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January 26, 2009

British Columbia Utilities Commission
Sixth Floor
900 Howe Street
Vancouver, B.C.
V6Z 2N3

Attention: Ms. Erica M. Hamilton, Commission Secretary

Dear Ms. Hamilton:

**Re: Terasen Gas Inc. ("Terasen Gas")**
**Application for a Certificate of Public Convenience and Necessity ("CPCN") for the Fraser River South Arm Crossing Upgrade (the "Application")**

**Response to the British Columbia Utilities Commission ("BCUC" or the "Commission") Information Request ("IR") No. 2(a)**

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On November 6, 2008, Terasen Gas filed the Application as referenced above. In accordance with Commission Order No. G-173-08 setting out the Regulatory Timetable for the Application, Terasen Gas respectfully submits the attached response to BCUC IR No. 2(a).

If there are any questions regarding the attached, please contact the undersigned.

Yours very truly,

**TERASEN GAS INC.**

***Original signed by: Shawn Hill***

***For:*** Tom A. Loski

Attachment

cc (e-mail only): Registered Participants

**11.0 Reference: Exhibit B-3, BCUC IR 1.18.1**

11.1 Please provide the economic analysis requested, rather than the discounted cost of service analysis provided in the response. TGI's attention is again drawn to the Commission's findings at page 200 of its Decision dated May 11, 2007 concerning BC Hydro's 2006 IEP/LTAP. The Excel spreadsheet TGICPCNECAN is attached. Please fill in the cells highlighted, as well as any others Terasen Gas may deem necessary.

- The purpose of the economic analysis is to enable the Commission to understand the Present Values of the status quo and each of the four alternatives, when considering only the cash flows of each scenario.

- It is noted that in Exhibit B-1, p. 17, (Lines 8-11) TGI spoke of ongoing O&M costs associated with monitoring NPS 20, but did not include them in its response to BCUC 1.18.1. Please include the difference in O&M costs for the existing and upgraded NPS 20 in the calculations.

- It appears that the discount rate of 7.48 percent that TGI used when responding to BCUC IR 1.18.1 is its average WACC. As requested in BCUC IR 1.18.1, please use TGI's incremental WACC as the discount rate, and explain how the rate was calculated.

- In the response to this question, please explain the basis of calculation of any numbers that are not readily apparent from the filed evidence.

- Please calculate the difference between the Present Value of the status quo and Alternative 1. Please use the discount rate to calculate the "discounted" quantity of through-put for each year, sum the "discounted" quantities of through-put and divide this number into the Present Value differential. This will create a value which may be regarded as the levelized cost of earthquake insurance Terasen is seeking to recover from its customers. Please comment on this observation.

(see attached spreadsheet)

**Response:**

See Attachment 11.1 for the incremental cash flows spreadsheet requested. The "Status Quo" scenario and Alternatives A through D are presented. The results of the cash flow analysis are presented in the table below and show the same Alternative ranking as the incremental cost of service analysis presented in BCUC IR 1.18.1.

| NPV / LEVELIZED RATE | PV | ALT PV - STATUS QUO | LEVELIZED RATE ($/GJ) |
|---|---|---|---|
| STATUS QUO | $ 19,780,159 | | |
| ALTERNATIVE A | $ 21,028,555 | $ 1,248,396 | $ 0.0004 |
| ALTERNATIVE B | $ 27,127,413 | $ 7,347,254 | $ 0.0026 |
| ALTERNATIVE C | $ 17,288,580 | $ (2,491,579) | $ (0.0009) |
| ALTERNATIVE D | $ 24,855,674 | $ 5,075,515 | $ 0.0018 |

Operating and Maintenance (O&M) cost differences, though minor, are included in the Status Quo and each Alternative. The Status Quo requires $30,000 O&M per year for river bed inspections. Alternative A requires no additional O&M since both pipelines would be installed via HDD deeply under the river bed. Alternative B requires $30,000 in 2009 for river bed inspections, no inspection in 2010 the year after the replacement of the NPS 24, $10,000 in 2011 and 2012 for inspections of the river banks only, and $30,000 for inspection of the river bed in 2013 and again in 2017. No further river bed inspection would be required as the NPS 20 would then be replaced in 2018. Alternative C would require river bed inspection every 4 years starting 2010 until the NPS 24 replacement in 2034. Alternative D would require river bed inspection every 4 years until NPS 24 replacement in 2034.

For the purposes of this 50 year analysis, the pipeline terminal values are assumed to be zero since the value of buried pipelines would be zero at the end of their useful lives.

The discount rate used for this analysis is the nominal after tax WACC. The cost of debt and ROE are the 2009 approved rates of 6.72% and 8.47% respectively. The corporate tax rate declines from the current 30% to 26% through 2012 and remains constant thereafter. Consequently, the after tax WACC increases from 6.02% to 6.20% during that period and remains at 6.20% thereafter. The after tax WACC discount rate was also used for the Mount Hayes LNG Storage Facility proceeding cost of service and cash flow analyses.

TGI was asked to comment on the suggestion that this project is merely an investment in "earthquake insurance". TGI, like all public utilities, are under a statutory duty to provide and maintain its property and equipment in a condition to enable it to provide service to the public that the Commission considers is in all respects adequate, safe, efficient, just and reasonable.[1] All system maintenance expenditures must be assessed with regard to the safety and reliability benefits obtained against the cost of performing that maintenance at the present time. There will be projects where the cost savings can be achieved without risking safety or reliability in any meaningful way. TGI believes that this is not one of those projects. With the knowledge of a probable failure upon a seismic event, and the potential ramifications outlined in the Application and summarized above, TGI believes that it would be imprudent not to undertake the Project for the potential of relatively modest monetary benefits. TGI emphasizes that even the

[1] Act, section 38

monetary benefits of waiting are questionable. Re-light costs incurred in restoring service after a failure of both crossings, for instance, would add in the order of $12 million to the Project cost.[2]

[2] Exhibit B-1, at 11-12; Exhibit B-2, Response to BCUC IR No. 1.1.8.

**12.0 Reference: Exhibit B-1, pp. 25, 26, 27, Appendix 7; Exhibit B-2, BCUC IR 1.5.2, 1.5.3, 1.5.10**

12.1 TGI states that the capital cost of the project is estimated to be $27.3 million in 2008 dollars, with an expected accuracy of – 15 to +20 percent. Please provide cost estimates in nominal or "as spent" dollars for completion in 2009 and in 2010.

**Response:**

The cost estimate of $27.3 million -15% +20% in $2008 dollars for Alternative 1 was finalized in late 2008 – refer to BCUC IR 1.5.2 and 1.5.3. To convert the estimate to nominal or "as spent" dollars for both 2009 and 2010 completion options, construction and material cost escalations assumptions would need to be made. For the purpose of this response only, it is assumed that 2% inflation would apply to all costs incurred in 2010, and another year of AFUDC would be incurred. This results in estimates of:

- $27.3 million for 2009 completion
- $28.1 million for 2010 completion.

Please see response to BCUC 2.12.3.

12.2 Further to Appendix 7, please provide current Schedules for the project for completion in 2009 and 2010, and include columns showing start and end dates for each step.

**Response:**

Attachment 12.2 provides current project schedules for completion in 2009 and 2010.

12.3 The response to BCUC IR 1.5.3 states that there is no cost difference in the cost estimate between 2009 and 2010 completions in current dollars. Please explain why a one-year delay in project completion will not result in increased Project Management, Engineering, Consultation, Land Utilization, AFUDC and other costs.

**Response:**

TGI expects that deferral of construction to 2010 would result in only a marginal increase in the "as spent" costs to Project Management, Engineering, Consultation, Land

Utilization, AFUDC and other costs. Please refer to BCUC IR 2.12.5 for examples of steps TGI would take to minimize expenditures in the event of deferral.

As stated in BCUC IR 1.5.3, the central issue in deferring construction start to 2010 is evaluation of the required 2009 and 2010 control budgets, following receipt of tenders. Depending on the tenders received, total estimated project costs may be less expensive in 2010 vs. 2009, offsetting any marginal increases in project management, engineering, consultation, AFUDC and other costs.

Hence at this time, TGI sees no rationale for distinguishing between the estimated costs for constructing in 2009 versus 2010.

12.4 Please provide the information that was requested in BCUC IR 1.5.2 and 1.5.3, in nominal dollars.

**Response:**

The following two tables are completed for project completion in 2009 and 2010. For the purposes of this response only, TGI has used its current +20% and -15% cost estimates in the table, rather than P90 and P10 estimates, as this is the best information available at this stage in the project. TGI will submit P10 and P90 estimates, upon completion of the control budget. As indicated in BCUC IR 2.19.1, a cost risk analysis will be completed after the material and construction tendering process.

The following table is in response to question BCUC IR 1.5.2 which is for project completion in 2009.

| **ESTIMATE DATA** | | | | **PROJECT TIMELINE** | |
|---|---|---|---|---|---|
| **DOLLARS IN NOMINAL**<br>$27.3 million | **WACC** %<br>6.02 in 2009 | **USEFUL LIFE**<br>*50 years* | **AACE ESTIMATE CLASS**<br>Not Calculated | **PROJECT START DATE**<br>*(YYYY/MM/DD)*<br>2009/03/05 | **IN-SERVICE DATE**<br>*(YYYY/MM/DD)*<br>2009/11/05 |

| **ESTIMATED COST AT COMPLETION** | | | | |
|---|---|---|---|---|
| | **ESTIMATED COST AT COMPLETION ($ million)** | **ESTIMATE ACCURACY** | **ENGINEERING COMPLETED %** | 30% |
| **BEST CASE** (P10) | Not calculated | Not calculated | **AFUDC $ SPENT TO DATE** | $73,000 |
| **WORST CASE** *(P90)* | Not calculated | Not calculated | **INTERNAL REVIEW** *(yes/no)* | yes |
| **EXPECTED COST** *(Base Case)* | $27.3 million | -15% +20% | **EXTERNAL REVIEW** *(yes/no)* | no |

| **ESTIMATE COST DATA** | |
|---|---|
| **WORK BREAKDOWN STRUCTURE ELEMENT**<br>*(at WBS Level 3 or higher)* | **ESTIMATED COST**<br>**(Dollars x 1,000)** |
| Project Management, Engineering, Consultation, Inspection | 4,300 |
| Land Utilization, Temporary Workspace | 1,800 |
| Pipe & Coating Materials | 3,600 |
| River Crossing HDD Installation & Pipeline Construction | 11,600 |
| Tie In Construction | 2,500 |
| North Bank Dike Improvements Allowance | 1,000 |
| Operations & Commissioning | 600 |
| **Total Project AFUDC (Cost of Money)** | 900 |
| **CORPORATE & ADMINISTRATIVE COSTS** | 300 |
| **UNDISTRIBUTED COSTS** | Not calculated |
| **PERFORMANCE MEASUREMENT BASELINE (PMB) (Subtotal)** | 26,600 |
| **PROJECT RESERVE** | Not Calculated |
| **PROJECT COST** *(Performance Measurement Baseline including Project Reserve)* | 26,600 |
| **FIRST NATIONS CONSULTATION AND ACCOMODATION COSTS** | 70 |
| **LEGAL COSTS** | 230 |
| **OTHER REGULATORY COSTS** *(provide a separate listing in a similar table)* | Not Calculated |
| **BC EAO REGULATORY COSTS** | Not Calculated |
| **BCUC REGULATORY COSTS** | Not Calculated |
| **OTHER NON-PROJECT COSTS** *(provide a separate listing in a similar table*<br>**(RETIREMENT COSTS)** | 400 |
| **CONTINGENCY (***without escalation or inflation)* | Not Calculated |
| **ESCALATION** *(including Inflation)* | Not Applicable |
| **TOTAL PROJECT COST (TPC)** | 27,300 |

The following table is in response to question BCUC IR 1.5.3. for project completion in 2010. The numbers are the same as in the previous table plus the addition of $500,000 escalation and addition of $300,000 AFUDC.

| | | | | PROJECT TIMELINE | |
|---|---|---|---|---|---|
| **DOLLARS IN NOMINAL** $28.1 million | **WACC** % 6.02 in 2009 | **USEFUL LIFE** *50 years* | **AACE ESTIMATE CLASS** Not Calculated | **PROJECT START DATE** *(YYYY/MM/DD)* 2009/03/05 | **IN-SERVICE DATE** *(YYYY/MM/DD)* 2010/08/06 |

| ESTIMATED COST AT COMPLETION | | | | |
|---|---|---|---|---|
| | **ESTIMATED COST AT COMPLETION ($ million)** | **ESTIMATE ACCURACY** | **ENGINEERING COMPLETED %** | 30% |
| **BEST CASE** (P10) | Not calculated | Not calculated | **AFUDC $ SPENT TO DATE** | $73,000 |
| **WORST CASE** *(P90)* | Not calculated | Not calculated | **INTERNAL REVIEW** *(yes/no)* | yes |
| **EXPECTED COST** *(Base Case)* | $27.3 million | -15% +20% | **EXTERNAL REVIEW** *(yes/no)* | no |

| **ESTIMATE COST DATA** | |
|---|---|
| **WORK BREAKDOWN STRUCTURE ELEMENT** *(at WBS Level 3 or higher)* | **ESTIMATED COST (Dollars x 1,000)** |
| Project Management, Engineering, Consultation, Inspection | 4,300 |
| Land Utilization, Temporary Workspace | 1,800 |
| Pipe & Coating Materials | 3,600 |
| River Crossing HDD Installation & Pipeline Construction | 11,600 |
| Tie In Construction | 2,500 |
| North Bank Dike Improvements Allowance | 1,000 |
| Operations & Commissioning | 600 |
| **Total Project AFUDC (Cost of Money)** | 1200 |
| **CORPORATE & ADMINISTRATIVE COSTS** | 300 |
| **UNDISTRIBUTED COSTS** | Not calculated |
| **PERFORMANCE MEASUREMENT BASELINE (PMB) (Subtotal)** | 26,600 |
| **PROJECT RESERVE** | Not Calculated |
| **PROJECT COST** *(Performance Measurement Baseline including Project Reserve)* | 26,600 |
| **FIRST NATIONS CONSULTATION AND ACCOMODATION COSTS** | 70 |
| **LEGAL COSTS** | 230 |
| **OTHER REGULATORY COSTS** *(provide a separate listing in a similar table)* | Not Calculated |
| **BC EAO REGULATORY COSTS** | Not Calculated |
| **BCUC REGULATORY COSTS** | Not Calculated |
| **OTHER NON-PROJECT COSTS** *(provide a separate listing in a similar table* **(RETIREMENT COSTS)** | 400 |
| **CONTINGENCY (***without escalation or inflation)* | Not Calculated |
| **ESCALATION** *(including Inflation)* | 500 |
| **TOTAL PROJECT COST (TPC)** | 28,100 |

12.5 When does TGI expect to make the decision to complete the Project in 2009 or delay it to 2010? In the event that project completion is delayed to 2010, please discuss the steps that TGI will take to delay expenditures on Detailed Engineering, Permitting, Materials Procurement and Land Utilization.

**Response:**

TGI expects to make the decision on or about May 2009 to complete the Project in 2009 or delay it to 2010, predicated on evaluation of construction tenders, and determination of revised cost estimates for both options. At that time TGI will also evaluate risks to the permitting process and completion of working space agreements, to assess the probability of meeting schedule deadlines before proceeding.

In the event that project completion is delayed to 2010, the steps that TGI will take to delay or minimize duplication of effort include:

A. Detailed Engineering – complete all deliverables in progress, re-assign staff personnel to other projects, and suspend consultant contracts. Remaining deliverables will be re-scheduled to facilitate 2010 work.

B. Permitting – submit applications that request permit(s) to cover the entire period up to and including 2010.

C. Material Procurement – any materials already contracted for purchase and not received will either have receipt delayed at manufacturing point at a negotiated rate, or will be received and stockpiled if cost effective. A cost provision for this circumstance has been factored into the estimates. For materials not yet contracted, the procurement process will be postponed to meet the 2010 construction window.

D. Land Utilization – negotiate agreements that are based on actual property occupancy required, and permit a construction window in both 2009 and 2010 calendar years, with final property restorations in 2011, if required.

12.6 Considering that the Application was filed on November 6, 2008, please discuss whether project completion in 2009 is reasonably feasible. What are the pros and cons of putting the project on hold for a period, and restarting it for a 2010 in-service date?

**Response:**

Based on the present status of design, procurement, stake-holder negotiations, and permitting, TGI believes that project completion in 2009 is reasonably feasible.

The following pros and cons may apply to the choice of a 2010 in-service date:

- Bid price – In winter months, the demand for HDD contractors is usually stronger in northern Canada, and prices are expected to be higher. While TGI would normally expect 2010 spring/summer construction to attract lower bids, the current economic slow-down might result in lower bids for a 2009 summer/late fall schedule. Only by tendering both options can market conditions be ascertained.

- Contractor capability – Similarly, the demand for HDD work also influences the availability of experienced and capable personnel. Obtaining a contractor with proven operators and supervision is central to minimizing completion risk for this highly specialized work, and only by tendering both options can the most advantageous bids be determined.

- Project team – The project team is staffed and currently has very good momentum. A delay into 2010 would require the team to re-orient and would also bring a greater risk of turnover for internal resources and consultants.

- Permitting and Landowner Agreements – A 2010 schedule offers some additional time for negotiations, but TGI would not expect any net benefits to be significant.

- Tie-ins – A 2010 schedule offers more flexibility and avoids potential delay of the tie-ins, as might occur in extended cold weather during winter 2009.

- Pipeline Integrity Issues – A 2010 schedule would:

    - extend the risk of pipeline failure from a seismic event for nine extra months,

    - expose the crossings to scouring from one additional spring freshet and

    - extend the risk of possibly requiring additional temporary mitigation efforts to minimize soil loads and accommodate dike requirements.

12.7 On page 26, TGI proposes to structure the HDD contract as being conditional on Commission review and approval and to file a revised control budget accounting for new information. Please confirm that TGI assures the Commission that the new budget will be within the – 15 to +20 percent range.

**Response:**

TGI expects that the control budget will be within the -15% to +20% range. As per BCUC IR 1.5.9, TGI has estimated the expected cost range for each line item, and developed an overall estimate based on its experience and on the best information currently available. However, it is not possible for TGI to *guarantee* that the new budget will be within the -15 to +20% range since the control budget is, to a significant degree, a function of the HDD contract price and the subsequent cost risk analysis.

Nevertheless, TGI believes the cost estimates provided in the Application are within an acceptable accuracy range to be able to compare between alternatives and for stakeholders and the Commission to understand the relative impact on ratepayers. In addition, TGI believes that, due to the risk of pipeline failure and the serious consequences associated with such a failure, this project would be in the public interest and necessity even if the cost were to exceed the estimate included in the Application.

12.8 Please file a detailed schedule for the Commission approval process that TGI proposes that covers at least the following steps, and identifies when TGI expects each step to be completed.

- Commission approval of CPCN;
- Filing of HDD contract with Commission;
- Commission approval of HDD contract;
- Filing of revised control budget for Project;
- Commission approval of revised control budget;
- Final Commission approval of Project;
- Signing of contracts for HDD and pipeline construction;
- Signing of contracts for purchasing line pipe and other materials;
- Signing of agreements for land and workspace.

**Response:**

As discussed in the response to BCUC 1.5.10, TGI is currently seeking approval from the Commission for a CPCN for the Project prior to finalizing the HDD contract and other

contractual arrangements. The certainty of having Commission approval will put TGI in the best position to tender and obtain competitively priced contracts to implement and complete the project most cost effectively.

In the Application TGI proposed to: *"(i) structure the HDD contract as being conditional upon Commission review and approval; (ii) at the same time, file a revised control budget accounting for new information; and (iii) file with the Commission quarterly project progress reports and a project completion report in a form developed in conjunction with Commission staff"* (Exhibit B-1, Section 9, page 36). The proposal was intended to provide the Commission and customers with additional comfort that once the HDD contract was in place and there is more certainty with respect to project costs that TGI would not proceed without final review of the revised cost estimates. TGI did not intend that the HDD contract in itself would require Commission review and approval, but that giving final notice to the contractor to proceed would be conditional to TGI receiving final approval from the Commission following the submission of the revised cost control budget.

In preparing the responses to the series of questions under BCUC IR 2.12, TGI has given further consideration to this proposal, and given the non-discretionary nature of the Project, TGI believes that a condition that the Commission review and approve the revised control budget prior to the project proceeding is only necessary if the revised estimates exceed the current -15 to +20% range of estimates provided in the Application.

On this basis, TGI proposes the following schedule for the Commission approval process based on a 2009 construction schedule. Note that the HDD contract may be executed prior to filing of the revised control budget; however, it will be conditional and the condition will not be waived or fulfilled by TGI until the revised control budget has been filed (if within the estimate range) or accepted (if above the estimate range). Likewise, the signing of contracts for materials and land use may be completed as those arrangements are put in place, however TGI will endeavour to minimize any cost obligations under those agreements until such time the revised control budget is completed. Note that the tendering and evaluation of service and material contracts requires a significant commitment of resources and expenses, therefore TGI is requesting approval of the Project at the earliest practical date:

| Activity | Estimated Date |
| --- | --- |
| • Commission approval of CPCN | March 5, 2009 |
| • Completion of HDD contract | June 1, 2009 |
| • Filing of report with revised control budget and description of contracts | June 1, 2009 |
| • TGI waiver of condition on HDD contract (if control budget within estimate range) | June 15, 2009 |
| • Commission acceptance of the | June 15, 2009 |

| | |
|---|---|
| revised control budget (if budget exceeds estimate range) | |
| • Signing of contracts for purchasing line pipe and other materials | As required |
| • Signing of agreements for land and workspace | As required |

Note: Since HDD contractors will bid on a 2009 and 2010 construction, this schedule is expected to apply to both construction windows.

12.9 Please describe the processes that TGI proposes the Commission use to review the HDD contracts and the revised control budget.

**Response:**

As indicated in the response to BCUC IR 2.12.8 TGI proposes to file the control budget, not the HDD contract itself. If the control budget does not exceed the current -15% to +20% range (as TGI expects it will be) then no further action on the part of the Commission would be required. TGI could proceed with construction.

If, however, the control budget exceeds the -15% to +20%, Commission approval of the control budget would be required. Even so, TGI believes that, in most circumstances, no additional process steps would be necessary to permit the Commission to consider and approve the control budget. TGI would likely respectfully request in its transmittal letter accompanying the control budget that the Commission review and approve the control budget within two weeks, so as to preserve the 2009 construction window.

12.10 Please discuss the status of the Project in the event that the Commission does not approve the HDD contract or the revised control budget.

**Response:**

Please see the responses to the BCUC IR 1.12.7 and 1.12.8. TGI is requesting that the Commission approve the Project based on the justification provided in the Application and believes that the project is in the public interest and necessity even if the costs exceed the estimate range in this Application. However, if the revised control budget exceeds the estimate range, and if the Commission does not accept the revised control budget, TGI will not be able to proceed. However, as indicated in the Application, TGI regards this project as non-discretionary. TGI would resubmit materials as required so as to permit the Project to proceed based on any guidance provided by the Commission.

12.11 Please explain why for this Project, it is necessary for the Commission to withhold final approval to proceed with the project until it has reviewed the HDD contract and revised control budget. Specifically, why should the Commission not approve or deny the Project based on the cost estimate in the Application, with that estimate forming the basis for project progress reporting and a prudency review of actual expenditures after completion?

**Response:**

TGI believes that it is appropriate that the project progress reporting should be based a control budget that is determined prior to the Project proceeding once the major contracts are in place and there is greater cost certainty. This is consistent with TGI's practice for other major projects where progress reports are filed with the Commission. The practice of filing a control budget and progress reports that show spending against that control budget contribute significantly to cost transparency and management and ensures there are no big surprises. This should also eliminate or at least significantly reduce the need for future prudency reviews of actual expenditures after completion.

As discussed in the responses to BCUC IRs 2.12.7 to 2.12.10, TGI is requesting that the Commission issue final approval to proceed with the Project based on the evidence provided in the Application except in the case where the revised control budget exceeds the estimate range in this Application. TGI has proposed that, in such cases, the Commission review and approve the revised control budget. While Commission review of the control budget is not, strictly speaking, *necessary,* TGI made this proposal to demonstrate good faith and add even greater transparency.

12.12 Please provide a draft of the CPCN Order that TGI is requesting for the Project.

**Response:**

Please refer to the draft order included as Attachment 12.12.

**13.0 Reference: Exhibit B-2, BCUC IR 1.3.1**

13.0 Please repeat BCUC IR 3.1 with respect to the NPS 24 pipeline

**Response:**

The NPS 24 pipeline segments that will not be replaced in Alternative 1 are:

| Location | Length (m) | Grade (MPa) | Wall Thickness | Material Specification* | Installation date |
|---|---|---|---|---|---|
| Tilbury Gate to Entry Point | 40 | 290 | 12.7 | CSA Z245 | 2000 |
| | 80 | 290 | 12.7 | API 5L | 1985 |
| | 490 | 359 | 7.1 | CSA Z245 | 1974 |
| Exit Point to Nelson Gate | 300 | 448 | 7.1 | CSA Z245 | 1998 |
| | 50 | 414 | 12.7 | API 5L | 1998 |
| | 110 | 448 | 7.1 | CSA Z245 | 1998 |
| | 200 | 359 | 9.5 | API 5L | 2001 |

* TGI's records the material standards the pipe was specified under as part of its normal records database. The specific methods of manufacture ie, ERW; SMAW, or DSAW has not been an integrity issue to date. Flash welded pipe and low frequency ERW pipe have not been accepted.

All of the above pipe is "on-land" pipe. No underwater portion will remain in service after the Alternative 1 upgrade.

13.1 It appears that 670 m of the NPS 20 on-land pipeline was replaced in 1998 and 2001. Please explain the reasons why any section of NPS 20 and NPS 24 between Tilbury and Nelson was replaced.

**Response:**

**From Fraser River North to Nelson**

All 2000 m of the original NPS 20 (1959) and the original NPS 24 (1974) pipelines between the North bank of the Fraser River South Arm and the Nelson Valve Station have been replaced.

The original pipelines were designed and installed to suit the existing land conditions: a large wetland with a thick layer of organic soils which did not appear to have any development potential. However, the property owner retained the legal rights to construct vehicle crossings over the pipeline Right of Way, and also to use the Right of Way for similar purposes, such as parking lots or material storage.

In 1995, TGI temporarily relocated the pipelines between the Fraser River and Nelson Station, preloaded the Right of Way to consolidate the soils, and then replaced the pipelines with higher strength pipe in compacted backfill to make the pipelines compatible with the owner's revised use of the Right of Way.

This replacement program was constructed in phases as property development impacted the original pipelines. The final pipe replacements occurred in 1998 and 2001.

**From Fraser River South to Tilbury**

In 1985, during the development of the Tilbury Industrial Park, approximately 80 m of the NPS 24 (1974) pipeline between the South bank of the Fraser River and Tilbury Valve Station was replaced to accommodate a major widening and re-construction of River Road in Delta.

In 2000, approximately 40 m of the NPS 24 (1974) pipelines within the Tilbury Valve Station compound were replaced during installation of pigging facilities.

**14.0 Reference: Exhibit B-2, BCUC IR 1.4.1, 1.4.2**

14.1 Please explain whether TGI designs the Lower Mainland system based on peak day or peak hour flows.

**Response:**

The Coastal Transmission System (CTS) in the Lower Mainland operates at a relative low operating pressure range and covers a relative small geographic area. Consequently, it does not have sufficient linepack capability to absorb hourly demand fluctuations. Therefore, TGI designs the CTS based on peak hour flows.

14.2 If TGI uses peak hour flows, please respond to BCUC IR 4.1 and 4.2 based on peak hour capacities.

**Response:**

The response to BCUC IR 1.4.1 based on peak hour capacities is as follows:

- The existing NPS 20 and NPS 24 pipelines provide approximately 33.6 TJ/h in design day throughput capacity. This capacity is sufficient to meet the forecasted design day flows within the 20-year long range planning period ending in the winter of 2028/2029.

- To demonstrate the adequate sizing of the existing NPS 20 and NPS 24 for the long term, an estimate of forecast growth for 50 years is used to check against the pipeline capacities. Beyond the normal 20-year planning period, the forecast growth assumes a stabilized long range peak day demand growth rate, which is equivalent to the average growth rate from the initial 20 years for the Metro Vancouver area of approximately 0.5% per year.

Table 4.1 below summarizes the pipeline flow capacities between Tilbury Gate and Nelson Gate for the various pipeline size combinations and the expected year at which the design day flows reach the respective pipeline capacities. The existing NPS 20 & NPS 24, as well as for the single NPS 30, have sufficient pipeline capacities to meet the design day flows beyond a 50 year period based on the assumptions above.

**Table 4.1**

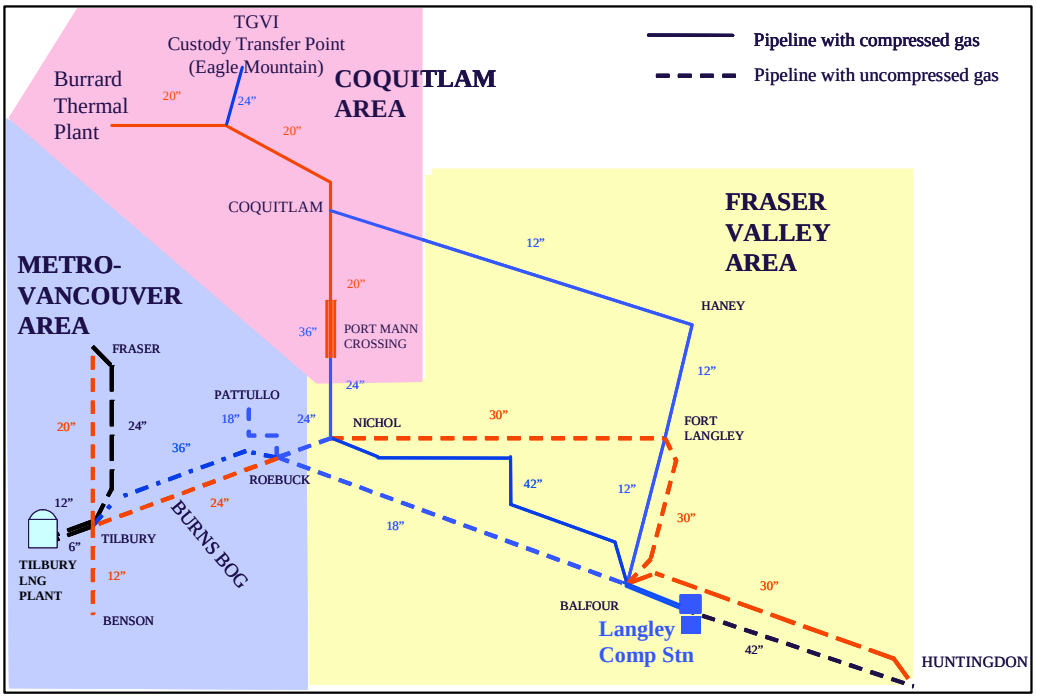
| *Pipeline Size Combination* | *Equivalent Capacities to NPS 20 plus 24* | *Year at which design day flows exceed pipeline capacities* |
|---|---|---|
| NPS 20 only | 38% | Immediately |
| NPS 24 only | 62% | Immediately |
| NPS 20 & NPS 24 | 100% | Greater than 50th year |
| NPS 30 only | 103% | Greater than 50th year |
| NPS 24 & NPS 24 | 121% | Greater than 50th year |
| NPS 24 & NPS 30 | 126% | Greater than 50th year |
| NPS 36 only | 150% | Greater than 50th year |
| NPS 24 & NPS 36 | 214% | Greater than 50th year |

The Coastal Transmission System ("CTS") is a network rather than a single bullet line; therefore, the system capacity constraints are not determined in isolation. As discussed in the TGI's 2008 Resource Plan [pp. 59], and as illustrated in Figure 4-1 below, the majority of the CTS in the Fraser Valley and Metro Vancouver areas is already looped and consequently has sufficient capacity to meet long-term demand requirements. The single feed pipeline from Nichol in Surrey to Coquitlam, TGVI and Burrard Thermal could potentially be capacity constrained in the long term. TGI has four alternatives available to solve this capacity constraint:

- Looping the Nichol to Coquitlam Pipeline;
- Adding more compression at the Langley Compressor Station;
- Building a new compressor station closer to the constraint location; and
- Expanding the existing Tilbury storage facility.

However, with the TGVI Mt. Hayes storage facility in operation by the winter of 2011/2012, it will reduce TGVI's transportation requirements during peak periods across the CTS and alleviate the capacity constraint on the CTS, potentially by as much as 6.7 TJ/h. This will eliminate any minor pipeline capacity deficiency throughout the CTS. In summary, TGI does not expect any capacity constraint on the CTS for the long term, provided the existing pipeline sizing including the existing crossings of the Fraser River South Arm from Tilbury remains the same or equivalent. Therefore, the replacement of the existing NPS 20 and NPS 24 crossings by the same size pipelines is sufficient for the long term. Any other combination of pipeline sizing that offers greater system capacity than a NPS 20 & NPS 24 is not necessary, including NPS 24 & NPS 24, NPS 24 & NPS 30, NPS 36 only, or NPS 24 & NPS 36.

**Figure 4-1 CTS Schematic**




The response to BCUC IR 1.4.2 based on peak hour capacities is as follows:

- The design day flow across the crossing is forecasted to be 22.4 TJ/h for the winter of 2008/2009, and growing to 25.0 TJ/h for the winter of 2028/2029. As indicated in the response to BCUC IR 1.4.1 (Table 4.1), the NPS 20 and NPS 24 crossings, respectively, provide 38% (12.8 TJ/h) and 62% (20.8 TJ/h) of the total 33.6 TJ/h in pipeline flow capacity. Consequently, both crossings are required to meet the current design day flow as well as the expected design day flow for each year in the 20 year planning period.

- All of the assumptions regarding population growth, changes in customer capture rates, and changes in use per account that were used in developing the 20 year forecast were the same as those used to prepare the Reference Case forecast of TGI's 2008 Resource Plan.

14.3 To confirm the average growth rate of 0.5 percent per year for the next 50 years, what were the average increases in peak day (or peak hour) demand over the periods 1988 to 1998, 1998 to 2008 and forecast for 2008 to 2018 and 2018 to 2028?

**Response:**

The average increases in peak day (or peak hour) demand over the periods 1999 to 2008 and forecast from 2009 to 2028 are shown in Table 14.3. As the information illustrates, the forecast growth is expected to trend downward into the future. Therefore, using 0.5 percent per year as an average growth rate is reasonable to approximate the expected peak hour demand throughput across the Fraser River South Arm Crossing for the long term (50 year). Note: Flow information prior to 1998 is no longer available; therefore, this response only provides flow data from 1998 onwards.

**Table 14.3**

| *Period* | *average annual increase in peak day (or peak hour) demand* |
| --- | --- |
| 1989 to 1998 | No longer available |
| 1999 to 2008 | 0.61% |
| 2009 to 2018 | 0.60% |
| 2019 to 2028 | 0.52% |

**15.0 Reference: Exhibit B-2, BCUC IR 1.4.7**

15.1 Please quantify the additional capital cost for additional launchers and traps if the NPS 20 crossing were replaced with a 24 inch crossing, identify when the money would be spent and provide the NPV additional cost.

**Response:**

The capital cost for additional launchers, traps and valves if the NPS 20 crossing were replaced with a 24 inch crossing is estimated at:

| | |
|---|---|
| Materials | $ 1,600,000 |
| Project Services & Indirect | $ 400,000 |
| Construction | $ 2,150,000 |
| Land | $ 1,400,000 |
| Total Stations | $ 5,550,000 |

Incremental O&M costs associated with these facilities are estimated at $2,000 per year and $9,000 every fifth year for valve maintenance, weed control, fencing repair, security and painting. This alternative would require TGI to install these facilities concurrently with the HDD to allow baseline ILI runs during commissioning. Incremental ILI run O&M costs of $120,000 would be required every 10 years after the HDD. The incremental property taxes on the land are estimated to be approximately $77,000 per year.

The PV of these additional capital and O&M costs is calculated to be $6.4 million. The discount rate used was the nominal after tax WACC. Attachment 15.1 provides a spreadsheet showing how the PV was calculated.

15.2 Please repeat the previous question if the NPS 20 crossing were replaced with NPS 30.

**Response:**

The capital cost for additional launchers, traps and valves if the NPS 20 crossing were replaced with a NPS 30 crossing is estimated at: :

| | |
|---|---|
| Materials | $ 1,800,000 |
| Project Services & Indirect | $ 400,000 |
| Construction | $ 2,700,000 |
| Land | $ 1,400,000 |
| Total Stations | $ 6,300,000 |

Incremental station maintenance and property taxes associated with these facilities would be as estimated in BCUC IR 2.15.1 above, as would the timing of construction and the start of O&M costs. Incremental ILI run O&M costs of $220,000 would be required every 10 years after the HDD.

The PV of these additional capital and O&M costs is calculated to be $7.2 million. The discount rate used was the nominal after tax WACC. Attachment 15.2 provides a spreadsheet showing how the PV was calculated.

15.3 Please quantify the additional annual O & M ILI cost of the NPS 20 crossing was replaced with NPS 24.

**Response:**

The O&M ILI cost would total approximately $120,000 over a ten-year period, comprised of:

- inspecting the second NPS 24 crossing separately, costing $100,000 once every 10 years.
- inspecting the NPS 20 in two sections, rather than as a single section, costing $20,000 once every 10 years

**16.0 Reference: Exhibit B-2, BCUC IR 1.5.10**

16.1 Further to the response to BCUC IR 5.10, since the Commission could deny as well as approve the HDD contract or the revised cost estimate, please explain why prior partial approval of the CPCN is expected to result in the lowest possible cost and rate impact for the Project.

**Response:**

As discussed in the response to BCUC IR 2.12.11, the proposal to submit the HDD contract to the Commission for approval was more directed at providing the Commission and customers with additional comfort that TGI was proceeding in the most effective manner. TGI was not intending to suggest that making the HDD contract subject to Commission approval will have an effect on the bid prices.

**17.0 Reference: Exhibit B-1, p. 24; Exhibit B-2, BCUC IR 1.1.3, 1.10.1**

17.1 The Application states that the HDD paths cross the NPS 48 Tilbury water main on the south side of the river, and that the vertical separation between the water and gas mains is approximately 25 m. Please provide a copy of the diagram in Attachment 1.3 that shows the profile location of the water main.

**Response:**

A detailed map showing the vertical separation between the HDD paths and the NPS 48 Tilbury water main is provided as Attachment 17.1. This map is an enlarged section of the drawing previously provided in BCUC IR1, Attachment 1.3.

Based on the current updated drill path, the proposed vertical separation between the NPS 20 HDD and NPS 48 Tilbury water main is now at least 35 metres.

17.2 Please describe the "sufficient monitoring" that will ensure there are no detrimental effects to the water main.

**Response:**

As a pipeline operator, TGI shares Metro Vancouver's concern for the safe operation of the water main at the south bank of the Fraser River, beneath which pass TGI's existing crossings and proposed HDD replacement crossings.

As HDD plans are finalized, TGI will hold further pre-work consultations and discussions with Metro Vancouver. TGI will provide construction drawings and work plans so that Metro Vancouver can confirm to its satisfaction that TGI activity will not adversely impact their pipeline. This will include appropriate monitoring technology which will utilize such equipment as seismographs, vibration monitoring instruments, strain gauges installed on the water main, and surveyed displacement monitors.

17.3 Please outline the discussions that TGI has held with Metro Vancouver regarding the crossing of the water main, and any concerns about the HDD Project that Metro Vancouver raised.

**Response:**

TGI met with the Senior Project Engineer, Operations and Maintenance, with Metro Vancouver on July 30, 2008 to identify any concerns it may have about the Project. Metro Vancouver informed TGI that the Tilbury water main is an important asset for

service to Delta and the Project should not detrimentally impact the water main. No major issues were identified by Metro Vancouver with regards to the potential HDD construction methodology. Metro Vancouver forwarded a copy of the Tilbury water main as-built construction documents to TGI to aid in TGI's Project planning process

Metro Vancouver requested, as part of its regular operating processes and standard requirements, to see the design drawings for TGI's pipelines that cross the Tilbury water main located on the Delta side of the Project after approval of the CPCN application. Metro Vancouver informed TGI that all pipeline and construction access crossings will require a permit inclusive of the requirement to have an inspector on site. The water main will have to be exposed prior to any TGI's excavation activities within the Metro Vancouver Right of Way.

TGI and Metro Vancouver also agreed to communicate with regard to how both organizations will co-ordinate its infrastructure with the City of Richmond dike improvements.

**18.0 Reference: Exhibit B-2, BCUC IR 1.15.1 and Exhibit B-1, pp. 17-18 and Appendix 13**

The response to BCUC IR#1 Question 15.1 lists reasons for the variation in project costs estimated for the 2008 TGI Resource Plan versus those in the Application.

18.1 Please show the composition of the variation in expected project costs between the $9.75 million Resource Plan estimate, and the $16 million described under Alternative 3 in the Application, using the same format as Appendix 13 of the Application.

**Response:**

The table below displays the composition of the variation in the expected project costs. Note also that the Resource Plan estimate was for direct costs only:

| Fraser River South Arm Crossing Upgrade Project | | | |
|---|---|---|---|
| Description | CPCN Estimate Alternative 3 | Resource Plan Estimate | Variance |
| 1 Project Services | $4.0 | $1.6 | $2.4 |
| 2 Land, Temporary Workspace | $1.1 | $0.6 | $0.5 |
| 3 Pipe & Coating Materials | $1.4 | $1.2 | $0.2 |
| 4 River Crossing HDD Installation | $6.6 | $5.7 | $0.9 |
| 5 Pipeline tie-in Construction | $1.0 | $0.6 | $0.4 |
| 6 Pipeline Commissioning | $0.4 | | $0.4 |
| 7 North Bank Dike Improvements | $1.0 | | $1.0 |
| 8 Subtotal | $15.5 | $9.7 | $5.8 |
| 9 Retirement Allowance | $0.3 | | $0.3 |
| 10 AFUDC | $0.6 | | $0.6 |
| 11 Total Project | $16.4 | | |

The Resource Plan estimate was very preliminary and high-level. It was made before detailed project engineering began. The development of the Resource Plan estimate is discussed in BCUC IR 1.15.1. The Application estimate reflects a deeper understanding of project-specific issues, as well as some changes to the scope of work. These include:

- The 2008 seismic evaluation requires that the replaced crossings be longer and to a greater depth than assumed for the estimate for the 2008 Resource Plan.
- Temporary bypass lines around the drill entry and exit sites are required to maintain system delivery while constructing the HDD pipeline replacements.
- Material pricing in the Application estimate is based on preliminary vendor estimates for pipe designed to fit the seismic model.
- In the Application, the HDD installation contractor costs are based on the recent experience of TGI's HDD Engineering & Construction Consultant.

- Retirement costs and AFUDC costs are included in the Application estimate.
- A Dike Improvement Allowance is included in the Application based on updated studies.

**19.0 Reference: Exhibit B-2, BCUC IR 1.15.1 and Exhibit B-1, pp. 25, 15-19**

19.1 Are the cost estimates presented for the Alternatives P50 figures?

**Response:**

TGI did not explicitly calculate P50 values for the cost estimates for the Alternatives. A cost risk analysis will be completed after the material and construction tendering process, which will allow for the development of a P50 estimate. However, TGI believes it is quite reasonable to assume, based on estimating experience and methods, that when a P50 value is calculated it will fall within the +20 / -15% range of accuracy provided in the Application.

19.2 For Alternatives 1 and 3, what are the P10 and P90 cost estimates?

**Response:**

Please refer to BCUC IR 1.5.7.

TGI believes that the cost estimates provided in the Application are within an acceptable accuracy range to be able to compare between alternatives and for stakeholders and the Commission to understand the relative impact on ratepayers. At the current stage of development, the preparation of P10 and P90 estimates, using either a project execution risk based approach or WBS estimate variance approach is not necessary to approve the CPCN application. TGI believes that the appropriate point in the schedule to determine P10 and P90 confidence levels is after receipt of material and pipeline construction tenders. At that point, it will be possible to improve project cost estimating accuracies, inclusive of reserve and contingency.

It is expected that the materials and pipeline construction contracts will represent two thirds of the project cost. Developing a probable low cost, a most likely cost, an extreme likely high cost, and the probability distribution for the materials and construction categories prior to tendering will be subjective and not lead to an accurate P10 and P90 estimates.

19.3 What is the cost of the temporary bypass lines associated with Alternative 3? Please explain whether those lines may be re-used for other purposes after project completion.

**Response:**

The cost for bypasses at the South and North HDD worksites has been estimated at approximately $400,000.

Following the installation of the new NPS 20 HDD crossing, most of the temporary bypass pipe will be re-installed to permanently connect the existing NPS 20 to the new crossing. The re-installed bypass piping will be stronger than the pipe that was removed, as required by the seismic design.

**20.0 Reference: Exhibit B-2, BCUC IR 1.11.1 and 1.18.1**

20.1 Please compare Alternative A and Alternative C, as presented in the economic analysis, in terms of the incremental risk of the occurrence of a seismic event during the period 2010 to 2034 that would result in the failure of the NPS 24 prior to its replacement.

**Response:**

As explained in the response to BCUC IR 1.2.1, HDD replacement of the pipelines will result in a seismic withstand capability exceeding ground motions having a mean return period of 2,475 years, and potentially as great as 5,000 to 10,000 years. Thus, for Alternative A, the probability of losing pressure integrity due to a seismic event will be less than1% in 25 years, and may potentially be in the range of 0.5% – 0.25%.

For the same interval of 25 years (e.g. 2010 to 2034), Alternative C will have a 3% – 5% probability of losing pressure integrity in the original NPS 24 pipeline.

Alternative C does not meet the TG seismic design criterion, and is at least 3 to 5 times more likely than Alternative A to lose pressure integrity in a seismic event.

**21.0 Reference: Exhibit B-2, BCUC IR 1.14.1**

21.1 Please provide an update of any response communications from the three First Nations who have archaeological interests in the area that have been received since the filing of TGI's responses to the Commission's first Information Request.

**Response:**

TGI has not received any further response communications from the three First Nations since the filing of TGI's responses to the Commission's first Information Request.

# Attachment 11.1

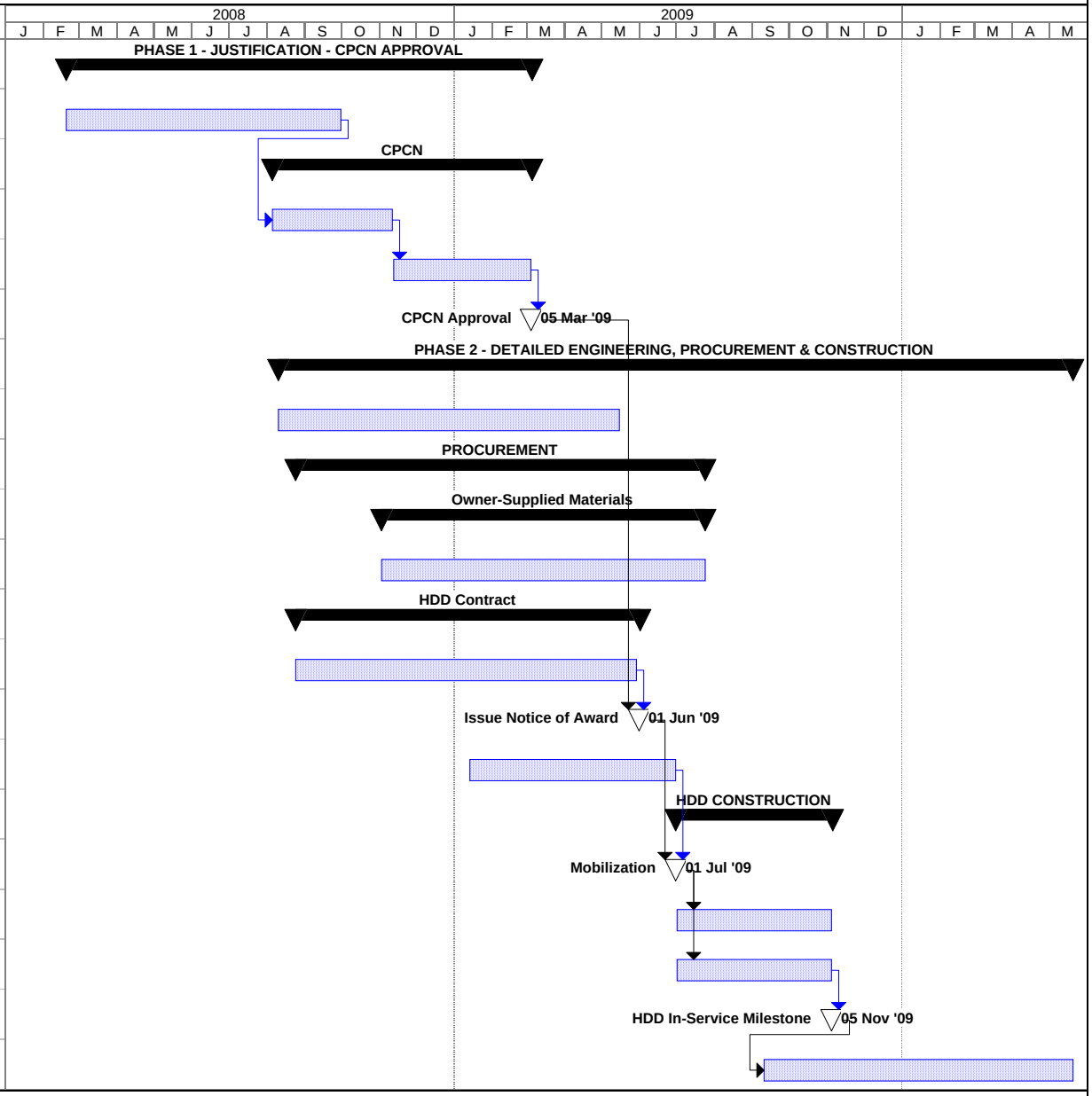
## REFER TO LIVE SPREADSHEET

(accessible by opening the Attachments Tab in Adobe)

# Attachment 12.2

FRASER RIVER SOUTH ARM CROSSING UPGRADE PROJECT : Fall 2009 In-Service Target Rev 1

| ID | Task Name | Duration |
|---|---|---|
| 1 | **PHASE 1 - JUSTIFICATION - CPCN APPROVAL** | **272 days?** |
| 2 | Preliminary Engineering - Environmental - Public Consultation | 8 mons |
| 3 | **CPCN** | **152 days?** |
| 4 | Prepare CPCN | 3.5 mons |
| 5 | Application Review | 4 mons |
| 6 | CPCN Approval | 1 day? |
| 7 | **PHASE 2 - DETAILED ENGINEERING, PROCUREMENT & CONSTRUCTION** | **464 days?** |
| 8 | ENGINEERING | 10 mons |
| 9 | **PROCUREMENT** | **240 days?** |
| 10 | **Owner-Supplied Materials** | **190 days** |
| 11 | Linepipe Procurement & Other Materials | 9.5 mons |
| 12 | **HDD Contract** | **201 days?** |
| 13 | Contract Preparation - Tender Process | 10 mons |
| 14 | Issue Notice of Award | 1 day? |
| 15 | PERMITS | 6 mons |
| 16 | **HDD CONSTRUCTION** | **92 days?** |
| 17 | Mobilization | 1 day? |
| 18 | HDD Drilling | 4.5 mons |
| 19 | Pipeline Construction | 4.5 mons |
| 20 | HDD In-Service Milestone | 1 day? |
| 21 | RESTORATION | 9 mons |

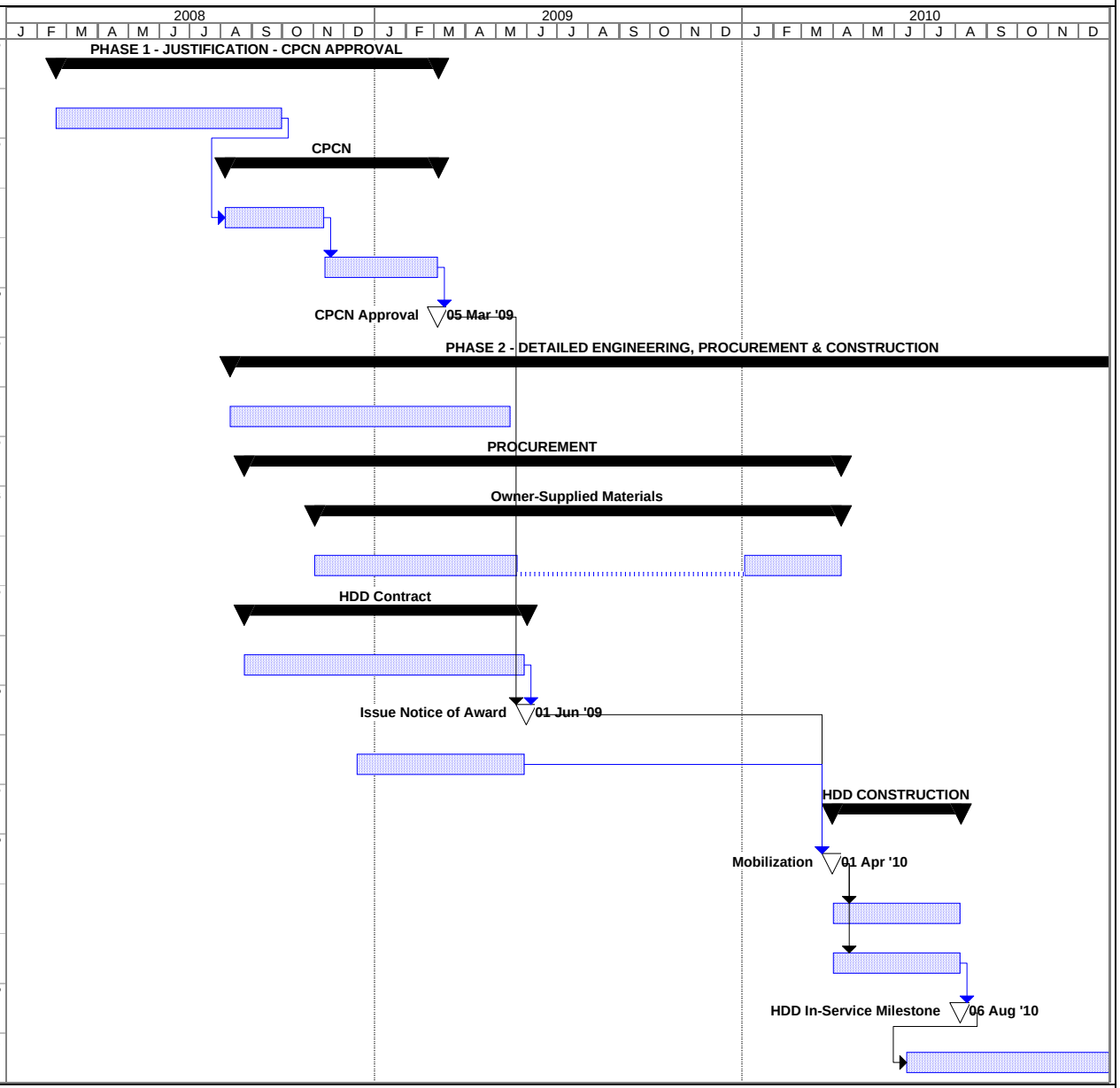



Project: FRSAUP Concept Schedule - Date: Mon 26/01/09

Task
Split
Progress
Target Milestone
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
Windows

FRASER RIVER SOUTH ARM CROSSING UPGRADE PROJECT : 2010 In-Service Target Rev 0

| ID | Task Name | Duration |
|---|---|---|
| 1 | **PHASE 1 - JUSTIFICATION - CPCN APPROVAL** | **272 days?** |
| 2 | Preliminary Engineering - Environmental - Public Consultation | 8 mons |
| 3 | **CPCN** | **152 days?** |
| 4 | Prepare CPCN | 3.5 mons |
| 5 | Application Review | 4 mons |
| 6 | CPCN Approval | 1 day? |
| 7 | **PHASE 2 - DETAILED ENGINEERING, PROCUREMENT & CONSTRUCTION** | **660 days?** |
| 8 | ENGINEERING | 10 mons |
| 9 | **PROCUREMENT** | **425 days?** |
| 10 | **Owner-Supplied Materials** | **375 days** |
| 11 | Linepipe Procurement & Other Materials | 10.75 mons |
| 12 | **HDD Contract** | **201 days?** |
| 13 | Contract Preparation - Tender Process | 10 mons |
| 14 | Issue Notice of Award | 1 day? |
| 15 | PERMITS | 6 mons |
| 16 | **HDD CONSTRUCTION** | **92 days?** |
| 17 | Mobilization | 1 day? |
| 18 | HDD Drilling | 4.5 mons |
| 19 | Pipeline Construction | 4.5 mons |
| 20 | HDD In-Service Milestone | 1 day? |
| 21 | RESTORATION | 9 mons |




Project: FRSAUP Concept Schedule - Date: Mon 26/01/09

Task
Split
Progress
Target Milestone
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
Windows

# Attachment 12.12

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IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by Terasen Gas Inc. -
for a Certificate of Public Convenience and Necessity
for the Upgrade of the Transmission Pipeline Crossing of the South Arm of the Fraser River

**BEFORE:**

(Date)

**WHEREAS:**

A. On November 6, 2008, Terasen Gas Inc. ("TGI") applied (the "Application") to the British Columbia Utilities Commission (the "Commission"), pursuant to Section 45 of the Utilities Commission Act (the "Act"), for a Certificate of Public Convenience and Necessity ("CPCN") for two horizontal directional drilled ("HDD") natural gas transmission pipeline crossings of the South Arm of the Fraser River between Delta and Richmond near Tilbury Island (the "Fraser River South Arm Crossing Upgrade Project", "Project"); and

B. The Fraser River South Arm Crossing Upgrade Project, as proposed by TGI, will be approximately 1,400 metres (0.9 mile) of 508 mm (20 inch) and 610 mm (24 inch) HDD pipelines, and will replace the existing 508 mm (20 inch) and 610 mm (24 inch) buried crossings at this location; and

C. TGI states that it considered several alternatives in the Application, one of which was the replacement of the existing 508 mm (20 inch) crossing with a new HDD 762 mm (30 inch) crossing and pipeline extending from Tilbury Gate Station to Nelson Gate Station; and

D. TGI considers that the Project is non-discretionary as the existing natural gas transmission pipeline crossings are no longer reliable due to potential consequences in the event of a seismic event, the effects of river scouring and future dike improvements; and

E. TGI proposes to start installation of the new crossings in June 2009 and to have the new crossings in-service by October 2009. However, TGI proposes that construction may be undertaken in 2010 if, following evaluation of tenders for the HDD work, it is determined to be more cost effective. TGI estimates the cost of the project will be $27.3 million including Allowance for Funds Used During Construction ("AFUDC"); and

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F. By Order G-173-08 dated November 20, 2008, the Commission determined that the Application will be examined by a Written Public Hearing process, and established an amended Regulatory Timetable; and

G. Submissions in the proceeding concluded with TGI's Reply Submission on February 11, 2009; and

H. The Commission Panel has considered the Application and the evidence and submissions in the proceeding and has determined that the Project is in the public interest and that a CPCN be issued to TGI for the Project for the reasons set out in the Reasons for Decision that accompany this Order.

**NOW THEREFORE** pursuant to Sections 45 and 46 of the Utilities Commission Act the Commission orders as follows:

1. A Certificate of Public Convenience and Necessity is granted to TGI for construction and operation of the Fraser River Crossing Upgrade Project, subject to the following conditions:

    a. TGI shall file with the Commission a control budget that reflects the results of the HDD contract tender, and

    b. The control budget must be approved by the Commission prior to the HDD contractor being given notice to proceed, but only if the control budget exceeds the -15% to +20% estimate range in the Application.

2. TGI shall file with the Commission Quarterly Progress Reports on the Project showing planned versus actual schedule, planned versus actual costs, and any variances or difficulties that the Project may be encountering. The Quarterly Progress Reports will be filed within 30 days of the end of each reporting period.

3. TGI shall file with the Commission a Final Report, within six months of the end or substantial completion of the Project, that provides a complete breakdown of the final costs of the Project, compares these costs to the updated cost estimate, and provides an explanation and justification of material cost variances.

4. Subject to paragraphs 2 and 3 of this Order, the format and content of the Progress Reports and the Final Report will be determined by TGI in consultation with Commission staff, or by determination of the Commission.

5. TGI shall comply with directions of the Commission Panel in the Decision that accompanies this Order.

**DATED** at the City of Vancouver, In the Province of British Columbia, this day of <month>, 2009.

BY ORDER

# Attachment 15.1

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASSUMPTIONS | | | | | | | | | | | | | | |
| CCA | | | | | 8% | | | 2009 | | 2010 | | 2011 | | |
| TAX RATE | | | | | | | | 30.0% | | 29.0% | | 27.5% | | |
| INFLATION | | | | | 2% | | | | | | | | | |
| COST OF CAPITAL | | | | **RATIO** | | **COST** | | **PRETAX** | **POSTAX** | **PRETAX** | **POSTAX** | **PRETAX** | **POSTAX** | |
| DEBT | | | | | 65% | 6.72% | | 4.37% | 3.06% | 4.37% | 3.10% | 4.37% | 3.17% | |
| EQUITY | | | | | 35% | 8.47% | | 2.96% | 2.96% | 2.96% | 2.96% | 2.96% | 2.96% | |
| NOMINAL WACC | | | | | 100% | | | 7.34% | 6.02% | 7.34% | 6.07% | 7.34% | 6.13% | |
| REAL WACC | | | | | | | | 5.23% | | 5.34% | | 5.34% | | |
| YEAR | | | | | | 2009 | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | |
| | ($2009) | | | | | 1 | | 1.02 | 1.0404 | 1.061208 | 1.08243216 | 1.104080803 | 1.126162419 | |
| Transmission Valve Station | $ 4,150,000 | | | | | $ 4,150,000 | | | | | | | | |
| Land | $ 1,400,000 | | | | | $ 1,400,000 | | | | | | | | |
| TERMINAL VALUES | $ - | $ - | | | | | | | | | | | | |
| TAX SHIELD | | | | | | $ (49,800) | $ | (92,429) | $ (80,636) | $ (70,139) | $ (64,528) | $ (59,365) | $ (54,616) | |
| EXTRA O&M | $ 2,000 | $ 9,000 | $ | 120,000 | | $ - | $ | 2,040 | $ 2,081 | $ 2,122 | $ 9,742 | $ 2,208 | $ 2,252 | |
| PROPERTY TAX | $ 77,000 | | | | | $ - | $ | 78,540 | $ 80,111 | $ 81,713 | $ 83,347 | $ 85,014 | $ 86,715 | |
| ANNUAL CASH FLOW | | | | | | $ 5,500,200 | $ | (11,849) | $ 1,555 | $ 13,697 | $ 28,561 | $ 27,857 | $ 34,351 | |
| DISCOUNTED CASH FLOW | | PV | $ | 6,424,943 | | $ 5,187,697 | $ | (10,532) | $ 1,301 | $ 10,768 | $ 21,144 | $ 19,419 | $ 22,548 | |
| OPENING BALANCE | | | | | | $ - | $ | 3,984,000 | $ 3,665,280 | $ 3,372,058 | $ 3,102,293 | $ 2,854,110 | $ 2,625,781 | |
| ACQUISITION COST | | | | | | 4,150,000 | | - | - | - | - | - | - | |
| CCA CLAIMED | | | | | | (166,000) | | (318,720) | (293,222) | (269,765) | (248,183) | (228,329) | (210,062) | |
| CLOSING BAL | | | | | | $ 3,984,000 | $ | 3,665,280 | $ 3,372,058 | $ 3,102,293 | $ 2,854,110 | $ 2,625,781 | $ 2,415,718 | |
| TAX SAVING | | | | | | $ (49,800) | $ | (92,429) | $ (80,636) | $ (70,139) | $ (64,528) | $ (59,365) | $ (54,616) | |

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

ASSUMPTIONS

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CCA | 2012 | | | | | | | | | | |
| TAX RATE | 26.0% ff | | | | | | | | | | |
| INFLATION | | | | | | | | | | | |
| COST OF CAPITAL | **PRETAX** | **POSTAX** | | | | | | | | | |
| DEBT | 4.37% | 3.23% | | | | | | | | | |
| EQUITY | 2.96% | 2.96% | | | | | | | | | |
| NOMINAL WACC | 7.34% | 6.20% | | | | | | | | | |
| REAL WACC | 5.34% | | | | | | | | | | |
| YEAR | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
| | 1.148685668 | 1.171659381 | 1.195092569 | 1.21899442 | 1.243374308 | 1.268241795 | 1.29360663 | 1.319478763 | 1.345868338 | 1.372785705 | 1.400241419 |

Transmission Valve Station
Land
TERMINAL VALUES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TAX SHIELD | $ (50,247) | $ (46,227) | $ (42,529) | $ (39,127) | $ (35,997) | $ (33,117) | $ (30,467) | $ (28,030) | $ (25,788) | $ (23,725) | $ (21,827) |
| EXTRA O&M | $ 2,297 | $ 2,343 | $ 154,167 | $ 2,438 | $ 2,487 | $ 2,536 | $ 2,587 | $ 11,875 | $ 2,692 | $ 2,746 | $ 2,800 |
| PROPERTY TAX | $ 88,449 | $ 90,218 | $ 92,022 | $ 93,863 | $ 95,740 | $ 97,655 | $ 99,608 | $ 101,600 | $ 103,632 | $ 105,704 | $ 107,819 |
| ANNUAL CASH FLOW | $ 40,499 | $ 46,334 | $ 203,660 | $ 57,174 | $ 62,230 | $ 67,074 | $ 71,727 | $ 85,445 | $ 80,536 | $ 84,725 | $ 88,792 |
| DISCOUNTED CASH FLOW | $ 25,032 | $ 26,966 | $ 111,612 | $ 29,504 | $ 30,239 | $ 30,691 | $ 30,904 | $ 34,665 | $ 30,767 | $ 30,478 | $ 30,076 |
| | | | | | | | | | | | |
| OPENING BALANCE | $ 2,415,718 | $ 2,222,461 | $ 2,044,664 | $ 1,881,091 | $ 1,730,604 | $ 1,592,155 | $ 1,464,783 | $ 1,347,600 | $ 1,239,792 | $ 1,140,609 | $ 1,049,360 |
| ACQUISITION COST | - | - | - | - | - | - | - | - | - | - | - |
| CCA CLAIMED | (193,257) | (177,797) | (163,573) | (150,487) | (138,448) | (127,372) | (117,183) | (107,808) | (99,183) | (91,249) | (83,949) |
| CLOSING BAL | $ 2,222,461 | $ 2,044,664 | $ 1,881,091 | $ 1,730,604 | $ 1,592,155 | $ 1,464,783 | $ 1,347,600 | $ 1,239,792 | $ 1,140,609 | $ 1,049,360 | $ 965,411 |
| | | | | | | | | | | | |
| TAX SAVING | $ (50,247) | $ (46,227) | $ (42,529) | $ (39,127) | $ (35,997) | $ (33,117) | $ (30,467) | $ (28,030) | $ (25,788) | $ (23,725) | $ (21,827) |

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

ASSUMPTIONS
CCA
TAX RATE
INFLATION
COST OF CAPITAL
DEBT
EQUITY
NOMINAL WACC
REAL WACC

| YEAR | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.428246248 | 1.456811173 | 1.485947396 | 1.515666344 | 1.545979671 | 1.576899264 | 1.608437249 | 1.640605994 | 1.673418114 | 1.706886477 | 1.741024206 |
| Transmission Valve Station | | | | | | | | | | | |
| Land | | | | | | | | | | | |
| TERMINAL VALUES | | | | | | | | | | | |
| TAX SHIELD | $ (20,081) | $ (18,474) | $ (16,996) | $ (15,636) | $ (14,386) | $ (13,235) | $ (12,176) | $ (11,202) | $ (10,306) | $ (9,481) | $ (8,723) |
| EXTRA O&M | $ 2,856 | $ 187,929 | $ 2,972 | $ 3,031 | $ 3,092 | $ 3,154 | $ 14,476 | $ 3,281 | $ 3,347 | $ 3,414 | $ 3,482 |
| PROPERTY TAX | $ 109,975 | $ 112,174 | $ 114,418 | $ 116,706 | $ 119,040 | $ 121,421 | $ 123,850 | $ 126,327 | $ 128,853 | $ 131,430 | $ 134,059 |
| ANNUAL CASH FLOW | $ 92,751 | $ 281,629 | $ 100,394 | $ 104,101 | $ 107,747 | $ 111,340 | $ 126,150 | $ 118,406 | $ 121,894 | $ 125,363 | $ 128,818 |
| DISCOUNTED CASH FLOW | $ 29,584 | $ 84,584 | $ 28,392 | $ 27,722 | $ 27,018 | $ 26,290 | $ 28,048 | $ 24,790 | $ 24,030 | $ 23,272 | $ 22,517 |
| OPENING BALANCE | $ 965,411 | $ 888,178 | $ 817,124 | $ 751,754 | $ 691,614 | $ 636,285 | $ 585,382 | $ 538,551 | $ 495,467 | $ 455,830 | $ 419,364 |
| ACQUISITION COST | - | - | - | - | - | - | - | - | - | - | - |
| CCA CLAIMED | (77,233) | (71,054) | (65,370) | (60,140) | (55,329) | (50,903) | (46,831) | (43,084) | (39,637) | (36,466) | (33,549) |
| CLOSING BAL | $ 888,178 | $ 817,124 | $ 751,754 | $ 691,614 | $ 636,285 | $ 585,382 | $ 538,551 | $ 495,467 | $ 455,830 | $ 419,364 | $ 385,814 |
| TAX SAVING | $ (20,081) | $ (18,474) | $ (16,996) | $ (15,636) | $ (14,386) | $ (13,235) | $ (12,176) | $ (11,202) | $ (10,306) | $ (9,481) | $ (8,723) |

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

ASSUMPTIONS
CCA
TAX RATE
INFLATION
COST OF CAPITAL
DEBT
EQUITY
NOMINAL WACC
REAL WACC

| YEAR | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.77584469 | 1.811361584 | 1.847588816 | 1.884540592 | 1.922231404 | 1.960676032 | 1.999889553 | 2.039887344 | 2.080685091 | 2.122298792 | 2.164744768 |
| Transmission Valve Station | | | | | | | | | | | |
| Land | | | | | | | | | | | |
| TERMINAL VALUES | | | | | | | | | | | |
| TAX SHIELD | $ (8,025) | $ (7,383) | $ (6,792) | $ (6,249) | $ (5,749) | $ (5,289) | $ (4,866) | $ (4,477) | $ (4,119) | $ (3,789) | $ (3,486) |
| EXTRA O&M | $ 229,084 | $ 3,623 | $ 3,695 | $ 3,769 | $ 3,844 | $ 17,646 | $ 4,000 | $ 4,080 | $ 4,161 | $ 4,245 | $ 279,252 |
| PROPERTY TAX | $ 136,740 | $ 139,475 | $ 142,264 | $ 145,110 | $ 148,012 | $ 150,972 | $ 153,991 | $ 157,071 | $ 160,213 | $ 163,417 | $ 166,685 |
| ANNUAL CASH FLOW | $ 357,799 | $ 135,715 | $ 139,167 | $ 142,630 | $ 146,107 | $ 163,329 | $ 153,125 | $ 156,674 | $ 160,256 | $ 163,873 | $ 442,451 |
| DISCOUNTED CASH FLOW | $ 58,892 | $ 21,034 | $ 20,310 | $ 19,601 | $ 18,907 | $ 19,901 | $ 17,569 | $ 16,927 | $ 16,303 | $ 15,698 | $ 39,911 |
| OPENING BALANCE | $ 385,814 | $ 354,949 | $ 326,553 | $ 300,429 | $ 276,395 | $ 254,283 | $ 233,941 | $ 215,225 | $ 198,007 | $ 182,167 | $ 167,593 |
| ACQUISITION COST | - | - | - | - | - | - | - | - | - | - | - |
| CCA CLAIMED | (30,865) | (28,396) | (26,124) | (24,034) | (22,112) | (20,343) | (18,715) | (17,218) | (15,841) | (14,573) | (13,407) |
| CLOSING BAL | $ 354,949 | $ 326,553 | $ 300,429 | $ 276,395 | $ 254,283 | $ 233,941 | $ 215,225 | $ 198,007 | $ 182,167 | $ 167,593 | $ 154,186 |
| TAX SAVING | $ (8,025) | $ (7,383) | $ (6,792) | $ (6,249) | $ (5,749) | $ (5,289) | $ (4,866) | $ (4,477) | $ (4,119) | $ (3,789) | $ (3,486) |

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

ASSUMPTIONS
CCA
TAX RATE
INFLATION
COST OF CAPITAL
DEBT
EQUITY
NOMINAL WACC
REAL WACC

| YEAR | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2.208039664 | 2.252200457 | 2.297244466 | 2.343189355 | 2.390053142 | 2.437854205 | 2.486611289 | 2.536343515 | 2.587070385 | 2.638811793 | 2.691588029 |
| Transmission Valve Station | | | | | | | | | | | |
| Land | | | | | | | | | | | |
| TERMINAL VALUES | | | | | | | | | | | |
| TAX SHIELD | $ (3,207) | $ (2,951) | $ (2,714) | $ (2,497) | $ (2,298) | $ (2,114) | $ (1,945) | $ (1,789) | $ (1,646) | $ (1,514) | $ (1,393) |
| EXTRA O&M | $ 4,416 | $ 4,504 | $ 4,594 | $ 4,686 | $ 21,510 | $ 4,876 | $ 4,973 | $ 5,073 | $ 5,174 | $ 340,407 | $ 5,383 |
| PROPERTY TAX | $ 170,019 | $ 173,419 | $ 176,888 | $ 180,426 | $ 184,034 | $ 187,715 | $ 191,469 | $ 195,298 | $ 199,204 | $ 203,189 | $ 207,252 |
| ANNUAL CASH FLOW | $ 171,228 | $ 174,973 | $ 178,768 | $ 182,615 | $ 203,247 | $ 190,477 | $ 194,498 | $ 198,582 | $ 202,733 | $ 542,081 | $ 211,242 |
| DISCOUNTED CASH FLOW | $ 14,544 | $ 13,995 | $ 13,463 | $ 12,950 | $ 13,572 | $ 11,977 | $ 11,516 | $ 11,072 | $ 10,643 | $ 26,798 | $ 9,833 |
| OPENING BALANCE | $ 154,186 | $ 141,851 | $ 130,503 | $ 120,063 | $ 110,458 | $ 101,621 | $ 93,491 | $ 86,012 | $ 79,131 | $ 72,801 | $ 66,977 |
| ACQUISITION COST | - | - | - | - | - | - | - | - | - | - | - |
| CCA CLAIMED | (12,335) | (11,348) | (10,440) | (9,605) | (8,837) | (8,130) | (7,479) | (6,881) | (6,330) | (5,824) | (5,358) |
| CLOSING BAL | $ 141,851 | $ 130,503 | $ 120,063 | $ 110,458 | $ 101,621 | $ 93,491 | $ 86,012 | $ 79,131 | $ 72,801 | $ 66,977 | $ 61,618 |
| TAX SAVING | $ (3,207) | $ (2,951) | $ (2,714) | $ (2,497) | $ (2,298) | $ (2,114) | $ (1,945) | $ (1,789) | $ (1,646) | $ (1,514) | $ (1,393) |

# Attachment 15.2

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASSUMPTIONS | | | | | | | | | | | | | | |
| CCA | | | | | 8% | | | 2009 | | 2010 | | 2011 | | |
| TAX RATE | | | | | | | | 30.0% | | 29.0% | | 27.5% | | |
| INFLATION | | | | | 2% | | | | | | | | | |
| COST OF CAPITAL | | | | **RATIO** | | **COST** | | **PRETAX** | **POSTAX** | **PRETAX** | **POSTAX** | **PRETAX** | **POSTAX** | |
| DEBT | | | | 65% | | 6.72% | | 4.37% | 3.06% | 4.37% | 3.10% | 4.37% | 3.17% | |
| EQUITY | | | | 35% | | 8.47% | | 2.96% | 2.96% | 2.96% | 2.96% | 2.96% | 2.96% | |
| NOMINAL WACC | | | | 100% | | | | 7.34% | 6.02% | 7.34% | 6.07% | 7.34% | 6.13% | |
| REAL WACC | | | | | | | | 5.23% | | 5.34% | | 5.34% | | |
| YEAR | | | | | | 2009 | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | |
| | ($2009) | | | | | 1 | | 1.02 | 1.0404 | 1.061208 | 1.08243216 | 1.104080803 | 1.126162419 | |
| Transmission Valve Station | $ 4,900,000 | | | | | $ 4,900,000 | | | | | | | | |
| Land | $ 1,400,000 | | | | | $ 1,400,000 | | | | | | | | |
| TERMINAL VALUES | $ - | $ - | | | | | | | | | | | | |
| TAX SHIELD | | | | | | $ (58,800) | $ | (109,133) | $ (95,209) | $ (82,814) | $ (76,189) | $ (70,094) | $ (64,487) | |
| EXTRA O&M | $ 2,000 | $ 9,000 | $ | 220,000 | | $ - | $ | 2,040 | $ 2,081 | $ 2,122 | $ 9,742 | $ 2,208 | $ 2,252 | |
| PROPERTY TAX | $ 77,000 | | | | | $ - | $ | 78,540 | $ 80,111 | $ 81,713 | $ 83,347 | $ 85,014 | $ 86,715 | |
| ANNUAL CASH FLOW | | | | | | $ 6,241,200 | $ | (28,553) | $ (13,017) | $ 1,021 | $ 16,900 | $ 17,128 | $ 24,480 | |
| DISCOUNTED CASH FLOW | | PV | $ | 7,193,395 | | $ 5,886,596 | $ | (25,379) | $ (10,889) | $ 803 | $ 12,511 | $ 11,940 | $ 16,069 | |
| OPENING BALANCE | | | | | | $ - | $ | 4,704,000 | $ 4,327,680 | $ 3,981,466 | $ 3,662,948 | $ 3,369,912 | $ 3,100,319 | |
| ACQUISITION COST | | | | | | 4,900,000 | | - | - | - | - | - | - | |
| CCA CLAIMED | | | | | | (196,000) | | (376,320) | (346,214) | (318,517) | (293,036) | (269,593) | (248,026) | |
| CLOSING BAL | | | | | | $ 4,704,000 | $ | 4,327,680 | $ 3,981,466 | $ 3,662,948 | $ 3,369,912 | $ 3,100,319 | $ 2,852,294 | |
| TAX SAVING | | | | | | $ (58,800) | $ | (109,133) | $ (95,209) | $ (82,814) | $ (76,189) | $ (70,094) | $ (64,487) | |

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

ASSUMPTIONS

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CCA | 2012 | | | | | | | | | | |
| TAX RATE | 26.0% ff | | | | | | | | | | |
| INFLATION | | | | | | | | | | | |
| COST OF CAPITAL | **PRETAX** | **POSTAX** | | | | | | | | | |
| DEBT | 4.37% | 3.23% | | | | | | | | | |
| EQUITY | 2.96% | 2.96% | | | | | | | | | |
| NOMINAL WACC | 7.34% | 6.20% | | | | | | | | | |
| REAL WACC | 5.34% | | | | | | | | | | |
| YEAR | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
| | 1.148685668 | 1.171659381 | 1.195092569 | 1.21899442 | 1.243374308 | 1.268241795 | 1.29360663 | 1.319478763 | 1.345868338 | 1.372785705 | 1.400241419 |

Transmission Valve Station
Land
TERMINAL VALUES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TAX SHIELD | $ (59,328) | $ (54,581) | $ (50,215) | $ (46,198) | $ (42,502) | $ (39,102) | $ (35,974) | $ (33,096) | $ (30,448) | $ (28,012) | $ (25,771) |
| EXTRA O&M | $ 2,297 | $ 2,343 | $ 273,676 | $ 2,438 | $ 2,487 | $ 2,536 | $ 2,587 | $ 11,875 | $ 2,692 | $ 2,746 | $ 2,800 |
| PROPERTY TAX | $ 88,449 | $ 90,218 | $ 92,022 | $ 93,863 | $ 95,740 | $ 97,655 | $ 99,608 | $ 101,600 | $ 103,632 | $ 105,704 | $ 107,819 |
| ANNUAL CASH FLOW | $ 31,418 | $ 37,980 | $ 315,483 | $ 50,103 | $ 55,725 | $ 61,089 | $ 66,221 | $ 80,379 | $ 75,875 | $ 80,438 | $ 84,848 |
| DISCOUNTED CASH FLOW | $ 19,419 | $ 22,104 | $ 172,895 | $ 25,855 | $ 27,078 | $ 27,952 | $ 28,532 | $ 32,610 | $ 28,986 | $ 28,935 | $ 28,740 |
| | | | | | | | | | | | |
| OPENING BALANCE | $ 2,852,294 | $ 2,624,110 | $ 2,414,182 | $ 2,221,047 | $ 2,043,363 | $ 1,879,894 | $ 1,729,503 | $ 1,591,142 | $ 1,463,851 | $ 1,346,743 | $ 1,239,004 |
| ACQUISITION COST | - | - | - | - | - | - | - | - | - | - | - |
| CCA CLAIMED | (228,184) | (209,929) | (193,135) | (177,684) | (163,469) | (150,392) | (138,360) | (127,291) | (117,108) | (107,739) | (99,120) |
| CLOSING BAL | $ 2,624,110 | $ 2,414,182 | $ 2,221,047 | $ 2,043,363 | $ 1,879,894 | $ 1,729,503 | $ 1,591,142 | $ 1,463,851 | $ 1,346,743 | $ 1,239,004 | $ 1,139,883 |
| | | | | | | | | | | | |
| TAX SAVING | $ (59,328) | $ (54,581) | $ (50,215) | $ (46,198) | $ (42,502) | $ (39,102) | $ (35,974) | $ (33,096) | $ (30,448) | $ (28,012) | $ (25,771) |

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

ASSUMPTIONS
CCA
TAX RATE
INFLATION
COST OF CAPITAL
DEBT
EQUITY
NOMINAL WACC
REAL WACC

| YEAR | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.428246248 | 1.456811173 | 1.485947396 | 1.515666344 | 1.545979671 | 1.576899264 | 1.608437249 | 1.640605994 | 1.673418114 | 1.706886477 | 1.741024206 |
| Transmission Valve Station | | | | | | | | | | | |
| Land | | | | | | | | | | | |
| TERMINAL VALUES | | | | | | | | | | | |
| TAX SHIELD | $ (23,710) | $ (21,813) | $ (20,068) | $ (18,462) | $ (16,985) | $ (15,627) | $ (14,376) | $ (13,226) | $ (12,168) | $ (11,195) | $ (10,299) |
| EXTRA O&M | $ 2,856 | $ 333,610 | $ 2,972 | $ 3,031 | $ 3,092 | $ 3,154 | $ 14,476 | $ 3,281 | $ 3,347 | $ 3,414 | $ 3,482 |
| PROPERTY TAX | $ 109,975 | $ 112,174 | $ 114,418 | $ 116,706 | $ 119,040 | $ 121,421 | $ 123,850 | $ 126,327 | $ 128,853 | $ 131,430 | $ 134,059 |
| ANNUAL CASH FLOW | $ 89,122 | $ 423,971 | $ 97,322 | $ 101,275 | $ 105,147 | $ 108,949 | $ 123,949 | $ 116,382 | $ 120,032 | $ 123,649 | $ 127,242 |
| DISCOUNTED CASH FLOW | $ 28,426 | $ 127,335 | $ 27,524 | $ 26,970 | $ 26,366 | $ 25,725 | $ 27,559 | $ 24,366 | $ 23,663 | $ 22,954 | $ 22,242 |
| OPENING BALANCE | $ 1,139,883 | $ 1,048,693 | $ 964,797 | $ 887,613 | $ 816,604 | $ 751,276 | $ 691,174 | $ 635,880 | $ 585,010 | $ 538,209 | $ 495,152 |
| ACQUISITION COST | - | - | - | - | - | - | - | - | - | - | - |
| CCA CLAIMED | (91,191) | (83,895) | (77,184) | (71,009) | (65,328) | (60,102) | (55,294) | (50,870) | (46,801) | (43,057) | (39,612) |
| CLOSING BAL | $ 1,048,693 | $ 964,797 | $ 887,613 | $ 816,604 | $ 751,276 | $ 691,174 | $ 635,880 | $ 585,010 | $ 538,209 | $ 495,152 | $ 455,540 |
| TAX SAVING | $ (23,710) | $ (21,813) | $ (20,068) | $ (18,462) | $ (16,985) | $ (15,627) | $ (14,376) | $ (13,226) | $ (12,168) | $ (11,195) | $ (10,299) |

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

ASSUMPTIONS
CCA
TAX RATE
INFLATION
COST OF CAPITAL
DEBT
EQUITY
NOMINAL WACC
REAL WACC

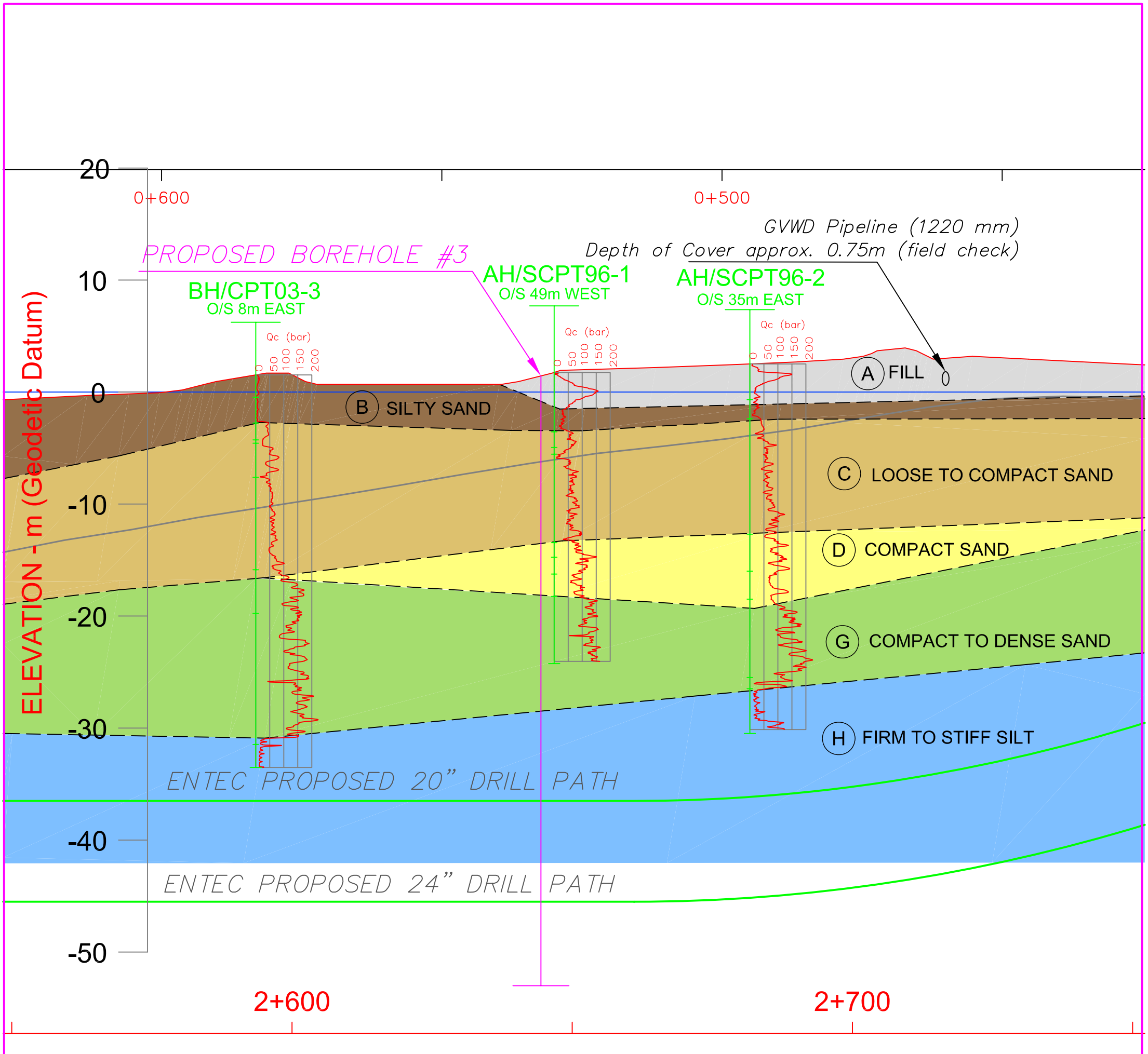
| YEAR | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.77584469 | 1.811361584 | 1.847588816 | 1.884540592 | 1.922231404 | 1.960676032 | 1.999889553 | 2.039887344 | 2.080685091 | 2.122298792 | 2.164744768 |
| Transmission Valve Station | | | | | | | | | | | |
| Land | | | | | | | | | | | |
| TERMINAL VALUES | | | | | | | | | | | |
| TAX SHIELD | $ (9,475) | $ (8,717) | $ (8,020) | $ (7,378) | $ (6,788) | $ (6,245) | $ (5,745) | $ (5,286) | $ (4,863) | $ (4,474) | $ (4,116) |
| EXTRA O&M | $ 406,668 | $ 3,623 | $ 3,695 | $ 3,769 | $ 3,844 | $ 17,646 | $ 4,000 | $ 4,080 | $ 4,161 | $ 4,245 | $ 495,727 |
| PROPERTY TAX | $ 136,740 | $ 139,475 | $ 142,264 | $ 145,110 | $ 148,012 | $ 150,972 | $ 153,991 | $ 157,071 | $ 160,213 | $ 163,417 | $ 166,685 |
| ANNUAL CASH FLOW | $ 533,933 | $ 134,380 | $ 137,940 | $ 141,500 | $ 145,068 | $ 162,373 | $ 152,246 | $ 155,865 | $ 159,511 | $ 163,188 | $ 658,296 |
| DISCOUNTED CASH FLOW | $ 87,883 | $ 20,827 | $ 20,131 | $ 19,445 | $ 18,772 | $ 19,785 | $ 17,468 | $ 16,840 | $ 16,228 | $ 15,633 | $ 59,381 |
| OPENING BALANCE | $ 455,540 | $ 419,097 | $ 385,569 | $ 354,723 | $ 326,346 | $ 300,238 | $ 276,219 | $ 254,121 | $ 233,792 | $ 215,088 | $ 197,881 |
| ACQUISITION COST | - | - | - | - | - | - | - | - | - | - | - |
| CCA CLAIMED | (36,443) | (33,528) | (30,846) | (28,378) | (26,108) | (24,019) | (22,098) | (20,330) | (18,703) | (17,207) | (15,831) |
| CLOSING BAL | $ 419,097 | $ 385,569 | $ 354,723 | $ 326,346 | $ 300,238 | $ 276,219 | $ 254,121 | $ 233,792 | $ 215,088 | $ 197,881 | $ 182,051 |
| TAX SAVING | $ (9,475) | $ (8,717) | $ (8,020) | $ (7,378) | $ (6,788) | $ (6,245) | $ (5,745) | $ (5,286) | $ (4,863) | $ (4,474) | $ (4,116) |

TERASEN GAS INC
FRASER SOUTH ARM CPCN
ECONOMIC ANALYSIS

ASSUMPTIONS
CCA
TAX RATE
INFLATION
COST OF CAPITAL
DEBT
EQUITY
NOMINAL WACC
REAL WACC

| YEAR | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2.208039664 | 2.252200457 | 2.297244466 | 2.343189355 | 2.390053142 | 2.437854205 | 2.486611289 | 2.536343515 | 2.587070385 | 2.638811793 | 2.691588029 |
| Transmission Valve Station | | | | | | | | | | | |
| Land | | | | | | | | | | | |
| TERMINAL VALUES | | | | | | | | | | | |
| TAX SHIELD | $ (3,787) | $ (3,484) | $ (3,205) | $ (2,949) | $ (2,713) | $ (2,496) | $ (2,296) | $ (2,112) | $ (1,943) | $ (1,788) | $ (1,645) |
| EXTRA O&M | $ 4,416 | $ 4,504 | $ 4,594 | $ 4,686 | $ 21,510 | $ 4,876 | $ 4,973 | $ 5,073 | $ 5,174 | $ 604,288 | $ 5,383 |
| PROPERTY TAX | $ 170,019 | $ 173,419 | $ 176,888 | $ 180,426 | $ 184,034 | $ 187,715 | $ 191,469 | $ 195,298 | $ 199,204 | $ 203,189 | $ 207,252 |
| ANNUAL CASH FLOW | $ 170,648 | $ 174,440 | $ 178,277 | $ 182,163 | $ 202,832 | $ 190,095 | $ 194,146 | $ 198,259 | $ 202,435 | $ 805,688 | $ 210,991 |
| DISCOUNTED CASH FLOW | $ 14,495 | $ 13,952 | $ 13,426 | $ 12,918 | $ 13,545 | $ 11,953 | $ 11,495 | $ 11,054 | $ 10,628 | $ 39,829 | $ 9,821 |
| OPENING BALANCE | $ 182,051 | $ 167,487 | $ 154,088 | $ 141,761 | $ 130,420 | $ 119,986 | $ 110,387 | $ 101,556 | $ 93,432 | $ 85,957 | $ 79,081 |
| ACQUISITION COST | - | - | - | - | - | - | - | - | - | - | - |
| CCA CLAIMED | (14,564) | (13,399) | (12,327) | (11,341) | (10,434) | (9,599) | (8,831) | (8,125) | (7,475) | (6,877) | (6,326) |
| CLOSING BAL | $ 167,487 | $ 154,088 | $ 141,761 | $ 130,420 | $ 119,986 | $ 110,387 | $ 101,556 | $ 93,432 | $ 85,957 | $ 79,081 | $ 72,754 |
| TAX SAVING | $ (3,787) | $ (3,484) | $ (3,205) | $ (2,949) | $ (2,713) | $ (2,496) | $ (2,296) | $ (2,112) | $ (1,943) | $ (1,788) | $ (1,645) |

# Attachment 17.1




TERASEN GAS - FRASER RIVER - SOUTH ARM

DETAIL MAP SHOWING GVWD WATER MAIN CROSSING