Responses to Questions regarding Foundation Decisions from the Lions Gate Public Advisory Committee

1. New federal legislation is forcing upgrading of the plant

A Canada-wide Strategy for the Management of Municipal Wastewater Effluent was endorsed by the Canadian Council of Ministers of the Environment (CCME) in 2009. Canadian provinces are updating their environmental regulations to align with the new strategy. Metro Vancouver's Integrated Liquid Waste and Resource Management Plan, approved by the Minister in 2011, is aligned with the new strategy.

In July 2012 the federal government announced a new regulation under the Fisheries Act to establish the strategy in federal law. The regulation prescribes four deleterious substances and the discharge standard that must be met by Canadian wastewater facilities:

- Carbonaceous biochemical oxygen demand not to exceed 25 mg/L
- Suspended solids not to exceed 25 mg/L
- Total residual chlorine not to exceed 0.02 mg/L
- Un-ionized ammonia not to exceed 1.25 mg/L

Transitional authorizations are part of the regulation to allow time for municipalities to upgrade the facilities that do not meet the new standard. The new standard is indicative of secondary level treatment and facilities providing only primary level treatment are not able to meet the new standard.

- Federal Wastewater Systems Effluent Regulations
  http://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-139/FullText.html
- CCME Canada-Wide Strategy for the Management of Municipal Wastewater Effluent
  http://www.ccme.ca/ourwork/water.html?category_id=81

2. Secondary treatment must be installed – do nothing is not an option

Upgrading to secondary level treatment has been a requirement since the 1990s when Metro Vancouver was ordered to upgrade the Annacis Island and Lulu Island treatment plants. The Minister approved the first Liquid Waste Management Plan for Metro Vancouver in 2002 requiring the upgrading to secondary level treatment for the Iona Island and Lions Gate treatment plants. In 2011 an updated Integrated Liquid Waste and Resource Management Plan that is aligned with the new CCME strategy was approved by the Minister confirming the timing of no later than 2030, and 2020, respectively for the final two upgrades.

- Integrated Liquid Waste and Resource Management Plan (ILWRMP)
  http://www.metrovancouver.org/services/wastewater/planning/Pages/default.aspx
- Letter of Approval from Minister of Environment
  http://www.newsroom.gov.bc.ca/2011/06/metro-vancouver-liquid-waste-management-plan-approved.html
- GVS&DD Board's Approval (**Attachment 1**)
  http://www.metrovancouver.org/boards/GVSDD%20Board/GVSDD_Board-May_21_210-Agenda.pdf
  http://www.metrovancouver.org/boards/GVSDD%20Board/GVSDD_Board-May_21_210-On_Table.pdf

http://www.metrovancouver.org/boards/GVSDD%20Board/GVSDD_Board-May_21_2010-Minutes.pdf

- BC Environmental Management Act - Municipal Wastewater Regulation
  http://www.env.gov.bc.ca/epd/mun-waste/regs/msr/pdf/mwr-OIC-Apr-2012.pdf
  Municipal Wastewater Regulation amendments status page:
  http://www.env.gov.bc.ca/epd/codes/msr/mun_sew_reg.htm

3. Secondary treatment is better than primary only and is justified from an environmental point of view

Secondary treatment has significantly higher removal rates for biochemical oxygen demand and suspended solids than primary treatment (better than 90 percent vs 30 to 60 percent). Primary treatment only removes substances that settle or float. Dissolved substances are not removed in primary treatment, but are in secondary treatment.

Secondary treatment is the regulatory baseline standard across Canada regardless of environmental conditions. Treatment required beyond secondary will be assessed based on a receiving environment approach outlined in the CCME Strategy.

- Metro Vancouver Quality Control Annual Report for GVS&DD 2011
  http://www.metrovancouver.org/about/publications/Publications/GVSDD_Quality_Control_Annual_Report_2011.pdf
- Metro Vancouver Liquid Waste Management Plan Biennial Reports
  http://www.metrovancouver.org/services/wastewater/planning/Pages/Reports.aspx

4. The new plant location cannot be at the existing location

The existing Lions Gate plant is located on lands being returned to Squamish Nation in accordance with the cut-off lands legislation. Some cut-off lands have already been transferred and the treatment plant lands will be the final remaining parcels that are part of the transfer. Work is underway on land contamination assessment required as part of the transfer.

- British Columbia Indian Cut-off Lands Settlement Act
  http://laws-lois.justice.gc.ca/eng/acts/B-8.3/page-1.html
- Indian Cut-off Lands Disputes Act
  http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_96218_01

5. Satellite plants vs one main plant are not an option

Distributed treatment for the North Shore was reviewed during development of the Integrated Liquid Waste and Resource Management Plan. It was also assessed by Fidelis Resource Group as part of their North Shore Integrated Resource Recovery Study. A centralized treatment plant is recommended. In general, simple distribution of plants to service existing development is not a preferred option for the North Shore. Costs are higher due to loss of economies of scale. Operation and maintenance staffing requirements for several facilities would be higher than for a central facility. Additional land is required and each site must meet the standards associated with fitting a new plant into a neighbourhood. Land on

the North Shore for treatment plant sites is limited. Each plant requires a regulatory operational certificate and an outfall to the receiving environment, further increasing costs and complexity. Wet weather management would also be compounded by the need to deal with overflows at each distributed site. Odour management would also be required. Resource recovery options may or may not be available. It is usually not practical to treat solids at small plants and a solids treatment and management strategy at a central location would be required.

Opportunities for distributed treatment will be available for consideration by the municipalities for new developments. Some examples of this type of distributed treatment and its resource recovery benefit include the Dockside Green development in Victoria and the on-site treatment facility that is associated with the Vancouver Convention Centre. These types of initiatives can assist with reducing the flow and load demand for the central system and help avoid the need for, or result in the deferral of, growth upgrades for the central system.

- GVRD Iona Island and Lions Gate WWTP by Stantec and Dayton & Knight (**Attachment 2**)
- North Shore IRR Study by Fidelis Resource Group (**Attachment 3 & Attachment 4**)

6. Private Public Partnerships are not particularly favoured but may be necessary to obtain federal and/or provincial money

The provincial policy that has been established is that for projects receiving $50 million or more of provincial funding a Public Private Partnership (P3) will be considered the base case unless there is a compelling reason to do otherwise. Federal funding from the P3 Canada program is only available for projects using Public Private Partnerships. As part of the Project Definition Phase, work will be undertaken in consultation with Partnerships BC and P3 Canada to assess the value of a P3 for the design and construction phase. This may include the assessment of discrete components of the new plant, particularly if there are energy and integrated resource recovery opportunities identified that might lend themselves to a P3 contracting approach and are validated by a value-for-money analysis.

- Partnerships BC
  http://www.partnershipsbc.ca/index.php
  http://www.partnershipsbc.ca/files-4/documents/partnershipsbc2010-11to2012-13serviceplanfinal.pdf
- P3 Canada
  http://www.p3canada.ca/home.php

7. The amortization policy is 15 years, highly unusual in utility projects

The amortization approach for capital works financing based on a 15 year term has been in place since 1996. It has been re-affirmed by the Board as recently as 2010.

Metro Vancouver's long-range capital plan continues to identify significant investments required for the water, wastewater and solid waste infrastructure in the coming decade and beyond. Given this continuous need to invest in infrastructure, the shorter amortization approach has avoided the compounding of debt, deferral of debt payment to future generations and has minimized the interest payments associated with Metro Vancouver's debt financing. Metro Vancouver continues to benefit from a AAA credit rating through the Municipal Finance Authority.

The Metro Vancouver Board Finance Committee has the mandate to review and recommend the financial approach and strategy.

8. What is the design basis (capacity, emissions, etc)? Is pre-investment involved for the future, and if so to what extent? Will additional expansion of the plant for more capacity or for higher treatment levels be possible on the proposed site? What were/are the technology options and what was chosen and why?

The Project Definition Phase work is intended to address each of these issues. Several scenarios incorporating different levels of treatment that lends itself to increased resource recovery, future regulatory requirements, etc. will be developed and assessed through seven Integrative Design Workshops and the Lions Gate Public Advisory Committee will have the opportunity to provide input.

9. What are the funding options?

Federal / provincial cost sharing, if available, would significantly reduce the user rate increase associated with the treatment plant upgrade projects.

There are currently no open federal / provincial funding programs that would provide cost sharing for the Lions Gate project (with the exception of P3 Canada if the project incorporated a large degree of private participation). The existing Canada – BC Infrastructure program is fully allocated and expires in 2014. In 2011 the federal government announced its intention to develop a new long-term infrastructure program that would be put in place when the current program expires in 2014. Input from Canadian municipalities has been invited through the Federation of Canadian Municipalities. Metro Vancouver will continue to participate in this process to develop and new long-term infrastructure program and the Board Chair and Vice-Chair are taking a lead role.

- Long-term Infrastructure Program
  http://www.infrastructure.gc.ca/plan/bpp-pbp/bc/bc-eng.html
- Federation of Canadian Municipalities (FCM) Infrastructure Funding
  http://fcm.ca/home/issues/infrastructure/about-the-issue.htm

10. What economic "hurdle rate" will MV use to determine if incremental investments are financially viable? Is full life cycle economics used to evaluate options?

The decision process and evaluation criteria that will be used to compare developed options are being undertaken as part of the Project Definition Phase. This phase is iterative and being developed through seven Integrative Design Workshops. The Lions Gate Public Advisory Committee will be engaged in the review of options and their evaluation. Life cycle cost will be part of the evaluation criteria.

Attachment 1

BRITISH COLUMBIA
The Best Place on Earth

Reference: 127948

MAY 3 0 2011

Lois E. Jackson, Chair
Metro Vancouver Board
Metro Vancouver
4330 Kingsway
Burnaby BC V5H 4H9

Dear Chair Jackson:

Thank you for your letter of June 25, 2010, with the attached Liquid Waste Management Plan (LWMP), the Board resolutions for adopting the plan and a summary of the Metro Vancouver's consultation process. A summary of endorsements confirming each member municipality commitments was received on December 21, 2010.

Ministry staff have reviewed your submission and accompanying documents. The technical aspects of the proposed LWMP are supported, and I am satisfied there has been adequate public review and consultation. However, the LWMP as submitted does not fully meet my requirements. Therefore, I hereby impose the following changes to the submitted LWMP titled *Integrated Liquid Waste and Resource Management: A Liquid Waste Management Plan for the Greater Vancouver Sewerage & Drainage District and Member Municipalities* (ILWRMP) dated May 2010:

1. The Ministry supports upgrading to secondary level treatment the Lions Gate wastewater treatment plant by 2020 and Iona Island wastewater treatment plant as soon as possible, but no later than 2030 and not contingent on the availability of senior government funding. The Ministry of Environment is not a funding agency. While I understand the cost of the upgrades is significant, they are necessary to meet current environmental standards. The Ministry will support Metro Vancouver pursuing senior government and alternative funding options, but cannot guarantee any provincial commitment in that regard, nor compromise the Ministry's mandate to protect the environment.

2. Member municipalities are strongly encouraged to business case and/or implement residential water metering programs and to consider municipal rebate programs for water efficient fixtures and appliances to reduce potable water use.

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Ministry of Environment
Office of the Minister
Mailing Address:
Parliament Buildings
Victoria BC V8V 1X4
Telephone: 250 387-1187
Facsimile: 250 387-1356

3. Metro Vancouver, in partnership with member municipalities, is encouraged to pursue a region-wide water conservation program targeting the industrial, commercial, institutional and agricultural sectors as part of its new Drinking Water Management Plan. Remaining municipalities in the region that have not implemented metering for these sectors are encouraged to do so.

4. Metro Vancouver must use receiving environment and effluent monitoring data from combined sewer overflow (CSO) and sanitary sewer overflow (SSO) in the regional system to interpret the overall status of CSOs and SSOs. Metro Vancouver will continue the fate and effects studies on CSOs with the Clarke Drive location and other significant sites as determined by the Environmental Management Committee. Metro Vancouver will establish similar studies representative of significant SSO locations, in particular the Cloverdale, Katsie and Lynn locations. The interpretation and assessment should demonstrate whether there has been any improvement or degradation along with any measures taken to address such discharges. Metro Vancouver will report out in the Quality Control Annual Report.

5. Metro Vancouver is encouraged to continue to build upon previous studies associated with studying endocrine-disrupting chemicals, persistent organic pollutants and other micro-contaminants found in wastewater by developing source control initiatives through education (for example, target outreach), regulation and inspection programs.

6. Metro Vancouver will continue the receiving and ambient monitoring programs specified in the approved 2002 LWMP, including, but not limited to, recreational water quality (beach monitoring); monitoring near the outfalls for all five wastewater treatment plants, including the extensive deep sea monitoring near the Iona Island plant; and CSO effluent quality and monitoring of small urban streams relating to impacts from urbanization and stormwater.

7. Member municipalities will, with MV planning and coordination, and to the satisfaction of the Regional Manager, develop a coordinated program to monitor stormwater and assess and report the implementation and effectiveness of Integrated Storm Water Management Plans (ISMP). The program will use a weight-of-evidence performance measurement approach and will report out in the Biennial Report. The Regional Manager may extend the deadline for completion of ISMP by municipalities from 2014 to 2016 if satisfied that the assessment program could result in improvement of ISMP and protect stream health.

8. Bypass conditions that occur at wastewater treatment plants will be reported out in the annual quality control report. The report on each activity will include a description of the event, cause, environmental effect and monitoring that occurred and any mitigation measures undertaken to prevent reoccurrence and remediate detrimental environment effect.

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9. The ILWRMP has a goal of protecting public health and the environment. In keeping with this goal and to ensure alignment with other national, provincial and regional initiatives, Metro Vancouver and member municipalities are encouraged to:
    a. Have local land use planning consider the direction provided by the ISMPs;
    b. Consider how the degree, type and location of land development within a drainage can affect the long-term health of the watershed;
    c. Consider how to protect the stream, including the riparian areas that exert an influence on the stream, from long-term cumulative impacts; and
    d. Use scenarios and forecasting to systematically consider environmental consequences/benefits of different land use approaches prior to build-out (for example, Alternative Future type approaches).

10. Metro Vancouver will continue to consult with First Nations during the implementation of the Plan—in particular, engaging, as appropriate, with First Nations likely to be impacted by the secondary upgrades.

Pursuant to Section 24(5) of the *Environmental Management Act*, I hereby approve Metro Vancouver's LWMP titled *Integrated Liquid Waste and Resource Management: A Liquid Waste Management Plan for the Greater Vancouver Sewerage & Drainage District and Member Municipalities* dated May 2010, subject to the conditions noted above.

I commend Metro Vancouver Board and staff on their success in developing a comprehensive master plan to manage the Greater Vancouver Sewerage & Drainage District's liquid waste for years to come.

Sincerely,

Terry Lake
Minister of Environment

cc: Jim Standen, Assistant Deputy Minister, Environmental Protection Division
Jonn Braman, Regional Manager South Coast, Environmental Protection Division

Attachment 2

8.6 ALTERNATIVE SITES FOR MULTIPLE PLANTS

Introduction

Real estate available for the future development of LGWWTP is limited. An alternative approach could consider treatment at three dispersed sites, the existing LGWWTP and at two other plants. The costs and benefits of this strategy are briefly reviewed in this section.

Plant sizing is based on projected flows for the year 2046. Basic descriptions of each plant are provided below.

West Vancouver Waste Water Treatment Plant

The design ADWF would be 26 ML/d. The plant would be located in the vicinity of Ambleside Park. Treated wastewater would be discharged into Burrard Inlet through a new outfall.

Lions Gate Waste Water Treatment Plant

This plant would be located at the existing LGWWTP site and would use the existing outfall and infrastructure on the treatment plant site. Secondary treatment would be designed for 66 ML/d ADWF.

Lynn Pump Station Waste Water Treatment Plant

This plant would be located in an industrial zone near the existing Lynn Pump Station and designed for 39 ML/d ADWF. Discharge would be into Burrard Inlet upstream of the Lions Gate Bridge and may require biological nutrient removal.

Credit for Existing Sewers

As the wastewater would be distributed to three treatment plants, it would not be necessary to upgrade some North Shore trunk sewers that would have to be upgraded if all flows were directed to LGWWTP or to a single replacement site. A credit of $5 million has been allowed for twinning the North Vancouver City Section trunk sewer. For estimating purposes this has been assumed to be a 915 mm (36 in.) diameter sewer with a length of 7.5 km.

Construction cost estimates are based on D&K cost data. Total Costs are estimated to be Construction Costs x 1.4 and are inclusive of additional items such as noise control, earthquake protection, odour control, architectural finishes, outfall, contingencies, engineering, financing and administration (Table 8.3). Estimates are based on an ENR Index of 6794 (November 2003).

TABLE 8.3
COST ESTIMATES – ALTERNATIVE SITES FOR MULTIPLE PLANTS

Treatment Plant	ADWF (ML/d)	Area (Ha)	Construction Cost 10^6	Total Cost 10^6
West Vancouver inc. outfall	26	1.8	38	53
Lions Gate	66	3.4	66*	92*
Deduction for existing infrastructure			(27)	(38)
Lynn P/S inc. outfall	39	2.9	56	78
Totals	**131**	**8.1**	**133**	**185**

*: Greenfield construction cost

Excluding land cost, the total project cost of a single new 131 ML/d plant near the existing plant is estimated to be $160 million while the cost of three dispersed plants is $185 million. The premium on the capital cost for dispersed treatment would therefore be approximately 16%.

O&M costs for dispersed treatment would be higher than for a single treatment plant. The cost of power and chemicals would be approximately equal. However, additional manpower resources would be required, particularly as the Lynn P/S plant could be a BNR plant, which would require a higher level of control. Monitoring costs for the three plants would be higher. Annual plant maintenance costs would also be higher.

Sludge Treatment

Lynn Pump Station WWTP and West Vancouver WWTP would probably not include sludge digestion facilities, as use would be made of the digesters at the Lions Gate WWTP. Sludge would be conveyed to the plant using existing sewers.

Discussion of Treatment at Multiple Plants

Given the existence of a trunk sewer system delivering to the LGWWTP site, the creation of a dispersed secondary treatment system has little advantage to offer. The following disadvantages have been identified:

- Difficulty of acquiring land
- Higher project cost
- Higher operating and maintenance cost
- More monitoring and administration
- Increased social impact

Attachment 3

8.3 FINANCIAL RESULTS

Table 14 summarizes the key financial and non-financial results for the six IRR scenarios. Column 7 provides comparative financial information for replacing the Lions Gate Treatment plant without heat recovery.

Table 14: Scenario Summary

Key financial indicators	1	2	3	4	5	6	7
1: Initial CapEx (inc. softs, contingency) - PV	-$376m	-$360m	-$368m	-$396m	-$341m	-$298m	-$148m
2: Net total value - PV (pre-finance)	-$228m	-$106m	-$83m	-$24m	-$206m	-$258m	-$249m
3: Net total value after finance - 2010$$	-$766m	-$64m	$44m	$336m	-$542m	-$797m	-$1,101m
4: Estimated average subsidy per taxpayer	-$70/yr	-$19/yr	-$16/yr	-$28/yr	-$48/yr	-$69/yr	-$93/yr
5: Estimated average subsidy/home	-$177/yr	-$48/yr	-$41/yr	-$70/yr	-$120/yr	-$174/yr	-$234/yr
6: Estimated duration of taxpayer subsidy	48yrs	31yrs	23yrs	6yrs	50yrs	50yrs	50yrs
7: Taxpayer ROI (contributed tax as equity)	-97%	-52%	57%	1,041%	-100%	-100%	-100%
8: Estimated IRR before tax & finance	Not calculable	Not calculable	Not calculable	Not calculable	Not calculable	Not calculable	Not calculable
Key resource recovery indicators	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9: Total projected energy generated	5,132 GWh	5,132 GWh	5,774 GWh	7,935 GWh	2,743 GWh		
10: Total tonnage processed/generated	112,000 tonnes	112,000 tonnes	136,000 tonnes	200,000 tonnes	60,000 tonnes		
11: Total water recovered	2,560 Mm3	2,560 Mm3	2,560 Mm3	2,560 Mm3	2,560 Mm3	2,560 Mm3	
12: Total CO2e reduction	11.1 mtCO2e	11.9 mtCO2e	13.9 mtCO2e	17.9 mtCO2e	12.0 mtCO2e	5.2 mtCO2e	
13: Relative total Shadow price of carbon (benefit)	-$616m	-$432m	$0m	$893m	-$413m	-$1,910m	

Scenarios
1. Distributed WW Treatment, Maplewood Energy Plant, 70% Diversion
2. McKeen WW Treatment, Maplewood Energy Plant, 70% Diversion
3. McKeen WW Treatment, Maplewood Energy Plant, 90% Diversion
4. McKeen WW Treatment, Maplewood Energy Plant, Current Transfer Station Volume
5. McKeen WW Treatment, Maplewood Energy Plant, 70% Diversion, Revenue Modified
6. McKeen WW Treatment, Heat Recovery from Wastewater Only
7. McKeen WW Treatment Only

Greater detail on each Scenario is provided in the Scenario Dashboard Appendix starting on page 82. Table 14 is interpreted as follows:

- Line 1 notes the initial capital costs and associated soft costs, excluding life cycle costs and revenues, expressed as a present value. This is a common method of evaluation. Under this metric Scenario 6 provides the least-cost IRR solution. On a least-cost present value basis, none of the other resource recovery models would be chosen due to higher capital and operating costs associated with full resource recovery. The approximate proportions are shown in Figure 15.

- Line 2 includes life cycle costs and revenues and shows the present value for each Scenario, before finance. This suggests that Scenario 4 is best and Scenario 3 is also marginally positive. Scenario 2 while a net loss is still superior to scenario 6. The revenues are illustrated in Figure 16.

- Line 3 assesses full life cycle valuation after finance in 2010 constant dollars. On this metric, Scenarios 1 and 6 are least preferred, with Scenarios 3 and 4 indicating a positive net value to the taxpayer (*i.e.* a net dividend). All Scenarios are superior to replacing Lions Gate

Attachment 4

- A site for a new wastewater treatment plant that is located between three areas with energy demands.

Accordingly, the principal findings and recommendations outlined below may not necessarily be applied to the rest of Metro Vancouver.

Our analysis and report follows a modified "Valuation for Secured Lending" standard which is in common use by industry and is considered appropriate to the task. Evaluation is thus primarily focused on financial metrics, but has been combined with Triple Bottom Line analysis to reflect the public interest and for consistency with Metro Vancouver's standard practice. The combined approach is considered consistent with international best practices.

A draft of the final report was shared with Metro Vancouver and municipal staff in a facilitated workshop. The main conclusions from this workshop were as follows:

- There was general agreement that IRR for the North Shore should be approved in principle, subject to more detailed analyses. It was felt that the general public would support IRR if it led to reduced taxes and greenhouse gas emissions and increased use of renewable energy as these were goals espoused in OCPs.
- There was concern over the complexity of the infrastructure design and an interest in seeing if this could be phased in a way that was more adaptive to community needs.
- There was recognition that existing governance models and procurement practices were not suited to IRR implementation and that new options should be explored.

9.1 Principal Findings

In view of this feedback and our analysis contained in the report, our principal findings are:

- All six scenarios result in higher net revenues than purely treating wastewater at McKeen with on-site cogeneration of energy from biosolids.
- Distributed wastewater treatment plants are financially unattractive on the North Shore, but may have merit elsewhere in Metro Vancouver.
- Combining solid and liquid waste produces synergies in energy recovery that results in higher and better use of resources than separating the two waste streams (Scenarios 2, 3, 4, and 5).
- A 50-year life cycle valuation was used. The preferred scenarios are projected to generate between $2.8 and $3.2 billion in new revenues.
- These revenues may exceed additional costs for IRR infrastructure resulting in tax payer dividends if financing models are optimized.