LIONS GATE SECONDARY Wastewater Treatment Plant

Utilities Committee
Special Workshop Meeting
Project Procurement Options Analysis

September 24, 2013
1:30 – 5:30 pm

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

Background

To obtain Federal and Provincial level funding for project a P3 business case needs to be undertaken

- P3 Canada funding is dependent upon P3 delivery
- The Building Canada Fund and provincial funding may not be tied to P3 delivery, but a P3 business case needs to be provided

P3 Assessment Business Case Process

- A Business Case comprises the following components:

	Sections	Components
Part A	Rationale for Project	• Strategic Context and Project Background
Part B	Delivery of Project	• Project Objectives • Service Delivery Options Analysis • Project Scope
Part C	Procurement Options Analysis	• Overview of Procurement Options • Qualitative Analysis (MCA) • Market Sounding • Quantitative Analysis (VfM) and Risk Analysis • Recommended Procurement Model
Part D	Procurement Plan and Funding	• Procurement Plan • Funding Analysis

P3 Assessment Business Case Process
Procurement Options Analysis

Overview of Procurement Models
- Long List of Options

Qualitative Analysis
- Assessment Against Criteria

Market Sounding
- Industry Capacity

Quantitative Analysis
- Value for Money Assessment

Recommended Procurement Model

Participants

Participants	Representation
Metro Vancouver	• LWS – Operations and Maintenance • LWS - Project Delivery • LGSWWTP Project Team • Finance – Purchasing and Risk Management
Engineering Team	• AECOM • CH2M Hill • Golder Associates – Geotechnical
Architecture and Community Integration Team	• Miller Hull Partnerships • Mathew Woodruff Architects
Consultants	• BTY Group – Cost Consultant • Maple Reindeers – Contractor • KPMG – Financial Modeling
Expert Advisors	• Dr. Alan Russell • Gordon Culp

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Overview of Procurement Models

Public Sector — *Risk Allocation* — Private Sector

Design-Bid-Build ("DBB")	Design-Build ("DB(f)")	Design-Build – Operate/Maintain ("DBOM")	Design-Build-Finance-Operate/Maintain (DBFOM")
▪ Contract separately to the private sector for design services and then construction of the facility	▪ Contract to the private sector to design and build the facility as a single contract. ▪ Private sector *may* be responsible for some construction financing (DB(f))	▪ Contract for private sector to design-build and operate/ maintain the facility	▪ Contract for private sector to design-build finance and operate public facility ▪ Private sector responsible for a portion of the financing (including equity investment) throughout agreement term
Risk transferred: Construction risk	**Risk transferred: Design and construction risk** Construction/ completion risk, (if some construction financed)	**Risk transferred:** Design, construction, and operations	**Risk transferred:** DBO + long-term financing

Package Bundling Review

Project Packages Identified for Analysis

- Lions Gate Secondary Wastewater Treatment Plant
  - Single construction package

- Conveyance between existing WWTP and new secondary wastewater treatment plant and outfall
  - Design-Bid-Build (DBB) procurement

- Decommission existing WWTP
  - Deconstruction and site clean up - Request for proposal

Procurement Options

- Design Bid Build (DBB)
- Design Build (DB)
- Design Build finance (DB(f))
  - (Extended Warranty/Holdback Provision)
- Design Build Operate Maintain (DBOM)
- Design Build Finance Operate Maintain (DBFOM)

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Multi Criteria Assessment

- Qualitative Analysis of Procurement Options
  - Social/Community Oriented Criteria
  - Facility Development and Operations Criteria
  - Environmental Criteria
  - Procurement and Financial Criteria

Multi Criteria Analysis Summary

Evaluation Criteria	DBB	DB	DB(f)	DBOM	DBFOM
Social/Community-Oriented Criteria					
Community Impacts – Design (i.e. aesthetic)	✓✓✓	✓+	✓✓	✓✓	✓✓
Community Impacts – Operations (i.e. noise/odour)	✓✓	✓✓	✓✓	✓✓	✓✓
Community Integration	✓✓✓	✓✓	✓✓	✓	✓
Community partnership	✓✓✓	✓✓	✓✓	✓	✓
Stakeholder Acceptance	✓✓✓	✓✓+	✓✓	✓	✓
Facility Development and Operations					
Staff Recruitment and Retention	✓✓	✓✓	✓✓	✓✓	✓✓
Staff Relationships	✓✓✓	✓✓✓	✓✓✓	✓	✓
Flexibility – Development Phase	✓✓	✓✓	✓✓	✓✓	✓✓
Flexibility – Operations Phase	✓✓✓	✓✓+	✓✓+	✓✓	✓✓
Level of control over system	✓✓✓	✓✓✓	✓✓✓	✓	✓
Customer service	✓✓	✓✓	✓✓	✓✓	✓✓
Environmental Criteria					
Environmental Sustainability	✓✓	✓✓+	✓✓✓	✓✓✓	✓✓✓
Resource Recovery	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓
Regulatory Compliance	✓✓✓	✓✓✓	✓✓✓	✓✓+	✓✓+
Permitting	✓✓	✓✓	✓✓	✓✓	✓✓
Procurement and Financial Criteria					
Cost certainty of design and construction	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Cost certainty of base operations	✓✓✓	✓✓	✓✓+	✓✓✓	✓✓✓
Lifecycle cost efficiency	✓✓	✓	✓+	✓✓✓	✓✓✓
Procurement Schedule	✓✓	✓✓✓	✓✓+	✓+	✓
Implementation Schedule	✓	✓✓+	✓✓✓	✓✓+	✓✓✓
Market Interest/ Capacity	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Procurement complexity	✓✓✓	✓✓+	✓✓+	✓+	✓
Contract enforcement	✓✓✓	✓✓	✓✓+	✓	✓+

- DBB performed strongest in Social/Community Oriented Criteria and Facility Development and Operations - primarily due to the additional control by the owner.
- DB(f) and DB performed stronger on the environmental criteria -primarily because of the incentives on performance testing.
- The DB(f), DBO, and DBFOM 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.

Short listing of Procurement Options for Value for Money Analysis

- **DBB** - due to its strength in the Social/Community and Facility Development and Operations
  - DBB model represents the Public Sector Comparator (PSC) as this approach is reflective of the historic delivery models implemented by Metro Vancouver.
- **DB(f)** - selected over DB due to better performance in the Environmental Criteria and the Procurement and Financial Criteria. These two options performed equally on the other criteria.
- **DBFOM** - selected over DBO due to the additional leverage for contract enforcement due to the equity and financing component and the P3 expectation of PPP Canada.

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Market Sounding

	Description
Purpose	To gain insights from firms active in delivery of wastewater projects on: • Project Participation • Specific Project Risks • Potential Delivery models
Firms	• 22 Firms in Total • Engineering and Construction, Infrastructure Developers, Operators, and Financiers
Project Interest	• Most expressed interest in the project • Concerns about process reversals once the project process has started.
Comments/ Concerns	• Delivery preferred through single package • Concerned about quality and quantity of Influent Risk • Concerned about risk of unit prices (power and chemical), geotechnical and conveyance interface

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Value for Money Assessment

Risk Assessment

- Identification and quantification of risks

Efficiency Assessment

- Assessment of relative efficiencies of the delivery models

Financial Modelling

- Cash flow projections and Net Present Value (NPV) comparison

Sensitivity Analysis

- Assess implications of changing assumptions

Cost Basis for VfM Analysis

Capital Costs - Based on anticipated capital program costs ranging from $ 500 M - $700 M (2018 dollars)

Description	Value
Construction	$ 314,000,000
Contingencies	94,000,000
Professional Fees	60,000,000
Management, Overhead and Utility Connections	32,000,000
Subtotal (2013 dollars)	**500,000,000**
Escalation to 2018 dollars	90,000,000
Total (2018 dollars)	**$ 590,000,000**

Cost Basis for VfM Analysis

Annual Operating and Maintenance Costs - Based on selected treatment process and current operating experience. Presented in 2020 dollars.

Description	Value
O&M Labour	$ 3,700,000
Utilities	$1,900,000
Chemicals	$ 600,000
Life Cycle Maintenance, Repair and Replacement (starting in year 2025)	$ 2,900,000
Biosolids Management	$ 1,450,000
Laboratory and Consumables	$ 150,000
Total	**$ 10,700,000**

Does not include – conveyance operating costs

Risk Register

From an initial list of over 50 risks:

20 key risks were included in the Risk Analysis as key differentiators between the procurement models.

Risk	Timeline	DBB	DB(f)	DBFOM
		Allocation	Allocation	Allocation
Owner's Project Management Team Experience	Pre-Construction (All)	Retained	Retained	Retained
Evaluation of submissions	Pre-Construction (All)	Retained	Retained	Retained
Incomplete RFP / Tender Documentation	Pre-Construction (All)	Retained	Retained	Retained
Shortlisted Proponent Withdraws	Pre-Construction (All)	Retained	Retained	Retained
Design delay	Pre-Construction (All)	Retained	Transferred	Transferred
Scope Changes by Owner - During RFP	Last Year Pre-Construction	Retained	Retained	Retained
Contract Award / Commercial Close Delay	Last Year Pre-Construction	Retained	Retained	Retained
Existing Conditions are different than what could reasonably be inferred	Construction (Year 1)	Retained	Transferred	Transferred
Owner's Project Management Team Experience	Construction (All)	Retained	Retained	Retained
Third party stakeholder interaction	Construction (All)	Retained	Retained	Retained
Community amenities	Construction (All)	Retained	Retained	Retained
Scope Changes by Owner - During Construction	Construction (All)	Retained	Retained	Retained
Incomplete RFP / Tender Documentation resulting in Scope Change	Construction (All)	Retained	Transferred	Transferred
Construction Schedule - ability to be operational in 2020 (December)	Construction (Last Year)	Retained	Partially transferred	Transferred
Un-anticipated Operating Costs - Electricity Usage	Operations (Every Year)	Retained	Retained	Transferred
Un-anticipated Operating Costs - Labour usage	Operations (Every Year)	Retained	Retained	Transferred
Un-anticipated Operating Costs - Chemical Usage	Operations (Every Year)	Retained	Retained	Transferred
Life-Cycle Maintenance Costs	Operations (Every Year)	Retained	Retained	Transferred
Operation for Intended Use	Operations (All)	Retained	Retained	Transferred
Handover Agreement	Operations - last year	Retained	-	Retained

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Risk Identification and Assessment

Risk Workshop

- Purpose: To identified probability of risk and value range for risk
- Process: For each Delivery Model (DBB, DB(f), DBFO)
    1. Determine if risk is retained by Metro Vancouver or transferred
    2. Determine probably of risk occurring
    3. Determine range of costs of risk, if encountered

Risk Identification and Assessment

Development of Risk Values (Cost of risk)

A probability simulation for each delivery model developed a probability distribution model based on:

- Probability of risk occurring
- Range of costs of risk

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Efficiency Assessment

Efficiencies of the alternative delivery models compared to the DBB model.

	DB(f) Compared to DBB	DBFO Compared to DB(f)
Design/Construction Interface	3 %	1 %
Foundation	5 %	
Structural	5 %	
Equipment	10 %	
Special Construction	5 %	
Mechanical	5 %	
Electrical	5 %	
Professional Fees	-0.5%	-1 %
Lifecycle (Repair and Replacement)		10 %

Efficiencies Results

Resultant Efficiencies of the alternative procurement models:

	DB(f) Compared to DBB	DBFOM Compared to DBB
Procurement, Design and Construction	7.0 %	7.2 %
Operations and Maintenance	0%	2.7 %

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Financial Modeling

To assess Value for Money, a financial model was created for each delivery model based on the annual risk adjusted cashflows over the term of the agreement.

Each model comprises the following components:

Risk Adjusted Cashflows	DBB	DB(f)	DBFOM
Capital Costs	✓	✓	✓
Operating Costs	✓	✓	✓
Lifecycle Costs	✓	✓	✓
Private Sector Financing Costs			✓
Taxes			✓
Insurance	✓	✓	✓
Efficiencies		✓	✓

Annual cash-flows for Metro Vancouver were developed for each model

Financial Modeling

Risk-Adjusted Cashflow Net Present Value Results:

	DBB	DB(f)	DBFOM
Procurement, Construction and Contract Management	$ 446 M	$ 421 M	$ 418 M
Incremental Financing		$ 0.2 M	$ 16 M
Operations and Maintenance	$ 102 M	$ 102 M	$ 101 M
Retained Risk Allocation	$ 6 M	$ 7 M	$ 7 M
Transferred Risk Allocation		$ 2 M	$ 2 M
Total Net Present Value	**$ 554 M**	**$ 532 M**	**$ 544 M**

- *Based on a discount rate of 6%.*

Value for Money Assessment

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Sensitivity Analysis

- Conducted to assess the implications of changing assumptions for:
  - Discount rate
  - Level of private financing
  - Interest rate
  - Inflation

Sensitivity Analysis Results

Scenario	Base	DBB	DB(f)	DBFOM
Base		554	**532**	544
Discount Rate – 5 %	6%	598	**577**	604
Discount Rate – 7.5 %	6 %	498	475	**470**
Funding during construction – 50%	70 %	554	**532**	555
Long Term Interest Rate – 5.2 %	5.8 %	554	**532**	537
Long Term Interest Rate – 6.5 %	5.8 %	554	**532**	550
Inflation during construction – 2%	3.4 %	521	**500**	510

- All values expressed in millions and as NPV to 2014

Sensitivity Analysis

- Most sensitive to discount rate used
- DB(f) model has lower NPV than DBB for all scenarios
- DBFOM and DBB have similar NPV when
  - discount rate is 5%
  - long term private financing is 50%
  - long term private financing rate is 6.5%
- DBFOM has lowest NPV when the discount rate is 7.5 % or greater.

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Initial Findings

- DB(f) and DBFOM delivery models result in a lower NPV than the DBB delivery model
- DB(f) model results in the lowest NPV for all but one of the scenarios tested