlier cost certainty during design and construction phase, and promotes cost efficiency through competitive pressure
Cost of operations	• Procurement option offers earlier cost certainty during the long-term operational period, and promotes cost efficiency through competitive pressure
Risk Management	• Procurement option has the potential to allocate risk to the party best able to manage it
Procurement and Implementation Schedule	• Procurement option offers greater certainty that the target operational date can be achieved.
Market Interest/ Capacity	• Procurement option maximizes interest from qualified proponents: minimum of three competitive bids received.

	• Procurement option has ability to attracts bidders that have experience delivering projects of comparable size and complexity.
Procurement complexity	• Procurement option minimizes transactional complexity, and is within MV capability / capacity
Operational efficiencies	• Procurement option maximizes potential for operational efficiencies to be achieved by each delivery option through competitive pressure
Contract enforcement	• Procurement option maximizes ability for MV to enforce specifications / agreement

2.3 Evaluation Methodology

The following scoring methodology is used to assess the relative benefits or impacts of each procurement option under consideration.

Table 2.3: Packaging Options Evaluation Scoring Methodology

Rating[1]		Description
✓✓✓	High	• High ability of the procurement option to meet a criterion
✓✓	Medium	• Moderate ability of the procurement option to meet a criterion
✓	Low	• Low ability of the procurement option to meet a criterion

[1] "+" sign may be used where required as an additional measure to distinguish between procurement options.

2.4 Multi-Criteria Evaluation Summary

The results of the MCA evaluation are summarized in the table below.

Table 3.2: Multi-Criteria Evaluation Summary

Evaluation Criteria	DBB	DB	DBF	DBO	DBFOM	Rationale
Social/Community-Oriented Criteria						
Community Impacts – Design (i.e. aesthetic)	✓✓✓	✓+	✓✓	✓✓	✓✓	• Project will impact the community • DBB provide more control for longer • DBF provides more contractual influence • DBO/DBFO – longer term relationship with contractor so more ability to change
Community Impacts – Operations (i.e. noise/odour)	✓✓	✓✓	✓✓	✓✓	✓✓	• Advantages/disadvantages of different models. • DBO/DBFO – threat of financial penalties will provide a higher ability to correct issues like noise/odour • However, potentially just as hard for MV to enforce contract then to just fix itself • If the plant is meeting spec, and there is still an issue, then it would be up to MV to resolve, and therefore no difference.
Community Integration	✓✓✓	✓✓	✓✓	✓	✓	• Depends how the contract is set up • DBB potentially most flexible for ops post 2020. • DB/DBF – contract with parties earlier • DBO/DBFO – more complicated for MV to work with contractor in the • DBO/DBFO could potentially lead to innovative solution
Community partnership	✓✓✓	✓✓	✓✓	✓	✓	• Same as Community Integration • MV is the owner, so DBO/DBFO will increase the number of stakeholders and complexity
Stakeholder Acceptance	✓✓✓	✓✓+	✓✓	✓	✓	• More stakeholder acceptance with familiar models: DBB, followed by DB.
Facility Development and Operations						
Staff Recruitment and Retention	✓✓	✓✓	✓✓	✓✓	✓✓	• No impact identified

Evaluation Criteria	DBB	DB	DBF	DBO	DBFOM	Rationale
Staff Relationships	✓✓✓	✓✓✓	✓✓✓	✓	✓	• Integration/interaction issues if DBO/DBFO as MV operations and private operations • Could be benefits of effluent heat recovery being separated
Flexibility – Development Phase	✓✓	✓✓	✓✓	✓✓	✓✓	• No impact identified
Flexibility – Operations Phase	✓✓✓	✓✓+	✓✓+	✓✓	✓✓	• DBO/DBFO lower as more complicated to make changes to operating contract
Level of control over system	✓✓✓	✓✓✓	✓✓✓	✓	✓	• Under DBO/DBFO, there is no control inside the facility. • Can write into the agreement, but it is hard to specify all requirements in an agreement for issues such as surges and wet weather events. • Issues such as who would close the gate? Is there incentive to improve the process to increase capacity? Would a private operator go above spec if there is a surge?
Customer service	✓✓	✓✓	✓✓	✓✓	✓✓	• No impact identified
Environmental Criteria						
Environmental Sustainability	✓✓	✓✓+	✓✓✓	✓✓✓	✓✓✓	• DB above DBB as design and construction working together • Financing component places incentives on performance testing and system proving • DBO/DBFO – incentive via evaluation criteria • Monetises sustainability
Resource Recovery	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓	• More interfaces with DBO/DBFO creates more complexity
Regulatory Compliance	✓✓✓	✓✓✓	✓✓✓	✓✓+	✓✓+	• When a spike/issue with influent, then MV could potentially deal with more efficiently • These issues are infrequent but significant • MV retains influent risk
Permitting	✓✓	✓✓	✓✓	✓✓	✓✓	• No impact identified
Procurement and Financial Criteria						

Evaluation Criteria	DBB	DB	DBF	DBO	DBFOM	Rationale
Cost certainty of design and construction	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	• More design and construction cost certainty for DB, DBF, DBO, DBFO
Cost certainty of base operations	✓✓✓	✓✓	✓✓+	✓✓✓	✓✓✓	• DBO and DBFO provide cost certainty at end of procurement • Financing component provides greater incentives and security on performance testing and system proving • MV has significant knowledge of operations, so high amount of cost certainty in each option. • MV will have more input into design with DBB, therefore higher cost certainty then DB/DBF
Repair and Replacement cost efficiency	✓✓	✓	✓+	✓✓✓	✓✓✓	• DBO/DBFO lead to more Repair and Replacement cost efficiency, as the contractor has to operate and maintain the facility • DB and DBF are impacted more by capital cost, however financing component would result in more testing and performance • MV retains more control of expected Repair and Replacement costs in DBB, at the expense of capital cost
Risk Management						*Remove as counted in Value for Money*
Procurement Schedule	✓✓	✓✓✓	✓✓+	✓+	✓	• Commence procurement earliest in DBB, however have to run two procurements • DBF can add some more complexity then DB, some could take a little longer • Operations adds more complexity so would take the longest
Implementation Schedule	✓	✓✓+	✓✓✓	✓✓+	✓✓✓	• DBB has higher rate of delays • Higher risk transfer (P3's) leads to more incentive to finish earlier • Finance component potentially leads to reaching substantial completion earlier, due to pressure from the banks, and financing costs

Evaluation Criteria	DBB	DB	DBF	DBO	DBFOM	Rationale
Market Interest/ Capacity	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	• Have seen significant market interest in wastewater projects recently. The procurement model should not make an impact
Procurement complexity	✓✓✓	✓✓+	✓✓+	✓+	✓	• MV have not undertaken an alternative procurement model for wastewater
Contract enforcement	✓✓✓	✓✓	✓✓	✓	✓	• More complex contracts are more difficult to enforce • Financing component adds additional leverage for enforcement

Preliminary Conclusions:

DBB performed strongest in Social/Community Orientated Criteria and Facility Development and Operations - primarily due to the additional control by the owner. DB and DBF performed stronger on the environmental criteria -primarily because of the incentives on performance testing. The DBO, and DBFOM, and DBF models all performed stronger with respect to Procurement and Financial Criteria, due to the integrated nature of the delivery model and the financial incentives of the models.

The procurement models selected to be shortlisted include:

- DBB - due to its strength in the Social/Community and Facility Development and Operations. Design-Bid-Build is reflective of the historic delivery models implemented by Metro Vancouver and will be used as the public sector comparator.
- DB(f) – DB and DBF performed favourably in the analysis; however the DBF model performed better than DB in the Environmental Criteria and the Procurement and Financial Criteria. These two options performed equally on the other criteria. As the results were very similar, it was discussed that the benefits of a DBF could be achieved with a partial financing component such as a financing holdback for warranty purposes. It was concluded to retain a Design-Build with financing for an extended warranty (DB(f)).
- DBFOM - selected above DBO due to the additional leverage for contract enforcement due to the equity and financing component. The model also provides additional funding options, including P3 Canada.

Appendix 2 Market Sounding

KPMG
cutting through complexity

Metro Vancouver Lions Gate Secondary Wastewater Treatment Project

Market Sounding Report

Contents

Important Notice

This report ("Report") summarizes the results of a market sounding exercise undertaken for Metro Vancouver ("MV") in relation to the Lions Gate Wastewater Treatment Plant Project ("Project") by KPMG LLP ("KPMG").

This Report summarizes the information collected from various participants during the market sounding exercise. KPMG has not performed an independent verification of this information. As a result, no representation, warranty or undertaking (explicit or implicit) is made in relation to the accuracy, comprehensiveness or completeness of the information provided by the participants as summarized in this Report. In addition, no responsibility is taken or accepted by KPMG for the adequacy, completeness or accuracy of the information and all liability is therefore expressly excluded.

This Report was prepared for the exclusive use of Metro Vancouver.

1 Overview

1.1 Objective of the Market Sounding

A market sounding exercise was undertaken to obtain up-to-date market information for the Lions Gate Secondary Wastewater Treatment Plant ("Project"). The purpose of this Market Sounding was to gather information and perspectives from organizations that are active in the development, operation and financing of Wastewater infrastructure projects.

1.2 The Market Sounding Process

Potential participants were initially contacted during May 2013 to determine their interest and availability to participate in the Market Sounding and to set up a convenient time for an interview. Participants were provided with a discussion document to provide background information on the Lions Gate Secondary Wastewater Treatment Plant Project (See Appendix 1). A series of telephone interviews were conducted between July 19 and August 1, 2013.

Companies were identified for participation based on their involvement in past water/wastewater deals in Canada, or were selected based on their potential as a partner for the Project.

A list of questions was prepared in advance to provide general guidance and was also included in the "Market Sounding Discussion." As the participants were from different sectors (i.e., construction, design, operation, and finance) of the industry and had different skills and interests relating to the Project, it was not the intent to ask all questions of all participants. Rather, the intention was to capture responses to the questions which would be most valuable for Metro Vancouver in the time available for each interview.

Participants were also encouraged to identify and discuss issues that were most relevant to them.

Out of the 34 developers, operators and financiers targeted, 23 companies have participated (See Appendix 2).

The chart below provides a total of the participation responses.

Table 1: Summary of Participation

Likelihood of Participating (e.g., unlikely, likely, highly likely)	Number of Times
Highly Likely	20
Likely	3
Unlikely	0

1.3 Overview of this Report

The report is laid out as follows:

- Section 1 provides an overview of the Market Sounding Process;
- Section 2 outlines our key findings;
- Section 3 provides a summary of the responses to each interview question provided by the participants;
- Appendix 1 provides the "Market Sounding Discussion" document that was distributed to each participant before their interview;
- Appendix2 provides a list of the participants to the market sounding interviews;

2 Findings

The following section provides highlights of the main findings from the market sounding interviews. Responses received on key questions raised in the interviews are summarized and presented herein. A summary of responses to each question raised in the interview is provided in Section 3.

2.1 Participation

There is significant market interest in the project, and the majority of organizations responded that they would be highly likely to participate in the project. The key caveat identified by the majority of participants was that there is significant concern regarding what has happened in Regina, Abbotsford and Whistler with respect to the proposed delivery of waste water/water treatment plants via a public private partnership (P3). Industry would like to see the project owner deal with political and public support issues prior to entering into a procurement process. If not handled appropriately this has the potential to significantly and negatively affect the water and wastewater P3 market in Canada.

The majority of respondents indicated some projects may be following a similar procurement timeline including CRD, Regina and St John's, but did not foresee any capacity issues either within their firms or the broader market. There is sufficient market capacity to deliver the project as a single package; however the majority of respondents indicated that they would team up to spread risk or to acquire the requisite skill sets needed to develop an effective bid.

Adherence to the procurement timeline is important for respondents, as it can affect their availability and capacity to participate in other projects. All respondents indicated and wished to see more information about the project schedule sooner to better determine their position to participate.

Project certainty and risk allocation were often indicated as major influencing factors for respondents' participation. Risk transfer considerations are further detailed below.

Respondents indicated that MV's project expectations should be clearly defined in procurement documentation. Vague requirements and uncertainty should be minimized to ensure a high level of bidder participation.

Most respondents also indicated the number of pre-qualified proponents to move into the RFP stage would influence their willingness to participate; many indicated the RFP process should be limited to no more than three proponents.

Perceived suitability of current advisors of the project, for aspects such as financial, commercial and technical, was an indicator to one respondent in their decision to participate. Financiers' interest in participating were greatly influenced by the potential level of long-term financing in the proposed model; while a short-term involvement model, such as DBB or DBF, would likely negate their interest.

2.2 Project Scope

The majority of participants agreed with MV's planned approach to deliver the project as a single package, with the exceptions of conveyance and demolition of the existing WWTP. Respondents indicated the exclusion of conveyance and demolition is a sensible approach because the majority of respondents could not provide significant value-add for either of the two services. MV was identified as being better positioned to negotiate and manage conveyance and demolition services, as agreements are likely to be in place to work with First Nations and potential land claims, and associated permits.

One respondent indicated that splitting off services of the single package into many smaller packages may be beneficial in capturing the best expertise available on the market, as well as increasing the number of opportunities that the market can participate in for this project. Conversely, a few respondents expressed interest in taking on conveyance and demolition as part of the single package. Inclusion of conveyance and demolition was noted to potentially increase the capital size of the project, thus potentially garnering more attention and interest from the market and it was noted that integration of the two services into a single package could potentially reduce integration and interfacing issues between contracts from MV's perspective.

2.3 Delivery Model

The preferred delivery model for the project was varied between DBB, DBF and DBFOM. Respondents indicating a preference for DBB and/or DBF were concerned with potential union and labour risks if operations and maintenance were incorporated as part of the model. Respondents preferring a DBB and/or DBF model indicated that a P3 model would limit participation in this project to a few players due to the large project size, and limited number of private operators.

All respondents agreed that a P3 model would provide the most value-add for MV. Some respondents noted savings of 10% to 20% in a P3 model compared to the DBB model. However, as there have been few WWTP procured under a P3 model in North America, the actual amount of savings remain speculative at best. Proponents of DBFOM and DBO models indicated that lifecycle costs would receive the most attention under a P3 model, which would influence the choice in design so as to optimize the project as a whole. This could also increase ability to achieve performance requirements over a longer period of time. Respondents noted long-term models inclusive of operations would provide the most opportunities for the private sector to be innovative in looking for cost-savings and optimizing the project as a whole. Schedule and contract interface were noted to be easier under the P3 model, as opposed to separating the project into DBB and O&M packages.

One respondent noted a project delivered under the P3 model would lower the tendency to defer maintenance, thus potentially increasing the quality of the facility at hand-back.

2.4 Risk Transfer

Respondents were familiar with the project risks. Generally, unforeseeable and difficult-to-quantify risks were noted to be unfavourable for the private sector to shoulder While the private sector can take on such risks, it is also likely these risks will be heavily overpriced with contingencies given the little control and lack of certainty around such risks. Risks that respondents would not want to take on include influent characteristics (outside a band) and process input unit prices including electricity and chemical costs. Other key risks identified include geotechnical, unforeseen environmental contamination, regulations, permitting, and the interface with conveyance.

Most respondents indicated risks related to permitting, zoning and First Nations agreements/requirements are better managed by MV as opposed to the private sector, although a small number of respondents responded that the transfer of these risks would be preferable as their company has a competitive advantage in this area.

As regulations and requirements related to the WWTP may change over the course of a contract, especially for P3 models that span 25 to 30 years, this risk was also noted to be better taken by MV than the private sector. There were significant concerns around union and labour contract risks if the contractor was required to take on an existing MV workforce.

2.5 Security

Respondents were familiar with various types of security applied on major capital projects. Varied responses for levels of security were provided – O&M respondents typically were more conservative with providing securities because there were fewer perceived risks that were not already allocated under operating costs.

Most respondents indicated parental company guarantees (PCGs) are typically between 40% and 50% of capital costs; 100% PCGs are rarely available as PCGs are often expected to be supplemented by other securities. Letters of Credit (LCs), respondents noted, are between 5% and 10% of capital costs. LCs are more favoured by lenders because of their liquidity compared to PCGs and bonds. Some respondents noted there is a smaller market for bonds, and estimated bonds to cover from 25% to 50% of capital costs.

During construction, respondents indicated they were comfortable with holdbacks between 5% and 10% of contract value. These holdbacks may be supplemented with substantial completion bonds. Many respondents indicated large holdbacks often create cash flow issues for construction and contracting companies. Instead of substantial completion bonds, one respondent noted a 1 to 2 year warrantee may be provided as an alternative form of security.

In general, most respondents recommended a security structure that would utilize and optimize security instruments throughout the life of the project. Respondents noted that different types of securities work better in different construction project types and project phases. In many instances, respondents indicated that duplicated efforts through use of different security instruments only resulted in higher project costs without providing substantially more security than if there were fewer, more effective types of securities used.

2.6 Honorarium

Respondents indicated that an honorarium would be appropriate for the RFP process as submissions for large capital projects, such as the LGWWTP, are costly. Respondents estimated bid costs for a project of such size to be around $3 million to $4 million. Honorariums influence proponents' willingness to compete in the process – respondents agreed the presence of an honorarium indirectly represents a commitment to the project, thus providing confidence to proponents that the project will likely be seen to fruition. Some respondents indicated an honorarium would also directly affect the quality of submissions.

Respondents collectively provided an honorarium range from $250,000 to $1.2 million. While respondents understood the upper-limit of the range quoted was high, it was indicated that bid costs would still not be fully covered; but would influence their willingness to bid and the quality of their submissions. One respondent indicated honorariums are approximately 0.2% of construction costs for capital projects in the US, which is consistent with the mid-point of the range suggested by the respondents. Some respondents perceived the honorarium provided for competition in the CRD's Core Area Wastewater Treatment Programs were lower-than-expected.

2.7 Community Integration

All respondents agreed that effective and ongoing community integration and interfacing is necessary in contributing to a successful wastewater treatment plant project. Most respondents cautioned that initial community integration should be largely complete prior to commencing the bidding process. It was largely agreed that the procurement process and quality of bids may be compromised if new elements of community integration were added during the procurement process. Some respondents indicated they would be comfortable with conducting open house sessions to educate and engage the community;

some respondents preferred for MV to take the lead on community integration, but would still provide support through information and presentation materials.

Most respondents have had experience with wastewater and water facilities that were well integrated into the community. While all respondents agreed it is important to integrate facility into the community, it was also agreed the level of integration can often be limited by project costs. MV is encouraged to hold collaborative meetings between proponents and the community to facilitate dialogue. MV should articulate and be specific with the nature of expected outcomes of community integration, while leaving the "how" to achieve these community integration outcomes for proponents to provide innovative approaches and insights. Additionally, MV should be open to "bonus" community integration ideas, above and beyond stated outcomes brought forth by proponents.

2.8 Macroeconomic factors

Respondents' outlooks of labour availability (skilled and unskilled) and construction materials during the timeframe in which LGWWTP is due to be under construction varied – some felt there may be competing projects in Alberta, while others felt the Vancouver market would have capacity to take on the project given its proximity and access to overseas materials and labour.

Several respondents indicated there is still little competition for water and wastewater operators in Canada. Most were unable to speculate if there will be an eventual surge of new water and wastewater operators, but indicated this may be an issue when proponents are forming teams in anticipation of the RFQ and RFP processes.

2.9 Other

A large number of participants noted that they would prefer more communication and certainty regarding project dates and schedules, including procurement timelines.

Appendix 1 Market Sounding Discussion

1 Introduction

1.1 Purpose of Market Sounding

KPMG LLP ("KPMG") is conducting a market sounding exercise on behalf of Metro Vancouver in order to obtain up-to-date market information for the Lions Gate Secondary Wastewater Treatment Plant ("Project"). The purpose of this Market Sounding is to gather information and perspectives from organizations that are active in the development, operation and financing of Wastewater infrastructure projects. Through this Market Sounding we would like to understand:

- Participant's level of interest in the proposed project.
- The acceptability of the proposed project and its governance arrangements.
- The challenges or barriers that may hinder private sector interest in participation, and potential mitigating strategies.
- Changes to the project definition that could improve market acceptability.

The knowledge gained through this market sounding will assist Metro Vancouver to structure a program that will meets the project objectives.

1.2 Project Overview

The existing Lions Gate Wastewater Treatment Plant opened in 1961 to serve the North Shore municipalities of West Vancouver, the City of North Vancouver and the District of North Vancouver. The plant, which has provided primary treatment for over 50 years, is one of two remaining primary treatment plants in the region.

New federal and provincial standards require all primary treatment plants be upgraded to secondary treatment. To meet these requirements, Metro Vancouver will build a new secondary treatment plant at a site approximately two kilometres east of the existing treatment plant.

Construction of the new facility, expected to be completed by 2020, will enhance environmental protection, underline Metro Vancouver's regional and national role as a leader in technological innovation, and fulfill the commitment made in Metro Vancouver's Integrated Liquid Waste and Resource Management Plan.

Project Phases and Timeline

- ***Project Definition***: Jan 2012 - Dec 2013 - The Project Definition Phase is underway. In early 2013, design ideas and concepts were screened and three build scenarios prepared. These scenarios are currently being reviewed. By December an indicative design - combining the best components from the three scenarios - will define the scope of work so the Design and Construction Phase can commence in 2014.

  As part of the Project Definition Phase, work is being undertaken to assess the value of procuring the project as a Public Private Partnership (P3). The project is required to undertake a P3 business case, to be eligible for provincial funding or federal funding from the P3 Canada program. The business case analysis will incorporate results of this market sounding, and will include a value-for-money assessment of the procurement options. The P3 business case is expected to be completed in late 2013,

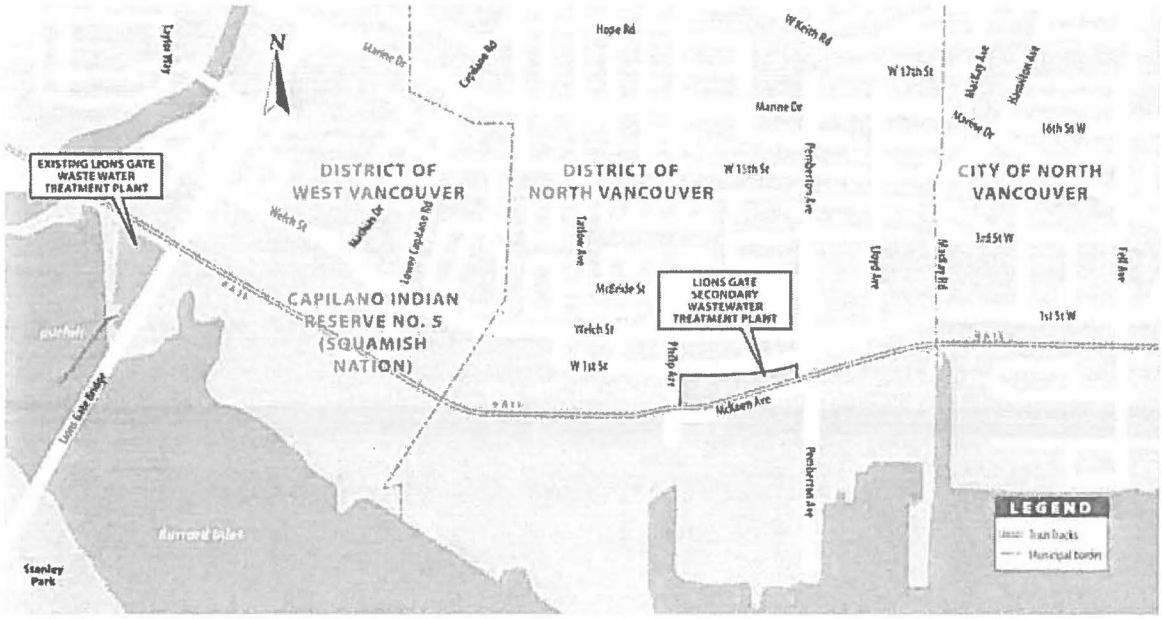
- ***Design and Construction***: Jan 2014 - Dec 2020 - Once the Metro Vancouver Board approves recommendations in the Project Definition Report, the project will proceed to the Design and Construction Phase, which is planned for the period 2014 to 2020.

  Metro Vancouver will be working with the Senior Levels of Government in order to secure additional funder for the program in 2014. The commencement of any procurement process will require Board approval that meets the required timelines for the program, and is expected to commence late 2014 to early 2015. .

- ***Existing Plant Decommissioning***: 2021 - Once the new plant is fully operational, the existing primary treatment plant will be decommissioned. The land is being returned to Squamish Nation in accordance with the cut-off lands agreement arranged by the federal and provincial governments.

Location

The new treatment plant will be built approximately two kilometres east of the existing plant in the area of industrial land south of 1st Street and between Philip and Pemberton Avenues in the District of North Vancouver. The new site was purchased from BC Rail Properties in 2008, and is approximately 3 hectares in size.



Project Objectives

- Secondary Wastewater Treatment - The facility will meet the requirements for secondary level treatment while incorporating Operations & Maintenance efficiencies for Metro Vancouver.
- Integrated Resource Recovery - The project will optimize generation and capture of valuable materials that can be repurposed for fuel, water, fertilizer and heat, assisting Metro Vancouver in reducing its energy costs, carbon footprint, effluent discharge and environmental impact.
- Sustainability Targets - The project will demonstrate Metro Vancouver's values and commitment to sustainability, provide leadership, and build a facility that will serve as a model for other agencies, while fulfilling its mandate to provide a core service.

- Community Integration - The project team will work with stakeholders to create an inclusive process, resulting in a strong community asset benefiting the ratepayers and municipalities of the North Shore and the region.

Preferred Indicative Design Concepts

Business casing work indicates that a preferred indicative design should be based on:

- Secondary treatment using the deep tank activated sludge process
- Average annual flow requirement of approximately 110 ML/d, increasing to 120 ML/d in 2051
- On site digestion sludge generated from wastewater treatment process for energy production
- Concept development to recover low grade effluent heat and waste heat for use in district energy systems
- Concept development for use of reclaimed water at the facility and for potential adjacent industries
- Concept development to recover phosphorus either as part of the initial plant construction or in the future
- Design for odour management
- Investigation of potential partnerships that would provide for associated facilities that would enhance community integration

Cost

It is expected that the program costs associated with the indicative design will be in the $500 to $700 million range, including Metro Vancouver project costs. Recommended budgets will be provided to the Board in later 2013.

2 Market Sounding Questions

2.1 Company Information and Experience

1. What is the nature of your business?

   Size (e.g. annual sales, number of employees)?
   Location of operations

2. Do you have first-hand experience with the construction, operation and/or maintenance of wastewater infrastructure in Canada? If yes, briefly describe the project(s) and any key best practices/lessons learnt.

2.2 Participation

3. For a project such as this, in which of the following areas would you be interested in participating?
   - Design
   - Construction
   - Operations and/or Maintenance
   - Financing (equity, on balance sheet corporate financing, off balance sheet project financing)
4. What other projects in the market will you be considering in the same timeframe that would be competing for resources and what is the impact on your ability / interest to participate in this project?
5. If other projects would impact your ability / interest to participate, how will you determine which project to pursue? What would make this project attractive?
6. Given the size of the project would your company likely be able to undertake the contract by itself, or would have you have to form a team / partnership?
7. Are there any other issues that are critical to your participation in this project that you can foresee?

2.3 Project Scope

8. Metro Vancouver is considering delivering Conveyance and the Demolition of the existing WWTP separately. What are your thoughts on this?
9. Excluding Conveyance and Demolition, does it make sense to contract other parts of the project separately? Please elaborate, and provide details of where you have seen this before.

2.4 Delivery Model

10. Metro Vancouver is considering a number of delivery models (Design-Bid-Build, Design-Build, Design-Build-Finance, and Design-Build-Finance-Operate). Are you more interested in one of these delivery models? If so, why?
11. Do you see more value to MV in one of these models? If so, please identify this value. Can this value be quantified?
12. Are there any models identified that would not be acceptable to the market?

2.5 Risk Transfer

13. Do you see any significant risk that the contractor would not be able to absorb?
14. Please explain your preference regarding the types of security. Do you prefer bonds, letters of credit, parent company guarantees, payment holdback or other forms of security?
15. Provide your comments as to the applicability of these types of security during different phases of the Project.
16. Is there a limit to the amount of security that your firm could provide for one contract? What levels have you provided in the past?

2.6 Procurement Process

17. Would an honorarium affect your willingness to bid on this project? What would you deem to be an appropriate amount for this project? Are you seeing any changes in the market regarding the use of honorariums?

2.7 Community Integration

18. Community Integration is a key objective of the project. What role could you play with Community Integration with the project, and how could this role be tied into the contract structure?
19. Are you aware of other water infrastructure projects in which meaningful community integration has brought added value to the Owner? If so, which projects were they and which delivery models were used?
20. In your opinion does Metro Vancouver's expectation of community integration have an impact on the risk profile of this project?

2.8 Other

21. Do you foresee any other macroeconomic factors that might affect the project? (Availability of financing, competition for labour, equipment and materials, other commodity pricing, etc.)

2.9 Concluding Questions

22. Based on the information provided above, how likely will you be participating in the Project (e.g., unlikely, likely, highly likely)? What are the factors that influence your decision to participate?
23. Is there any other information you would like to share with us in relation to this project?
24. Can we contact you again if we have follow up questions?

Appendix 2 Market Sounding Participants

- Acciona
- AECON
- AECOM
- Associated Engineering
- Balfour Beatty Group
- Black and Veatch
- CDM Smith
- CH2M Hill
- Corix
- EPCOR
- Fengate
- Graham
- Hatch Mott MacDonald
- Jacob Brothers
- Walsh
- Kenaidan
- Macquarie*
- PCL
- Plenary*
- SNC Lavalin
- Stantec
- Veolia Water
- Vinci

Appendix 3 Value for Money

Value for Money analysis is part of the quantitative procurement options analysis required as part of the business cases required for federal and provincial funding of large infrastructure projects. VFM analysis is required for any project over $50 million in British Columbia and the methodology for undertaking VFM analysis is prescribed by Partnerships BC. Any request for federal funding for a project over $100 million from either the Building Canada Fund or PPP Canada Fund must include a VFM analysis as part of the project business case. PPP Canada notes "It is PPP Canada's expectation that, where available, VFM methodologies that are local to the Project Sponsor will be used.".

The objective of the VFM analysis is to assess how alternative procurement models (DB(f) and DBFOM) compare to the traditional Public Sector Comparator model (DBB) in terms of value to Metro Vancouver over a defined term, typically the contract term of theP3 alternative.

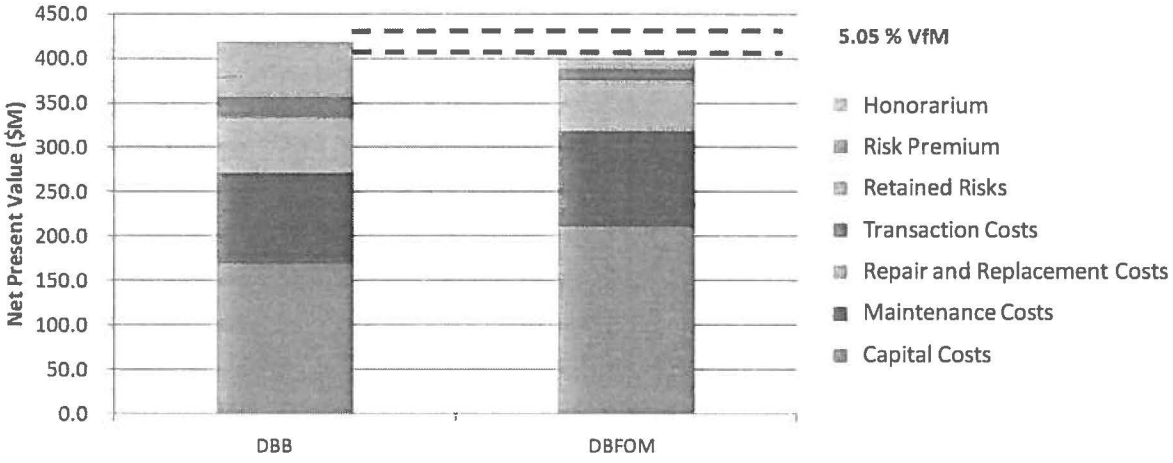
The VFM analysis involves calculating the estimated cost of the project under each of these procurement models. A financial model is created to calculate the cost in the form of the Net Present Value. The NPV estimate includes the cost estimates for the lifecycle of the project, the value of the project risk allocated, efficiencies for each delivery model that could be realizable; and the cost of financing.

The financial model is created for the project based on a traditional procurement method, also known as a public sector comparator (PSC), and is compared to a financial model created based on PPP procurement, also known as a Shadow Bid. It is called a Shadow Bid because it is an estimate based on an expected bid. The Value for Money Analysis involves the following process:

1. Identification of base assumptions (discount rate, schedule, inflation)
2. Identification of Costs (Capital, Operating & Maintenance, Repair and Replacement, Transaction and Financing)
3. Risk Identification and Assessment
4. Efficiencies Identification and Assessment
5. Payment Structure Analysis (progress, milestone, completion and/or annual concession)
6. Financial Model Development
7. Value Comparison of Models

The results of this quantitative comparison between the PSC and the Shadow Bid are used to determine the procurement method that provides the best potential VFM.

The procurement options are analyzed in order to estimate their financial impact from the perspective of the owner (public entity) that will be paying for the project. These costs are then compared in order to determine the procurement approach with the greatest potential to provide value for taxpayer dollars. The following chart illustrates the various components of the VFM for a hypothetical project.



If the NPV of a shadow bid is lower than the NPV of the PSC, then that delivery model/procurement option represents value from money. In the above example the DBFOM option is the procurement option that represents the best VFM, as it is 5.05% cheaper on an NPV basis.

Appendix 4 Discount Rate

Background

To compare the costs of the traditional procurement approach (DBB) to alternative procurement approaches (DB(f) and DBFOM), it is important to have a "like-for-like" comparison of the project cost under each method. This is achieved by discounting the cash flows to a common base date.

Discounting future cash flows to the present takes into account the time value of money so that cash flows that occur in different periods can be added together into one total amount, resulting in the Net Present Value. The NPV of two or more projects can then be compared to determine which one provided better value. Traditional procurement approaches typically have large cash flows in early years for the project owners, as the capital costs must be paid up front. Most of the alternative procurement approaches see more levelized annual cash flows as the project capital expended by the private sector party is paid back through annual instalments (principal and return on capital)

Because the NPV is a function of the discount rate, it can vary depending on the discount rate selected, and therefore heavily influence which option appears to have a more attractive cost. A higher discount rate will give cash flows (i.e., expenditures and income, or costs and revenues) expected in the future less value after discounting. A lower rate, on the other hand, leads to greater weight given to future costs and revenues.

Thus the choice of the discount rate is important and must be carefully determined as it can have a significant impact on the outcome. If an inappropriate discount rate is selected there is a significant risk that it will result in a suboptimal choice of procurement method. Best practice recommends the utilization of sensitivity analyses using different discount rates to ensure that the outcome is not skewed or biased by the selected discount rate.

Methodology

In most jurisdictions that have pursued P3s there is a standardized methodology for determination of the discount rate in the context of Value for Money analysis for comparing traditional public sector based procurement relative to P3 alternatives. In British Columbia, Partnerships BC has developed guidance material on the choice of discount rates, which is summarized below. At the federal level, P3 Canada has developed guidance on the choice of discount rate that dictates the use of guidance from a local P3 agency where such an agency exists. A standardized methodology for determination of the discount rate exists in British Columbia, and both Federal and Provincial Funding is contingent on using this methodology.

Partnership BC's methodology recommends using a different discount rate for different decisions in the approval process of a project. For the first decision, the investment decision of whether the Authority should fund the construction of an infrastructure asset, a social discount rate should be used to reflect the opportunity cost of capital from the rate payer's viewpoint. In these circumstances Metro Vancouver's guidance is to use a discount rate of 6%.

The second decision point, the procurement decision, is when the Authority determines whether to assume the risk of developing and operating an infrastructure asset rather than having those functions and associated risks taken on by the private sector. The approach involves basing the discount rate on the private sector cost of capital for a particular project. This is Partnerships BC's approach to selection of the discount rate for the VFM analysis.

The rationale for this cost of capital approach is based on investment portfolio theory and formulating the problem facing government as an asset portfolio investment decision: whether the risks relating to developing and operating the asset are retained or transferred to a private partner, while maximizing return/cost savings.

According to Partnership BC's approach, the overall risk profile of the project is similar whether the project is delivered by the public sector or the private sector. While the cash flows may be different because of the differences in the ways the risks are managed by each party and the different financing mechanisms, when comparing procurement models the cash flows need to be discounted using the same rate.

The Weighted Average Cost of Capital (WACC) involves calculating the weighted average cost of project funding sources including debt and equity, and is the discount rate that would be used by private sector bidders, as it represents the private sector's minimum required rate of return from the project.

Precedent Projects

Using the WACC approach, precedent projects in British Columbia have typically used discount rates of approximately 7.5%, ranging between 6.5% and 8.5%. The discount rates fluctuate depending on the risk profile of the project and the current borrowing rate.

WACC Calculation

The weighted average cost of capital for the Lions Gate Waste Water Treatment Plant was calculated based on the following assumptions:

- Debt: 88% of the Privatize Sector Bank Financing
- Equity: 12%
- Long Term Debt Yield: 5.77%
- Equity IRR: 12%

WACC = (88% * 5.77%) + (12% * 12%) = 6.5%

Using the Partnerships BC guidance for the determination of a discount rate, the WACC is calculated to be 6.5% for the Lions Gate Secondary Wastewater Treatment Plant Project.

Appendix 5 Risk Workshop Attendees

Participants of the risk workshops and risk review sessions included:

- Fred Nenninger, Metro Vancouver
- Paul Dufault, Metro Vancouver
- Jeff Carmichael, Metro Vancouver
- Mark Ferguson, Metro Vancouver
- Doug Humphris, Metro Vancouver
- Paul Lam, Metro Vancouver
- Tracey Husoy, Metro Vancouver
- Sean Smyth, Metro Vancouver
- Dr. Alan Russell, University of British Columbia
- John Haanstra, Mapel Rienders
- Rick Bitcon, AECOM
- Ian Dickinson, AECOM
- Scott Wolf, Miller Hull
- Matthew Woodruff, Matthew Woodruff Architects
- Steve Hadden, BTY
- Jack McInerney, BTY
- Trevor Fitzell, Golder Associates
- Gary Webster, KPMG
- Paul Levelton, KPMG
- John Andrews, KPMG

Appendix 6 Risk Workshop Results

The results of the risk workshops are as follows:

Risks		DBB					DB					DBFO				
Thousand dollars	Timeline		Prob	P	L	O	Allocation	Prob	P	L	O	Allocation	Prob	P	L	O
Owner's Project Management Team Experience	Pre-Construction (All)	Retained	7.5%	1,879	3,006	7,516	Retained	17.5%	2,255	3,608	9,019	Retained	17.5%	3,758	6,013	15,032
Evaluation of submissions	Pre-Construction (All)	Retained	3.5%	100	250	500	Retained	25.0%	200	500	1,000	Retained	25.0%	200	500	1,000
Incomplete RFP / Tender Documentation	Pre-Construction (All)	Retained	25.0%	1,046	2,092	5,229	Retained	17.5%	1,046	2,092	5,229	Retained	17.5%	1,046	2,092	5,229
Shortlisted Proponent Withdraws	Pre-Construction (All)	Retained	7.5%	-	3,138	15,688	Retained	7.5%	-	3,138	23,532	Retained	7.5%	-	3,138	31,376
Design delay	Pre-Construction (All)	Retained	17.5%	3,000	6,000	12,000	Transferred	3.5%	3,000	6,000	12,000	Transferred	0.0%	-	-	-
Scope Changes by Owner - During RFP	Last Year Pre-Construction	Retained	7.5%	500	1,000	5,000	Retained	17.5%	(3,138)	-	5,000	Retained	17.5%	(3,138)	-	5,000
Contract Award / Commercial Close Delay	Last Year Pre-Construction	Retained	3.5%	500	1,000	2,000	Retained	7.5%	500	1,000	2,000	Retained	7.5%	500	1,000	2,000
Existing Conditions are different than what could reasonably be inferred	Construction (Year 1)	Retained	17.5%	2,050	6,970	10,250	Transferred	17.5%	2,050	6,970	10,250	Transferred	17.5%	2,050	6,970	10,250
Owner's Project Management Team Experience	Construction (All)	Retained	7.5%	1,879	3,006	7,516	Retained	25.0%	2,255	7,215	22,548	Retained	17.5%	2,255	3,608	30,064
Third party stakeholder interaction	Construction (All)	Retained	7.5%	100	200	3,138	Retained	17.5%	100	200	3,138	Retained	17.5%	100	200	3,138
Community amenities	Construction (All)	Retained	7.5%	100	200	3,138	Retained	17.5%	100	200	3,138	Retained	17.5%	100	200	3,138
Scope Changes by Owner - During Construction	Construction (All)	Retained	17.5%	(2,353)	-	3,922	Retained	25.0%	(2,353)	-	3,922	Retained	10.0%	(3,138)	-	4,706
Incomplete RFP / Tender Documentation resulting in Scope Change	Construction (All)	Retained	17.5%	(2,353)	-	3,922	Transferred	17.5%	(2,353)	-	3,922	Transferred	17.5%	(2,353)	-	3,922
Construction Schedule - ability to be operational in 2020 (December)	Construction (Last Year)	Retained	17.5%	600	1,200	2,400	Partially transferred	7.5%	600	1,200	2,400	Transferred	3.5%	600	1,200	2,400
				-	-	-			-	-	-			-	-	-
Un-anticipated Operating Costs - Electricity Usage	Operations (Every Year) [1]	Retained	17.5%	(78)	-	311	Retained	7.5%	(78)	-	311	Transferred	3.5%	(78)	-	311
Un-anticipated Operating Costs - Labour usage	Operations (Every Year) [1]	Retained	17.5%	37	74	186	Retained	17.5%	37	74	186	Transferred	17.5%	37	74	186
Un-anticipated Operating Costs - Chemical Usage	Operations (Every Year) [1]	Retained	17.5%	(28)	-	112	Retained	7.5%	(28)	-	112	Transferred	3.5%	(28)	-	112
Life-Cycle Maintenance Costs	Operations (Every Year) [1]	Retained	7.5%	29	58	145	Retained	17.5%	29	58	145	Transferred	7.5%	29	58	145
				-	-	-			-	-	-			-	-	-
Operation for Intended Use	Operations (All)	Retained	7.5%	200	500	5,000	Retained	17.5%	200	500	5,000	Transferred	3.5%	200	500	5,000

Appendix 7 Risk Analysis

The risk analysis process involves the risk identification and risk quantification processes required to precede the ultimate Monte Carlo analysis that was used to quantify the risks retained by Metro Vancouver and transferred to the private sector.

Monte Carlo analysis involves using a software program that repeatedly runs random simulations of risk values to generate a risk distribution ranging from low to high impact that is referred to as a probability distribution.

The quantified risks discussed in this section were used as inputs to the financial model to calculate the Net Present Value of each procurement option on a risk-adjusted basis

Risk Register & Risk Workshop

The risk identification process started with creation and review of a detailed risk register that included hundreds of potential risks that could apply to a wastewater sector project. Specific risks from water and wastewater sector precedent projects were incorporated into the original risk register.

A risk workshop consisting of Metro Vancouver, KPMG and other external consultants was held. As a result of this workshop and subsequent discussion between the project team, the initial risk register was reduced down to approximately 24 key risks.

The following criteria were used to assess if a risk was quantified:

- There must be a difference in risk between the DBB, DB(f) and DBFOM procurement models analyzed
- A method for quantifying the risk was identified
- The risk was material

Retained Versus Transferred Risks

Risks were quantified separately for both retained and transferred components. Retained risks are the value of the risks retained by Metro Vancouver. Transferred risks are the value of the risk transferred to the contractor and/or concessionaire under either the DBB, DB(f) or DBFOM models.

It is important to note a subtle difference between how the transferred risks are ultimately incorporated into the discounted Net Present Value for the purposes of the VFM Analysis:

- Transferred risks under the DBB and DB(f) options are assumed to be costs that the contractor would price into their construction contract bid price or facilities operator would price into their FM contract bid so are ultimately incurred by Metro Vancouver in either the construction or operations period
- Transferred risks under the DBFOM model are assumed to be costs that the concessionaire prices into their construction and operational cost estimates and are ultimately incurred by Metro Vancouver via the payment of the concessionaire's availability service payment.

As a result, transferred risks have been added to the cost estimates used to derive the estimated ASP under the DBFOM model.

Risk Workshop & Risk Quantification

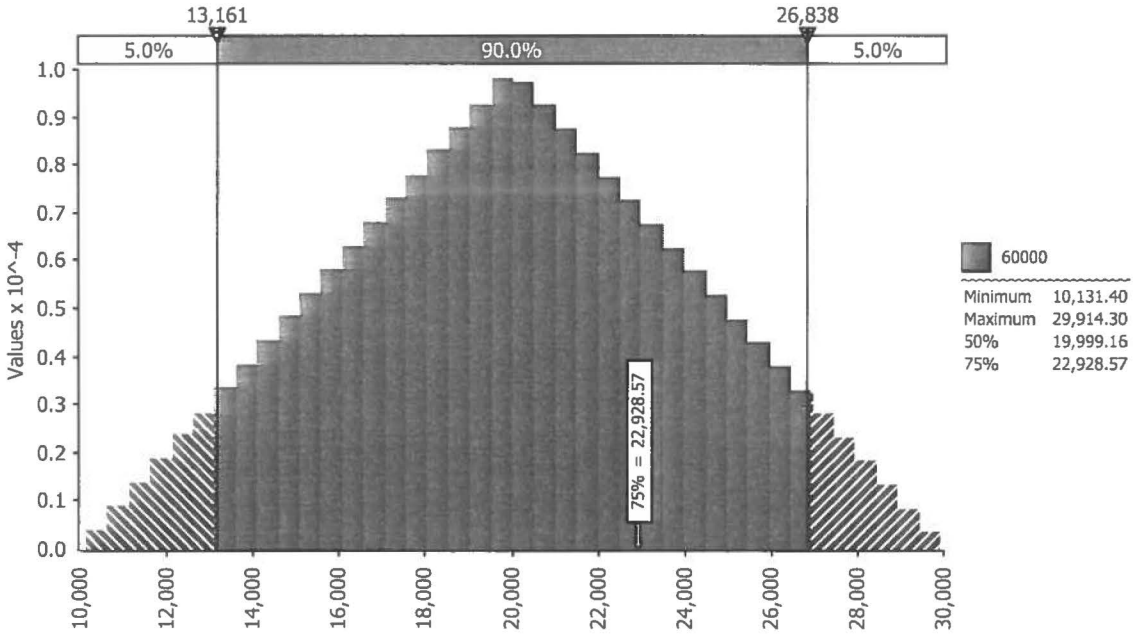
The purpose of the Risk Workshop was to quantify a range of possible risks at the individual risk level. The project team quantified risks using a triangular distribution consisting of three values, summarized from low to high impact below

- Perfect (P) – the smallest quantified impact an individual risk could potentially have, typically considered to be equivalent to the 1st percentile in a probability distribution;
- Likely (L) – the most likely quantified impact of an individual risk; and
- Outrageous (O) – the quantified upper limit impact of an individual risk, typically considered to be the 99th percentile in a probability distribution.

The P, L & O values were quantified for each individual risk resulting in a triangular distribution for each risk.

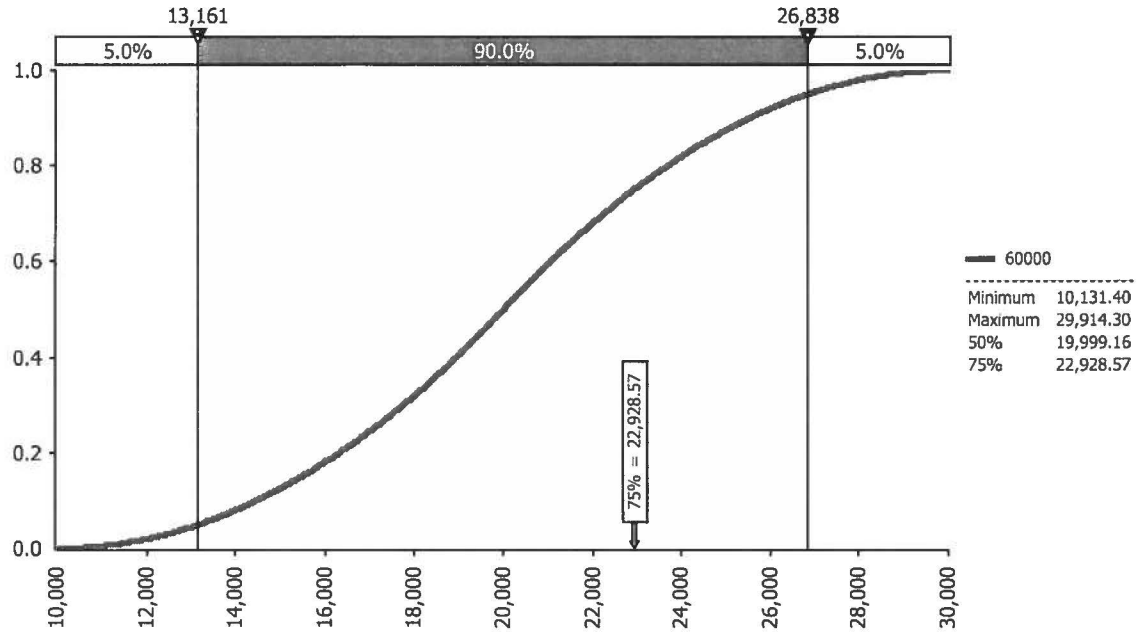
The example exhibit below shows a simple triangular distribution with $10,000 (P); $20,000 (L); and $30,000 (O) values and 100% probability of occurrence. The 75th percentile, a measure of the level of risk certainty, has been marked on the exhibit below.

Exhibit A5.1 – Example Triangular Risk Distribution



The next exhibit below demonstrates the same triangular risk distribution as above, but presented as a cumulative ascending function which better demonstrates the minimum and maximum level of risk exposure as you move from the P to O value:

Exhibit A5.2 – Example Cumulative Ascending Risk Distribution



For this draft report, the 75th Percentile was used to quantify risks. This is consistent the level of risk certainty used in comparable Value for Money analyses in the Canadian P3 sector.

Risk Allocation

In order to quantify the impact of the risks, an appropriate risk allocation under each of the procurement options was developed. This risk allocation recognized those risks that could be transferred to the private partner, and those that would be retained by the public sector. The risk allocation found in the risk matrix is summarized in the table in the next section

Timing of Risks for Value for Money

The individually quantified risks were grouped for the purposes of the Monte Carlo Analysis. The grouped risks are referred to as "Combined Risks" for the remainder of this section.

The discussion below describes the process used to group Combined Risks for input into the VFM financial model. An important consideration for the VFM analysis is capturing the timing of the recognition of the risks so they are reflected in real, nominal and discounted dollars in the Value for Money analysis appropriately. Combined risks were quantified for the following Combined Risk categories:

1. Pre-Construction Risks
2. Last Year of Pre-Construction Risks
3. Construction (All) Risks

4. Construction Year 1 Risks
5. Construction Last Year Risks
6. Operations Every Year Risks
7. Operations (All) Risks

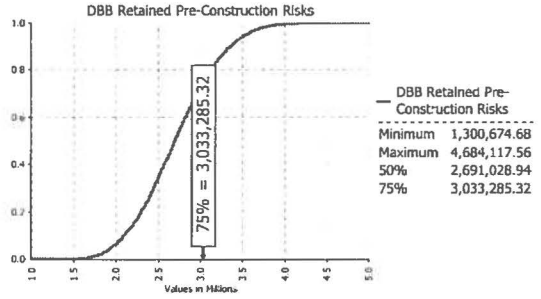
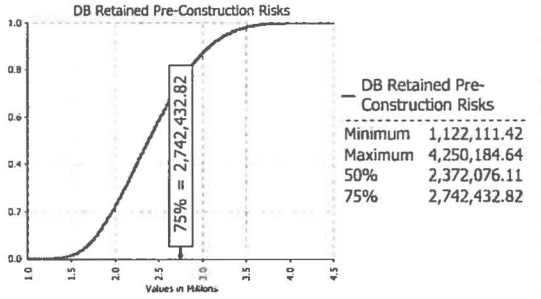
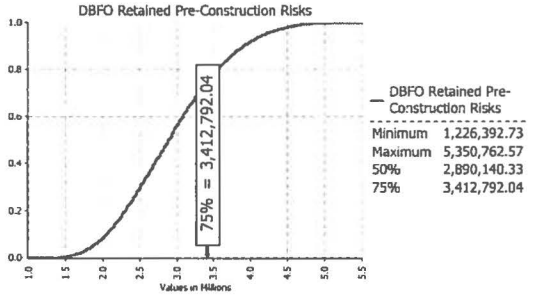
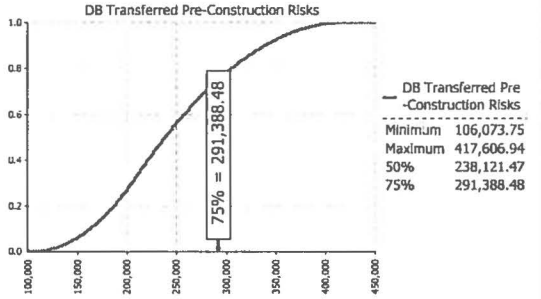
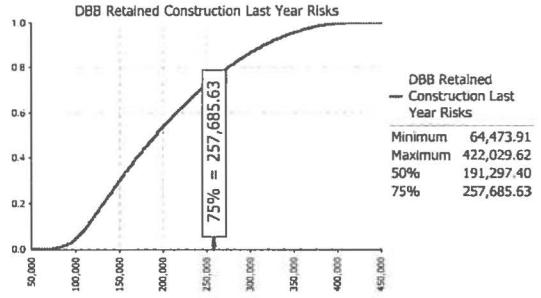
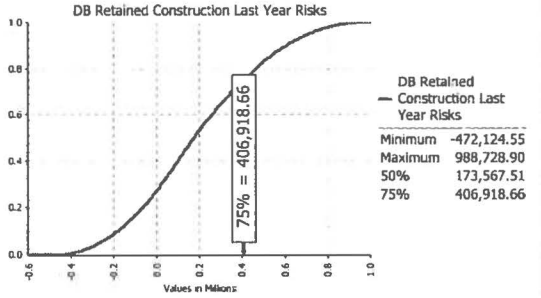
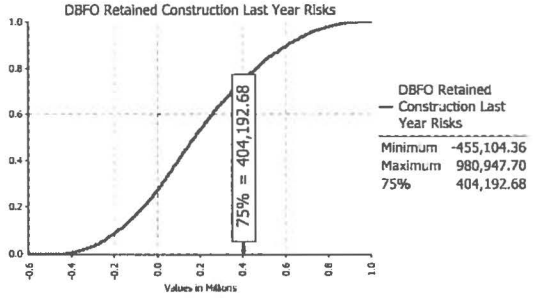
Results of Monte Carlo Analysis

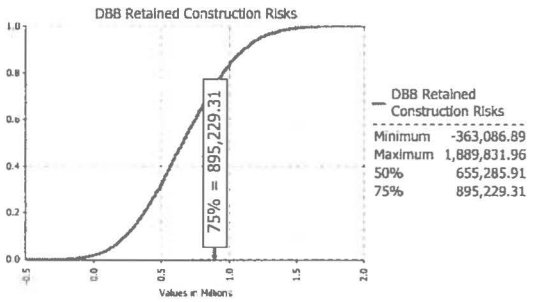
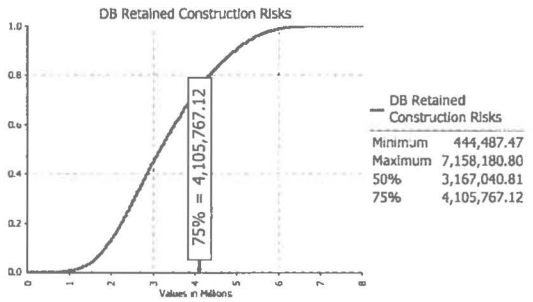
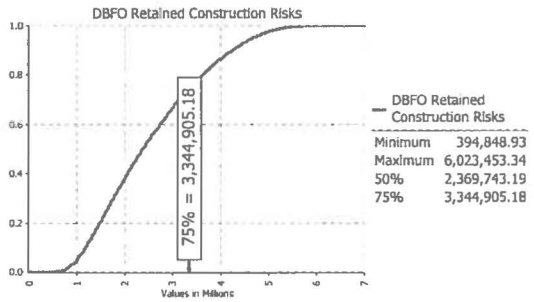
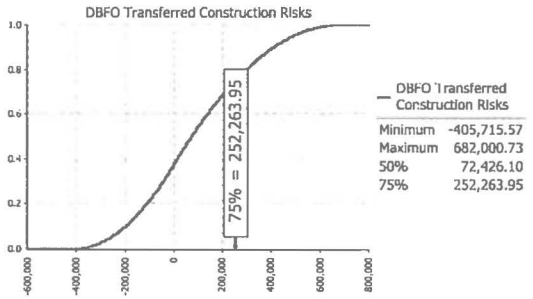
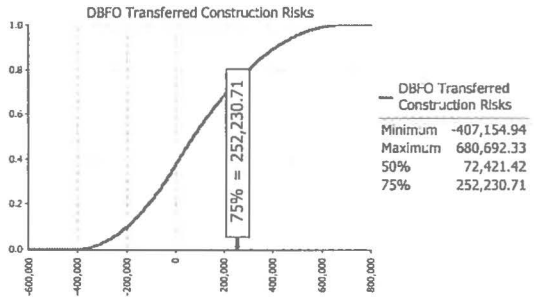
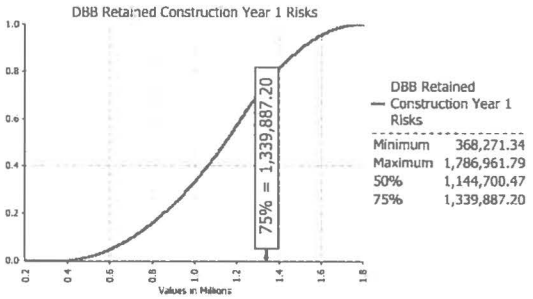
The exhibit below summarizes the quantified risks and allocation for each of the seven Combined Risk categories at the 75th percentile. All risks below are stated in real 2013 dollars. The results of the Monte Carlo simulation are as follows:

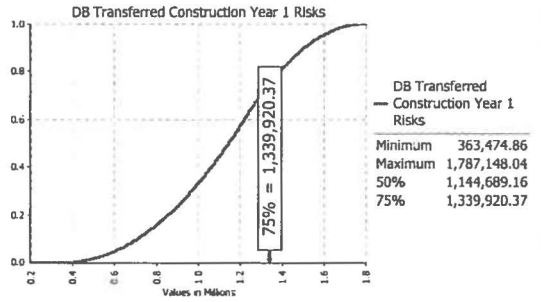
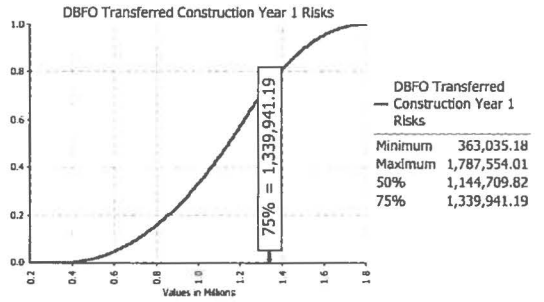
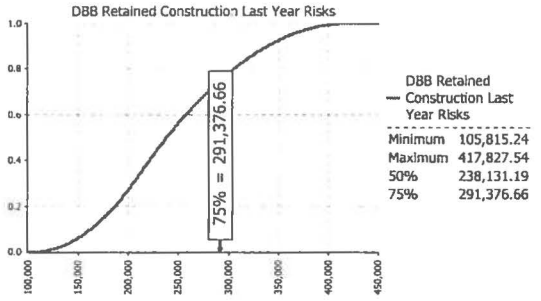
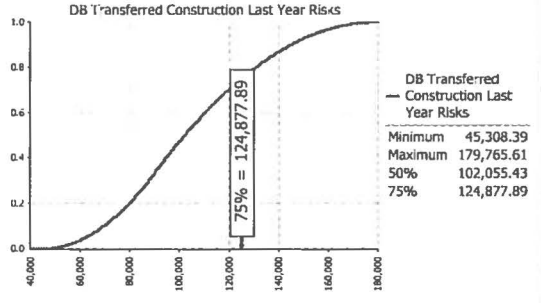
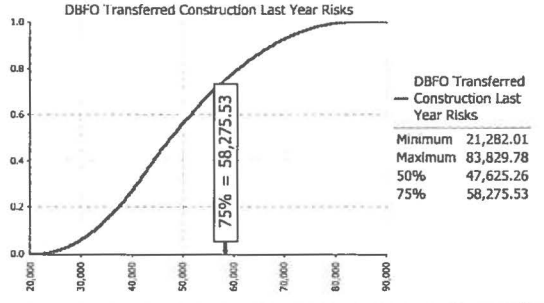
Exhibit A5.3 – Risk Results at 75th Percentile

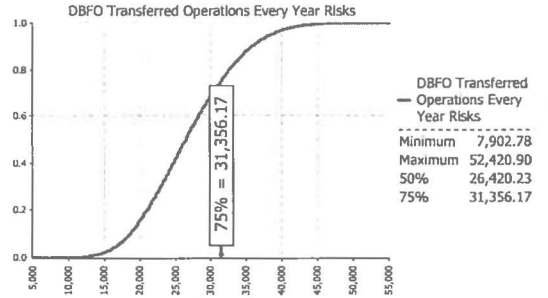
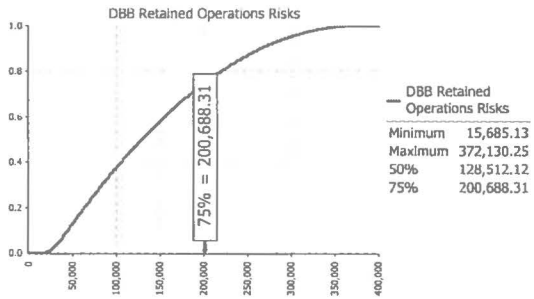
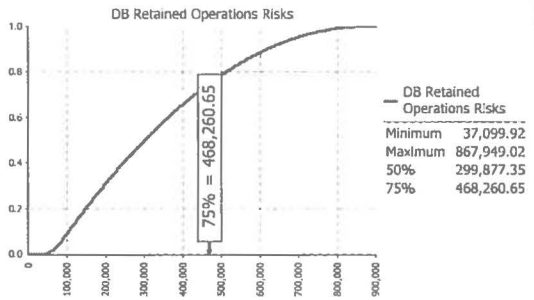
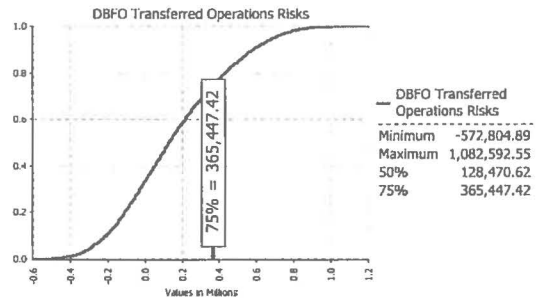
Risk Results ($'000)	DBB		DB		DBFOM	
	Retained	Transferred	Retained	Transferred	Retained	Transferred
Pre-Construction Risks	2,712.8	-	2,409.6	245.0	2,939.4	-
50th Percentile	2,693.2	-	2,374.4	238.1	2,886.8	-
75th Percentile	3,031.0	-	2,740.7	291.4	3,410.9	-
90th Percentile	3,345.8	-	3,098.8	338.7	3,888.0	-
Last Year of Pre-Construction	203.3	-	196.1	-	196.1	-
50th Percentile	190.8	-	174.0	-	172.9	-
75th Percentile	257.1	-	403.4	-	407.0	-
90th Percentile	315.2	-	607.9	-	609.7	-
Construction (All)	664.9	-	3,291.4	91.5	2,549.0	91.5
50th Percentile	653.9	-	3,172.7	72.4	2,365.9	72.4
75th Percentile	891.3	-	4,091.0	252.2	3,352.1	252.2
90th Percentile	1,122.9	-	4,922.2	411.8	4,226.0	411.8
Construction (Year 1)	1,124.1	-	-	1,124.1	-	1,124.1
50th Percentile	1,144.7	-	-	1,144.7	-	1,144.7
75th Percentile	1,339.9	-	-	1,340.0	-	1,339.9
90th Percentile	1,506.7	-	-	1,506.6	-	1,506.6
Construction (Last Year)	245.0	-	-	105.0	-	49.0
50th Percentile	238.1	-	-	102.1	-	47.6
75th Percentile	291.4	-	-	124.9	-	58.3
90th Percentile	338.6	-	-	145.1	-	67.7
Operations (Every Year)	41.6	-	38.8	-	-	26.8
50th Percentile	40.1	-	38.4	-	-	26.4
75th Percentile	53.1	-	45.2	-	-	31.4
90th Percentile	64.7	-	51.8	-	-	35.9
Operations (All)	142.5	-	332.5	-	-	66.5
50th Percentile	128.5	-	299.8	-	-	60.0
75th Percentile	200.7	-	468.3	-	-	93.7
90th Percentile	264.8	-	617.7	-	-	123.6

Exhibit A5.4 – Combined Risk Distributions by Procurement Model at 75th Percentile

Combined Risk	DBB	DB	DBFOM
Retained Pre-Construction Risks			
Transferred Pre-Construction Risks	N/A		N/A
Retained Construction Last Year Risks			

Combined Risk	DBB	DB	DBFOM
Retained Construction (All) Risks			
Transferred Construction (All) Risks	N/A		
Retained Construction Year 1 Risks		N/A	N/A

Combined Risk	DBB	DB	DBFOM
Transferred Construction Year 1 Risks	N/A		
Retained Construction Last Year Risks		N/A	N/A
Transferred Construction Last Year Risks	N/A		

Combined Risk	DBB	DB	DBFOM
Retained Operations Every Year Risks			N/A
Transferred Operations Every Year Risks	**N/A**	**N/A**	
Retained Operations (All) Risks			

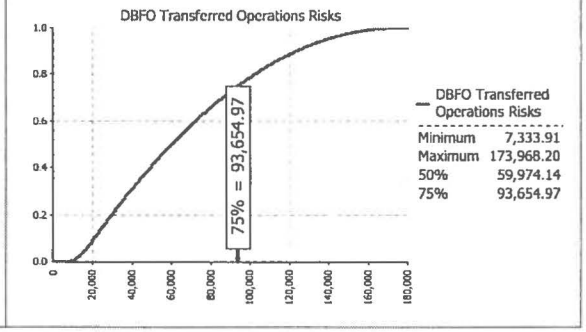
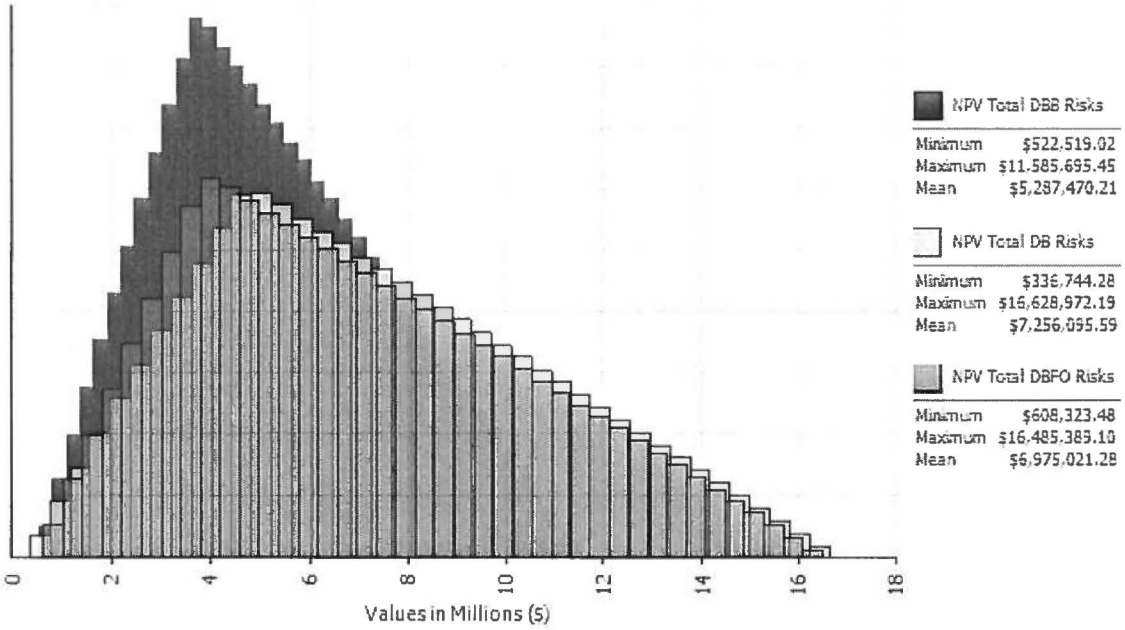
Combined Risk	DBB	DB	DBFOM
Transferred Operations (All) Risks	N/A	N/A	

Exhibit A5.5 – Risk Distributions



Appendix 8 Efficiencies

An efficiencies workshop was held on August 12, 2013 to assess any efficiencies that could be realized in the alternative delivery models.

Participants from Metro Vancouver and external advisors attended the efficiencies workshop to quantify efficiencies between the alternative delivery models. Efficiencies were quantified as a percentage of the base cost estimates. Results of the efficiencies workshop are as follows:

The project team developed the following efficiencies:

	Cost Base	Efficiency	Total	Timing
DB (compared to DBB)				
Program				
Design / Construction Interface	313,760,000	3%	9,412,800	Construction
Design / Construction				
Site work	31,900,000	0%	0	Construction
Foundation	41,000,000	5%	2,050,000	Construction
Structural	71,800,000	5%	3,590,000	Construction
Architectural	15,400,000	0%	0	Construction
Equipment	45,400,000	10%	4,540,000	Construction
Special Construction	20,900,000	5%	1,045,000	Construction
Conceying	200,000	0%	0	Construction
Mechanical	40,900,000	5%	2,045,000	Construction
Electrical	27,000,000	5%	1,350,000	Construction
Professional Services				
Professional Fees	313,760,000	-0.5%	(1,568,800)	Construction
	Cost Base	**Efficiency**	**Total**	**Timing**
DBFOM (compared to DB)				
Program				
Design / Construction / Operations interface	313,760,000	1%	3,137,600	Construction
Design / Construction				
Design / Construction	313,760,000	0.0%	0	Construction
Operations & Maintenance				
Operations & Maintenance	7,758,156	0.0%	0	Annual during Operations
Insurance	500,000	-15.0%	(75,000)	Annual during Operations
Lifecycle				
Repair & Replace	2,894,874	10%	289,487	Annual during Operations
Professional Services	Additional management involvement above that of DB.			
Professional Fees	313,760,000	-1.0%	(3,137,600)	Construction

Key Assumptions:

- Constrained site
- Each delivery model will meet project objectives, including Community integration requirements
- Treatment includes:
  - UV treatment

- No Chemicals (2 x ADWF)
- Activated sludge
- Digestion

- Biogas utilization

Key Risk Categories identified:

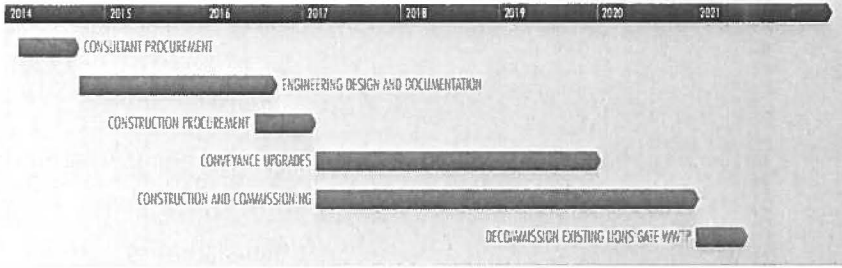
- **Program:** Integration efficiencies for combining multiple aspects of the program, including design, construction, operations and maintenance. Efficiencies are gained as responsibility for delivery remains with one party. Designers, Contractors and Operators are involved in the procurement process, and throughout the design, and help to ensure that constructability and operability are directly included in the design.
- **Integration between Design and Construction:** Innovation as the design build approach focuses on performance specifications, this provides a wider opportunity to use competition as an incentive for private parties to develop innovative solutions to meeting these service specs. Areas of innovation include process design, constructability, logistics, construction techniques. Also, asset utilization is improved as costs to government are reduced, through a more efficient design to meet performance specifications.
  - Site Work – potential for different construction materials
  - Foundation – Alternative foundation strategies are available
  - Architectural – Alternative materials and design
  - Equipment efficiency: Combining design and construction allows optimisation of equipment specifications, increases purchasing efficiency, as bidders have more ability to change the type of equipment
  - Mechanical – Optimal specifications
- **Integration between DB and O&M / Repair and Replacement:**
  - Adding O&M / Repair and Replacement to the design build approach allows the trade-off optimization between capital, maintenance and rehabilitation
  - It also provides a wider opportunity to use competition as an incentive for private parties to develop innovative solutions to meet O&M and Repair and Replacement requirements, while reducing costs.
  - Metro Vancouver already run plants, so the private sector efficiencies are for the most part cancelled by Metro Vancouver's operating economies of scale. Operational efficiencies including less FTE's are counteracted by higher rates/margins.
- **Professional services:** Changes in costs to Metro Vancouver for professional services including consultants, legal, project management, and ongoing management of Project Agreement. Metro Vancouver would require additional management involvement as this would be its first significant alternative delivery program.

LIONS GATE SECONDARY Wastewater Treatment Plant

As part of Metro Vancouver's responsibility to protect and enhance the natural environment, a new secondary wastewater treatment plant will be built on the North Shore.

TIMELINE

The plant is to be fully commissioned and operational by December 31, 2020. Procurement for the design and construction phase should commence in 2014. Construction and commissioning is to take place between 2017 and the end of 2020. Once the plant is in operation, the existing Lions Gate primary treatment plant will be decommissioned and deconstructed.



Metro Vancouver is designing a new Lions Gate Secondary Wastewater Treatment Plant – expected commissioning 2020.

The plant will provide secondary treatment to approximately 200,000 residents on the North Shore of Burrard Inlet – total estimated cost $700 million.

Project Definition is complete – project can move rapidly to full design and construction once federal/provincial funding support has been secured.

PROJECT PHASES AND TIMELINE

PROJECT BUDGET

Metro Vancouver has completed the Project Definition phase and Indicative Design of the Lions Gate Secondary Wastewater Treatment Plant project, and based on current design considerations, the estimated cost of the project – including decommissioning of the old facility – is approximately $700 million.

PROCUREMENT OPTIONS

Metro Vancouver also commissioned KPMG to undertake an in-depth value-for-money analysis of the design and construction procurement options available for the new Lions Gate plant, options that included three primary models: the traditional design-bid-build (DBB), design-build-finance (DBF), and design-build-finance-operate-maintain (DBFOM, or a full private/public partnership). A Committee of the Metro Board of Directors recently completed a detailed review of the KPMG report, and based largely on Metro Vancouver's 50+ years experience in building, operating and maintaining state-of-the-art wastewater treatment facilities throughout the region, concluded that the optimal procurement model for the Lions Gate Secondary Wastewater Treatment Plant is design-build-finance.

PROJECT FUNDING

The Metro Vancouver Board of Directors has formally committed a one-third share of the $700 million in estimated costs for the Lions Gate project, and is currently seeking a commitment from the federal and British Columbia governments for the remaining two-thirds of the project's capital costs. Given the amount of capital expenditures involved, the most appropriate potential funding source for the Lions Gate project is the new Building Canada Fund. The allocations for the Provincial-Territorial Infrastructure Component of the Building Canada Fund, which total $3.685 billion over the four main construction years for the Lions Gate project (2016/2017 through 2019/2020), align perfectly with the main capital outlays that will be required to complete the project within the mandated timelines stipulated under the *Canada-wide Strategy for the Management of Municipal Wastewater Effluent*.

View of the new plant along 1st Street West and Pemberton Avenue

Renderings by Miller Hull Partnership

METRO VANCOUVER

As the regional government on Canada's southwest coast, Metro Vancouver has legislatively mandated responsibility for providing regional-scale utility services – water, wastewater and solid waste management – to over 2.3 million residents in the greater Vancouver area, or just over 50% of British Columbia'stotal population.

Managing our region's wastewater is a combined effort. Residents, businesses and industries in Metro Vancouver produce about 1 billion litres of wastewater per day, which is brought to treatment plants through a municipal system of sewers, collection systems and sewage pumping stations.

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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

For more information on the Lions Gate Secondary Wastewater Treatment Plant, please contact:

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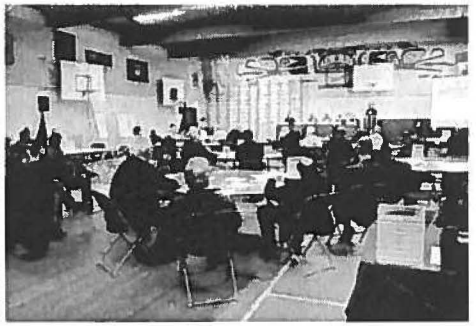
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Wastewater treatment plants


Project site


NEW Plant site rendering


Public meetings

LIONS GATE SECONDARY WASTEWATER TREATMENT PLANT PROJECT

A REGIONAL UTILITY

To collect and treat wastewater, Metro Vancouver operates a network of trunk sewers, pumping stations and wastewater treatment plants that connect with municipal sewer systems.

We are responsible for:

- five wastewater treatment plants
- about 530 km of trunk sewer pipes (large pipes that connect to smaller municipal pipes)
- 33 sewage pumping stations

Metro Vancouver also supports municipalities in the management of stormwater and habitat and drainage areas around certain rivers.

Our priority is to protect public health and the environment by maintaining healthy rivers and oceans. As part of the treatment process, we are also finding innovative ways to use wastewater as a resource.

The existing Lions Gate Wastewater Treatment Plant serves the North Shore municipalities of West Vancouver, the City of North Vancouver and the District of North Vancouver as well as the Squamish Nation and Tsleil-Waututh Nation with a population of 200,000. The plant was commissioned in 1961 and has provided primary level treatment on the North Shore for the past 50 years. The existing plant will continue in full operation until the new Lions Gate Secondary Wastewater Treatment Plant (LGSWWTP) is commissioned by 2020.

As identified in Metro Vancouver's *Integrated Liquid Waste and Resource Management Plan* – which was approved by the BC Ministry of Environment in May, 2011 – the Lions Gate project is part of the secondary upgrading program of the two remaining primary WWTPs in the region. Under federal regulations the Lions Gate Wastewater Treatment Plant must be upgraded to secondary treatment by December 31, 2020.

The Lions Gate Secondary Wastewater Treatment Plant presents an opportunity to simultaneously provide a needed upgrade to an essential service, protect the local environment and contribute to development on the North Shore.

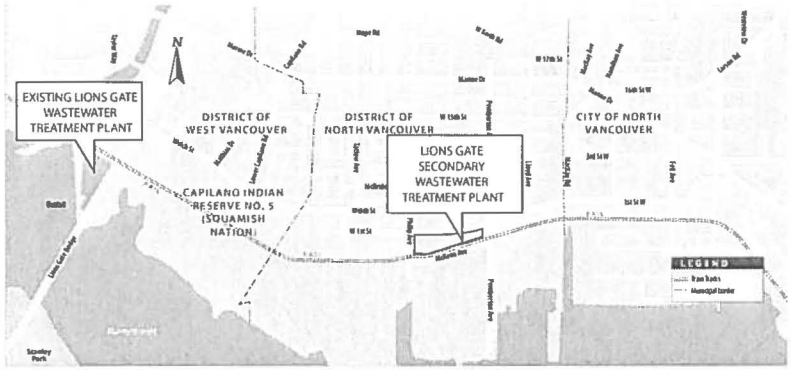
The new Lions Gate Secondary Wastewater Treatment Plant will occupy much of its 3.5 hectare site, and will employ best practices for wastewater treatment, resource recovery, and provide maximum flexibility for future treatment technology upgrades and growth.

PROJECT OBJECTIVES

- Provision of secondary wastewater treatment.
- Development and demonstration of a project that is socially, ecologically and economically sustainable.
- Implementation of integrated resource recovery strategies.
- Creation of a facility integrated into the community.

PROJECT DEFINITION – INDICATIVE DESIGN

During the project definition phase, Metro Vancouver used a multi-disciplinary process in defining the scope of work required for the delivery of a state-of-the-art wastewater treatment plant. The resulting Indicative Design specifically responds to Metro Vancouver's four objectives for the project.



North Shore map

The project team worked together in a highly collaborative way with a large number of stakeholder groups including businesses, residents, technical experts, local government and First Nations in order to integrate these objectives into the project design.

Intensive activities are focused at the west end of the site, with digesters, solids handling, headworks and dewatering clustered to facilitate robust odour control and efficient operation of the plant. Primary and secondary treatment occur mid-block, with a transparent cantilevered Operations and Maintenance building at the corner of 1st St. and Pemberton Avenue. These treatment plant functions are contained in a clean, architectural form balanced against the industrial scale of neighbouring industries. Translucent and glazed walls at the west end also allow selected views from the street into the plant, making the invisible visible.

INDICATIVE DESIGN – COMPLETE

What emerged from the Indicative Design process is a project characterized by a diverse range of urban experiences across the site, a pedestrian scaled public entrance and outdoor open space at the foot of Pemberton. A facility that is resilient and future proof, is secure but visually open to the community; has the potential to be a net producer of energy; and can be used to teach future generations about sustainable building, wastewater treatment and environmental stewardship.

COMMUNITY ENGAGEMENT

Supporting the objectives of the Lions Gate project is a detailed community engagement plan. The project team works with local stakeholders to identify issues early, and addressed community concerns throughout the Indicative Design process. Community engagement will continue until the completion of the project, through a Public Advisory Committee, a Community Resource Forum, an Intergovernmental Advisory Committee, presentations to Council, and meetings with local residents and businesses.

In November 2013, the Lions Gate Advisory Committee – representing the North Shore communities – submitted a comprehensive report, "Community Values and Interests for the Design of the Lions Gate Secondary Wastewater Treatment Plant".

The committee supports the Indicative Design as a reflection of their community values: prudent use of taxpayers' money, design that integrates well with the community, and using modern technology to reduce local impacts while meeting regulatory requirements.