

Report 4: July 2012

## AUDITS OF TWO P3 PROJECTS IN THE SEA-TO-SKY CORRIDOR

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## Library and Archives Canada Cataloguing in Publication

Library and Archives Canada Cataloguing in Publication  
British Columbia. Office of the Auditor General  
Audits of Two P3 projects in the Sea-to-Sky Corridor [electronic resource].

Includes bibliographical references and index.  
Electronic monograph in PDF format.  
ISBN 978-0-7726-6592-8

1. British Columbia. Ministry of Environment--Auditing. 2. British Columbia. Ministry of Transportation--Auditing. 3. Sea-to-Sky Highway Improvement Project (B.C.). 4. Britannia Mine Water Treatment Plant Project (B.C.). 5. Public-private sector cooperation--British Columbia.  
I. Title.

J9921 Z9 B74 2012

354.3'28243909711

C2012-980137-2



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The Honourable Bill Barisoff  
Speaker of the Legislative Assembly  
Province of British Columbia  
Parliament Buildings  
Victoria, British Columbia  
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Dear Sir:

I have the honour to transmit to the Legislative Assembly of British Columbia my 2012/2013 Report 4:  
*Audits of Two P3 Projects in the Sea-to-Sky Corridor*

This report contains the results of audits of two public-private partnerships (P3s) in British Columbia: the Sea-to-Sky Highway Improvement Project, and the Britannia Mine Water Treatment Plant Project. Although these pieces of work were conducted independent of each other, and on separate P3 projects, there were common findings between these two audits, and our previous work in this area.

The recommendations arising from the two audits in this report are applicable beyond these specific projects, and I encourage the decision makers of public sector entities to review them as they embark on similar arrangements.

I would like to thank the many staff at the ministries for their assistance and cooperation during these audits, and look forward to receiving updates on their progress in implementing the recommendations.

John Doyle, MAcc, CA  
*Auditor General*

Victoria, British Columbia  
July 2012

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**THIS REPORT CONTAINS THE RESULTS** of audits of two public-private partnerships (P3s) in British Columbia: the Sea-to-Sky Highway Improvement Project, and the Britannia Mine Water Treatment Plant Project. Although these pieces of work were conducted independent of each other, and on separate P3 projects, there were common findings between these two audits, and our previous work in this area.

The audit of the Sea-to-Sky project concluded that the design and construction risks were effectively allocated between the Province and the private-sector partners, and that the concession agreement, with a few exceptions, has been effectively managed. However, the Ministry of Transportation and Infrastructure was not able to demonstrate its success to date in achieving its long-term objectives for the project (improved safety, reliability and capacity).

I am encouraged that the Ministry has since gathered further information, particularly regarding safety. This should help the Ministry monitor and report progress towards its main objectives, as recommended in the report. I would also like to note that, while the Ministry's own assessment of the move from PST to HST states the impact to be minimal, I would be unable to conclude on this without seeing a detailed financial analysis. This may be an area for my Office to investigate across multiple projects.

In the audit of the Britannia Mine Water Treatment Plant Project, we found that construction met government's objectives, and that government's overall financial and environmental objectives for the plant are also substantially being met. However, the Ministry of Forests, Lands and Natural Resource Operations and the Ministry of Environment must still prepare plans and timelines to show how they expect to achieve their desired long-term outcomes with the Britannia Mine Remediation Project - an initiative that includes the water treatment plant as a key component.

Certain areas for improvement in my current report reflect some of the recommendations issued in my Office's previous report on P3s, [Audit of the Academic Ambulatory Care Centre Public Private Partnership: Vancouver Coastal Health Authority](#) - specifically, the need to retain all documents related to key changes in the project agreement, and to establish formal requirements for public reporting. These speak to the broader issue of public accountability, the need for which will only increase as P3s are increasingly used for major infrastructure and service delivery projects.

As with our previous P3 work, the recommendations arising from the two audits in this report are applicable beyond these specific projects, and I encourage the decision makers of public sector entities to review them as they embark on similar arrangements.

I would like to thank the many staff at the ministries for their assistance and cooperation during these audits, and look forward to receiving updates on their progress in implementing the recommendations.



**JOHN DOYLE, MAcc, CA**  
*Auditor General*

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## WHAT IS A PUBLIC-PRIVATE PARTNERSHIP?

A public-private partnership (P3) is an alternative approach to designing, building and maintaining public assets. Although P3 projects can involve almost any type of public infrastructure or service, some of the more common P3 projects include hospitals, highways and bridges.

In a P3 agreement, public-sector and private-sector entities enter into a long-term contract that outlines how each partner will provide assets and services for a project. These agreements aim to achieve cost savings over traditional procurement methods, as well as improved quality and efficient service delivery. Under a typical P3 arrangement, the private-sector partner builds the infrastructure and operates it for a set term. Government pays the private-sector partner based on the latter's performance.

P3 contracts are often complex and long-term: they require effective governance and contract management to ensure government achieves value for money.

In 2002, Treasury Board issued the Capital Asset Management Framework, which details government's objectives and policies for planning, procuring and managing publicly funded capital assets. The framework requires government ministries to consider a P3 model for capital infrastructure projects with an estimated cost of \$50 million or more.

To facilitate the development of P3s in British Columbia, the Province also established Partnerships BC, a provincially owned corporation.

Further information about P3s is available in a guide produced by our Office called [\*Understanding Public-Private Partnerships \(P3s\)\*](#).

## SEA-TO-SKY HIGHWAY IMPROVEMENT PROJECT

What We Evaluated Against	Not Achieved	Partially Achieved	Fully Achieved
<b>Objective:</b> To conclude on the effectiveness of the Ministry of Transportation and Infrastructure’s management of the Sea-to-Sky Highway Concession Agreement in meeting its goals for the project.			
<b>Criterion 1:</b> Was design and construction risk effectively transferred to the concessionaire?			√
<b>Criterion 2:</b> Has the ministry developed appropriate operations, maintenance and rehabilitation contract governance and management tools and managed them effectively?		√	
<b>Criterion 3:</b> Can the ministry demonstrate that it is achieving the project’s key objectives of improved safety, reliability and capacity through a well-designed and effectively managed contract?	√		

## BRITANNIA MINE WATER TREATMENT PLANT PROJECT

What We Evaluated Against	Not Achieved	Partially Achieved	Fully Achieved
<b>Objective:</b> To assess whether government’s objectives for the Britannia Mine Water Treatment Plant Project public-private partnership are being met.			
<b>Criterion 1:</b> Did construction of the treatment plant meet the government’s objectives?			√
<b>Criterion 2:</b> Are the government’s financial and environmental objectives being met?		√	



## SEA-TO-SKY HIGHWAY IMPROVEMENT PROJECT

### **WE RECOMMEND THAT THE MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE:**

- 1** review and approve all changes in the P3 ownership structure as allowed under the Sea-to-Sky Highway Concession Agreement for the remaining life of the project agreement.
- 2** ensure all key project documents are identified and accessible for the full term of the Sea-to-Sky Highway Concession Agreement.
- 3** review the Sea-to-Sky Highway Concession Agreement (and all other existing P3 contracts) to assess the financial impacts of switching from the PST to the HST, and recover any overpayments made.
- 4** measure and monitor the achievement of its main objectives for the Sea-to-Sky Highway Improvement Project.
- 5** report publicly on how well it is achieving its value for money and risk transfer objectives outlined in the Sea-to-Sky Highway Concession Agreement.

## BRITANNIA MINE WATER TREATMENT PLANT PROJECT

### **WE RECOMMEND THAT THE MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS:**

- 1** obtain periodic independent verifications of EPCOR Britannia Water Inc.'s water quality testing results over the remaining life of the project agreement.

### **WE RECOMMEND THAT THE MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS AND THE MINISTRY OF ENVIRONMENT:**

- 2** each develop and implement a clear and concise method of maintaining a record of key decisions about, interpretations of and amendments to the Britannia Mine Water Treatment Plant Project agreement and permits, respectively.
- 3** work to develop long-term plans and timelines for meeting their goal of closure of the contaminated site under the *Environmental Management Act*.

## MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE

### Section 1: Overall comments

The Ministry of Transportation and Infrastructure (the “Ministry”) welcomes the results of the OAG audit of the Sea-to-Sky Highway Improvement Project.

The Ministry agrees with the overall audit findings with the exception of the finding on criterion #3. The Ministry is confident that the Sea-to-Sky Highway Improvement Project has improved safety and reliability through a well-designed and effectively managed contract. In particular, the audit acknowledges that safety data does exist, and the concession agreement is effectively managed. The Ministry and Concessionaire collect data which clearly demonstrates that the safety of the Sea to Sky Highway has been improved by the project.

The audit recommendations highlight areas that the Ministry recognizes as opportunities to improve our concession management strategies and to better monitor and communicate to the public regarding the value and benefits that the Province is receiving from the project and the concession agreement. The Ministry has already begun to act on a number of the audit recommendations and will begin acting on all of the recommendations within this fiscal year.

### Section 2: Response to each Recommendation

**RECOMMENDATION 1:** *Review and approve all changes in the P3 ownership structure as allowed under the Sea-to-Sky Highway Concession Agreement for the remaining life of the project agreement.*

From page 10 of the audit report, “Overall, we found the ministry’s management of the Sea-to-Sky Highway contract to be generally good.

However, we did note some areas in need of improvement:

During 2010, the private-sector partner ownership changed. We found the ministry did not conduct a detailed analysis of this sale, something it is able to do under the terms of the contract. Because the government is such a long-term partner in any P3 arrangement, its contract managers need to ensure government’s best interests are reflected in any proposed ownership change.”

**RESPONSE 1:** *The Ministry has implemented processes to ensure analysis of ownership changes that may occur in the future.*

**RECOMMENDATION 2:** *Ensure all key project documents are identified and accessible for the full term of the Sea-to-Sky Highway Concession Agreement.*

From page 10 of the draft audit report, “The ministry was unable to provide us with some key construction documents, such as segment completion sign-offs. Given the long-term nature of the concession agreement, and the high likelihood of turnover in key staff over the life of the contract, it is important that this project documentation be well managed and maintained. Without such documentation, the ministry risks being at a disadvantage when managing and negotiating with its private-sector partners.”

**RESPONSE 2:** *The Ministry is working with the Concessionaire to ensure that the Ministry has a complete set of “as-built” record drawings and other construction completion sign-off documentation.*

**RECOMMENDATION 3:** *Review the Sea-to-Sky Highway Concession Agreement (and all other existing P3 contracts) to assess the financial impacts of switching from the PST to the HST, and recover any overpayments made.*

From page 10 of the draft audit report, “We found an issue related to the possible overpayment of sales tax. Payments to the private-sector partners included the provincial sales tax (PST) consistent with the concession agreement. When the Province introduced the harmonized sales tax (HST) in July 2010, the ministry did not adjust contract payments for any PST included in the annual operations and maintenance costs. Instead, it applied the HST to the PST-inclusive payments. The ministry did not analyze the monetary impact of the tax change, resulting in the risk that it is now paying both taxes to the private-sector partners.”

**RESPONSE 3:** *Most of the annual payment is for capital costs that were incurred by the Concessionaire prior to HST implementation and therefore are not recoverable. A small proportion of the payment (around 15%) relates to operating costs. HST is applicable to only a portion of those ongoing operating costs. The agreement did not anticipate a change in tax law such as the HST. Consideration of the relatively small sums involved indicated that the cost–benefit of such a negotiation would be unlikely to result in a net gain to the Province.*

**RECOMMENDATION 4:** *Measure and monitor the achievement of its main objectives for the Sea-to-Sky Highway Improvement Project.*

From pages 11 and 12 of the draft audit report, “When the Province announced the Sea-to-Sky Highway Improvement Project, it said the purpose of the project was to achieve three key objectives:

- ◆ **Safety:** Improve the safety of the Sea-to-Sky Highway, primarily through improvements to the highway’s design.
- ◆ **Reliability:** Improve travel time predictability for highway users.
- ◆ **Capacity:** Enhance the highway’s ability to accommodate community growth and other user needs.”

## *Safety measurement*

The concession agreement includes a safety performance payment to the private-sector partners. This safety payment is based on comparing Sea-to-Sky Highway safety results with the average of four other highways deemed comparable to the Sea to Sky Highway in the province. Whether safety has actually improved on the Sea-to-Sky Highway as a result of highway improvements and ongoing management is not known, however, because this is not being measured – despite the fact the data does exist to allow this kind of measurement.

## *Reliability measurement*

The concession agreement also includes a “highway reliability” performance payment. Highway reliability pertains to travel time from one point to another on the Sea-to-Sky Highway.

During the construction phase, electronic sensing equipment was installed to measure vehicle travel time between different points on the highway and to document travel time delays. However, the private-sector partner responsible for this equipment has not been able to get this equipment to operate successfully. Instead, a manual work-around solution is being used based on observation and self-reporting. As a result, we concluded that the Province is not effectively measuring and reporting on highway reliability.

## *Capacity enhancement measurement*

“Highway capacity” refers to how well the Sea-to-Sky Highway improvements accommodate economic development and community growth along the corridor. There is no mechanism within the concession agreement to measure capacity enhancement, and we found that the ministry is not measuring or reporting on the enhanced capacity objective it identified for the Sea-to-Sky Highway Improvement Project.”

**RESPONSE 4:** *Safety: The audit report leaves the impression that it is unclear whether the Sea to Sky Highway is safer now than before the Improvement Project. Ministry data clearly shows that there have been significant reductions in accidents on the Sea to Sky Highway since the main improvements were completed. The total number of motor vehicle accidents on the the Sea to Sky Highway decreased from 217 in 2004 to 124 in 2011, which is more than a 40% reduction in accident rates. The Ministry will continue to track the current and future accident rates on the highway, against the historical motor vehicle accident rates.*

*Reliability: As the audit report states, the Ministry and the Concessionaire continue to monitor reliability with a direct observation and self-reporting system. The data indicates significant reductions in road closures and reductions in the duration of road closures.*

*The Concessionaire continues its efforts to resolve the technical difficulties with their electronic sensing equipment that was installed to measure vehicle travel time and to document travel time delays. The Ministry will continue to press the Concessionaire to ensure that these difficulties are resolved.*

*Capacity: The agreement required the Concessionaire to achieve specific increases in the traffic capacity of the highway. While the upgraded highway is relatively new, the Ministry has heard from communities in the corridor that they believe there have been economic development benefits and community growth as a result. The Ministry will analyze and report on the capacity enhancement objective after a suitable length of time that takes into account short term economic fluctuations.*

**RECOMMENDATION 5:** *Report publicly on how well it is achieving its value-for-money and risk transfer objectives outlined in the Sea-to-Sky Highway Concession Agreement.*

From page 12 of the draft audit report, “Value for money” is the relationship between costs and benefits, which includes both objective (i.e. factual) and subjective (i.e. interpretive) considerations. In its 2005 Achieving Value for Money report, the ministry asserted that the Sea-to-Sky Highway Improvement Project achieved value for money because additional improvements above baseline highway improvements had been made, which in turn enhanced user benefits beyond baseline highway improvements.

The current lack of monitoring and reporting on the key objectives of the project makes it impossible for the ministry to report effectively on whether it is achieving value for money. As the Sea-to-Sky Highway and other early highway-type P3s move into the operations phase, it is important that the ministry measure whether it is achieving value for money in order to assess the effectiveness of the P3 approach for future highway procurements.”

**RESPONSE 5:** *As described in Response #4, the Ministry will report on indicators that demonstrate how the safety, reliability, and capacity objectives of the project have been met.*

## MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS

Thank you for the report “Audit of the Britannia Mine Water Treatment Plant Public-Private Partnership”. This response is made on behalf of the Ministry of Forests, Lands and Natural Resource Operations. In reviewing the report and our formal response, it will be important to note that the regulatory framework associated with management of contaminated sites in British Columbia and the remediation of the Britannia Mine falls under the *Environmental Management Act* and Contaminated Sites Regulation.

The recommendations contained in the Auditor General’s report provide a useful guide to improve management of the Britannia Water Treatment Plant. Accordingly, the ministry’s response on behalf of government is summarized below:

**RECOMMENDATION 1:** *We recommend that the Ministry of Forests, Lands and Natural Resource Operations obtain periodic independent verifications of EPCOR Britannia Water Inc.’s (EPCOR) water quality testing results over the remaining life of the project agreement.*

The Ministry of Forests, Lands and Natural Resource Operations will follow-up and obtain periodic independent verification of EPCOR Britannia Water Inc.’s water testing results. This independent oversight will provide additional verification that EPCOR is meeting its obligations under the partnership.

**RECOMMENDATION 2:** *We recommend that the Ministry of Forests, Lands and Natural Resource Operations and the Ministry of Environment each develop and use a clear and concise method of maintaining records of key decisions about, interpretations of and amendments to the Britannia Mine Water Treatment Plant Project agreement and permits, respectively.*

The Ministry of Forests, Lands and Natural Resource Operations will continue to efficiently manage the partnership with EPCOR to provide value for the expenditure of public funds. A concise method will be developed to ensure the documentation of key decisions related to the agreement and existing permits.

**RECOMMENDATION 3:** *We recommend that the Ministry of Forests, Lands and Natural Resource Operations work with the Ministry of Environment to develop long-term plans and timelines for meeting their goal of closure under the Environmental Management Act.*

The Ministry of Forests, Lands and Natural Resource Operations will work with the Ministry of Environment to develop long-term plans and timelines to achieve closure of the Britannia Mine. This will be with the understanding that closure will comprise of the cessation of active site investigation and remediation, but recognize that long-term water treatment will be ongoing unless alternate cost effective technologies are available.

## MINISTRY OF ENVIRONMENT

The ministry has reviewed the findings and is in general agreement with the recommendations. In respect to the recommendation specific to the Ministry of Environment we offer the following responses.

**RECOMMENDATION 2:** *We recommend that the Ministry of Forests, Lands and Natural Resource Operations and the Ministry of Environment each develop and use a clear and concise method of maintaining records of key decisions about, interpretations of and amendments to the Britannia Mine Water Treatment Plant Project agreement and permits, respectively.*

- ◆ All statutory decision should be guided by the principles of administrative fairness and natural justice. The Ministry of Environment is committed to ensuring that statutory decisions are made in a fair, predictable and transparent manner. In making statutory decisions staff are informed by a number of factors including risks to health and the environment, public safety and the use of technology to mitigate against pollution and the potential impacts. The ministry recognizes that there exists variability in how decision makers have historically exercised these powers and has committed to establishing a guidebook for Statutory Decision Makers that will be made available to staff in 2012. The ministry is currently evaluating the options for implementing a Reasons for Decision, which would document such decisions and their supporting rationale or considerations. With the introduction of the guidebook, the ministry will initiate training for its statutory decision makers on the use of the guide over the next several years. If adopted, the Reasons for Decision would form part of the permit file and may be made available.
- ◆ With respect to the Britannia Remediation Project, key statutory decisions and Reasons for Decisions related to permits or remediation of the mine site will continue to be posted to the Ministry of Environment's public web site on the Britannia Remediation Project.

**RECOMMENDATION 3:** *We recommend that the Ministry of Forests, Lands and Natural Resource Operations work with the Ministry of Environment to develop long-term plans and timelines for meeting their goal of closure under the Environmental Management Act.*

- ◆ Remediation of the Britannia Mine site remains a work in progress. The Ministry of Forests, Lands and Natural Resource Operations has made significant progress on the remediation of the site and in bringing on line the operation of the water treatment plant. Already the benefits to the environment are being seen with these efforts with the recent return of fish to Britannia Creek. Investigation and remediation of several units comprising this very large mine site are still underway and the work has been phased taking into consideration the priorities of the ministry and the other stakeholders involved in the project. The investigation and remediation of the site are governed by the provisions of the *Environmental Management Act* and its associated regulations, and the federal *Fisheries Act*. The outcome of remediation remains a work in progress and will to a degree be

determined by the technical feasibilities of available remedial technologies, their likelihood of success, the level of environmental recovery achieved in response to implemented remedial actions, and costs. We will continue to work with the Ministry of Forests Lands and Natural Resource Operations on the development of long-term remediation goals and timelines and monitoring progress towards site closure under EMA. The ministry and stakeholders recognize that not all areas of the site may recover to their baseline conditions or the intended management goals given site constraints. In these circumstances the option for providing offsets in the area around Britannia may be more effective.



## BACKGROUND

The Sea-to-Sky Highway (Highway 99) extends for 95 kilometres, passing through coastal mountains and connecting a number of communities between West Vancouver and Whistler (see Exhibit 1).

In January 2003, Treasury Board approved \$600 million to improve the highway. In June 2005, the Province (represented by the Ministry of Transportation and Infrastructure) entered into a P3 agreement with the Sea-to-Sky Highway Investment Limited Partnership (a group of private companies) to design, build and finance about two-thirds of the highway improvements and to operate and maintain the entire highway for 25 years. The ministry is responsible for managing the remaining one-third of improvements through separate contracts.

The contract, called a concession agreement, governing this P3 details the obligations for each party during the construction and operating phases of the agreement.

The ministry's plans to improve the Sea-to-Sky Highway included widening, straightening and dividing sections of the highway to improve its safety, reliability and capacity. In addition to these "baseline" improvements, as referred to by the ministry, the private-sector partners agreed to provide a number of additional enhancements within the scope of the project budget. These included installing:

- ◆ additional passing lanes and median barriers;
- ◆ reflective pavement markers and rumble strips;
- ◆ wider shoulders and pull-outs;
- ◆ stronger bridges and better intersections; and
- ◆ enhanced road- and weather-monitoring equipment.

Six months after the agreement was signed, in December 2005, the ministry released a project report entitled *Achieving Value for Money – Sea-to-Sky Highway Improvement Project*, which provided details of the P3 arrangement for the project. Our Office reviewed the contents of that report before its publication. We issued a Review Engagement Report in which the Auditor General concluded that nothing had come to his attention to cause him concern that the ministry did not "fairly describe the assumptions, context, decisions, procurement processes and results to date of the Sea-to-Sky Highway Improvement Project."

In 2009, the P3 contractors completed the major improvements to the highway in time for the 2010 Vancouver Olympic and Paralympic Winter Games. The private-sector partners continue to maintain and operate the highway in keeping with the concession agreement.

Exhibit 1: Route of the Sea-to-Sky Highway



Source: B.C. Ministry of Transportation and Infrastructure

## AUDIT OBJECTIVES AND SCOPE

We carried out this audit to determine whether the Ministry of Transportation and Infrastructure:

- ♦ effectively transferred Sea-to-Sky Highway design and construction risk to the private-sector partners;
- ♦ developed appropriate contract governance and management methods, and is effectively managing the Sea-to-Sky Highway Concession Agreement; and
- ♦ is able to demonstrate it is achieving its key objectives for the Sea-to-Sky Highway Improvement Project: enhanced highway safety, reliability and capacity.

We based our audit objectives and criteria on guidance provided by the UK National Audit Office in its report *A Framework for Evaluating the Implementation of Private Finance Initiative (PFI) Projects (Volumes 1 and 2)*.<sup>1</sup> We also considered guidance from our Office's past work on public-private partnerships.

We conducted the audit in the fall of 2011, in accordance with Section 11(8) of the *Auditor General Act* and the standards for assurance engagements established by the Canadian Institute of Chartered Accountants.

## AUDIT CONCLUSION

We concluded that:

- ♦ the design and construction risks of the Sea-to-Sky Highway Improvement Project were effectively allocated between the Province and the private-sector partners, based on their respective ability to manage risks and costs;
- ♦ the concession agreement, with a few exceptions, has been effectively managed; and
- ♦ the ministry is not able to demonstrate its success to date of achieving its long-term objectives for the project: improved safety, reliability and capacity.

<sup>1</sup> The UK National Audit Office is a leader in the field of private finance initiative projects (also known as public-private partnership, or P3, projects), having had extensive experience in analyzing and evaluating them.

## KEY FINDINGS AND RECOMMENDATIONS

### Design and construction risk transfer

A key to any project's success is to plan for and manage potential problems. This is referred to as risk management. Key risks to the success of the Sea-to-Sky Highway Improvement Project included issues related to highway design, construction, operations, maintenance and rehabilitation.

Trade-offs must often be made between construction costs and costs for operations, maintenance and rehabilitation. Under a P3 contract, a contractor can choose to spend more on construction, knowing the benefits will likely be lower maintenance and rehabilitation costs later in the contract period.

For the Sea-to-Sky Highway Improvement Project, risks were either allocated or shared between the Province and the private-sector partners based on an assessment of who was most able to cost-effectively manage each potential risk.

Appendix A in this report details the project's risks and how they were allocated in the agreement between the public- and private-sector parties.

To determine whether project design and construction risks were transferred effectively between the Province and its private-sector partners, we examined whether the project was completed to the specifications outlined in the concession agreement and consistent with any approved change orders. We found that the private-sector partners had completed the project on time. As well, final costs were consistent with what the ministry planned for the project, and within the scope of approved changes. We also found that the ministry had appropriately managed design and construction risks in accordance with the risk allocation (see Appendix A) set out within its 2005 *Achieving Value for Money* report and within the terms of the contract.

### Payments to P3 partners

In reviewing the capital costs for the project, we found the total payments to the private-sector partners to be consistent with the terms of the concession agreement. However, the ministry's allocation of these payments between capital and operating costs changed as the result of a revised interpretation of accounting standards. Capital costs increased from \$600 million to \$795 million, while over the term of the agreement operating costs correspondingly decreased.

The ministry disclosed these changes in the 2008/09 budget documents. Because there was no change in the ministry's project costs – or in the agreed-on annual payments to the private-sector partners – we concluded that the construction phase of the project had been completed within budget.

**Rehabilitation** refers to major repairs undertaken periodically to maximize the lifespan of a highway. In contrast, **maintenance** refers to ongoing preventative and corrective measures to ensure a highway is available and safe for public use.

## Contingency fund

The project budget included a \$65 million contingency fund to pay for unanticipated costs and work not yet planned. Contingency funds are a best practice in large construction projects – and even in a P3 project where known design and construction risks have been allocated between the public- and private-sector partners, residual unanticipated risks remain. A contingency fund is used to pay for unanticipated costs and is used as necessary.

The Province approved a total of \$56 million in change orders (see sidebar) during the design and construction phases of the project. These orders included an additional interchange, another overpass, sound walls and other additions to the original project scope. We also noted an example of when the ministry approved a change order to address construction delays that were outside the control of the private-sector partners.

We concluded that because the change orders were mainly ministry-initiated additions to the project scope, they were consistent with the expected risk transfer to the private-sector partner.

## Contract management

The Sea-to-Sky Highway concession agreement is a 25-year contract that includes project design and construction as well as ongoing highway operations, maintenance and rehabilitation. While the design and construction portion of the contract has been completed, the concession agreement must still be managed effectively to ensure that all parties deliver the contract's remaining requirements, and that the highway is well managed and maintained. This is critical to achieving the project's value for money objectives.

To facilitate effective contract management, the Ministry of Transportation and Infrastructure dedicated staff and resources to manage the concession agreement. The ministry provided staff with contract management training and hired consultants to support internal expertise.

The private-sector partners receive annual payments to compensate for their highway construction costs, in addition to payments to cover the annual costs to operate, maintain and rehabilitate the highway to required standards during the 25 years of the agreement. A portion of these payments is tied to the partner's performance around highway availability and volume usage, as well as to performance incentives (e.g. safety). The ministry's 2005 *Achieving Value for Money* report provides an estimate of the payments over the agreement.

We observed good working relations between ministry staff and the private-sector partners, supported by processes such as monthly operations and maintenance meetings.

The contract also contains mechanisms to support good highway management. For example, one of the private-sector partners was required to implement and maintain an ISO 9001-certified quality management system (see sidebar). The concession agreement includes performance-based pay incentives and penalties to motivate the

**Change order** – A written order to the contractor issued after the signing of a construction contract, authorizing a change in the construction work, time and/or amount.

### What is ISO 9001?

ISO 9001 is an internationally recognized standard for the quality management of a business. Companies must go through a rigorous process of accreditation to receive ISO 9001 certification.

P3 partner to deliver quality service. There is also a \$50 million end-of-term payment if the highway is transferred back to the Province in an agreed-on condition.

Overall, we found the ministry's management of the Sea-to-Sky Highway contract to be generally good.

However, we did note some areas in need of improvement:

- ◆ During 2010, the private-sector partner ownership changed. We found the ministry did not conduct a detailed analysis of this sale, something it is able to do under the terms of the contract. Because the government is such a long-term partner in any P3 arrangement, its contract managers need to ensure government's best interests are reflected in any proposed ownership change.
- ◆ The ministry was unable to provide us with some key construction documents, such as segment completion sign-offs. Given the long-term nature of the concession agreement, and the high likelihood of turnover in key staff over the life of the contract, it is important that this project documentation be well managed and maintained. Without such documentation, the ministry risks being at a disadvantage when managing and negotiating with its private-sector partners.
- ◆ We found an issue related to the possible overpayment of sales tax. Payments to the private-sector partners included the provincial sales tax (PST) consistent with the concession agreement. When the Province introduced the harmonized sales tax (HST) in July 2010, the ministry did not adjust contract payments for any PST included in the annual operations and maintenance costs. Instead, it applied the HST to the PST-inclusive payments. The ministry did not analyze the monetary impact of the tax change, resulting in the risk that it is now paying both taxes to the private-sector partners.

**RECOMMENDATION 1:** *We recommend that the Ministry of Transportation and Infrastructure review and approve all changes in the P3 ownership structure as allowed under the Sea-to-Sky Highway Concession Agreement for the remaining life of the project agreement.*

**RECOMMENDATION 2:** *We recommend that the Ministry of Transportation and Infrastructure ensure all key project documents are identified and accessible for the full term of the Sea-to-Sky Highway Concession Agreement.*

**RECOMMENDATION 3:** *We recommend that the Ministry of Transportation and Infrastructure review the Sea-to-Sky Highway Concession Agreement (and all other existing P3 contracts) to assess the financial impacts of switching from the PST to the HST, and recover any overpayments made.*

## Accountability for achieving key objectives and measuring value for money

We examined the ministry's monitoring and accountability reporting on the achievement of its key objectives for the Sea-to-Sky Highway Improvement Project. We found that the ministry does not know if it is meeting its key objectives, because it is not measuring, monitoring or reporting on them.

When the Province announced the Sea-to-Sky Highway Improvement Project, it said the purpose of the project was to achieve three key objectives:

- ◆ Safety: Improve the safety of the Sea-to-Sky Highway, primarily through improvements to the highway's design.
- ◆ Reliability: Improve travel time predictability for highway users.
- ◆ Capacity: Enhance the highway's ability to accommodate community growth and other user needs.

Effective accountability for major public-sector projects such as the Sea-to-Sky Highway P3 requires the reporting of timely, relevant and reliable performance information to stakeholders. Ineffective or incomplete performance measurement, monitoring and reporting increase the risk that lessons will not be learned, that future contracts will not be well managed and – equally important – that these projects will not provide value for money.

### *Safety measurement*

The concession agreement includes a safety performance payment to the private-sector partners. This safety payment is based on comparing Sea-to-Sky Highway safety results with the average of four other highways deemed comparable to the Sea-to-Sky Highway in the province. Whether safety has actually improved on the Sea-to-Sky Highway as a result of highway improvements and ongoing management is not known, however, because this is not being measured – despite the fact the data does exist to allow this kind of measurement.

### *Reliability measurement*

The concession agreement also includes a “highway reliability” performance payment. Highway reliability pertains to travel time from one point to another on the Sea-to-Sky Highway.

During the construction phase, electronic sensing equipment was installed to measure vehicle travel time between different points on the highway and to document travel time delays. However, the private-sector partner responsible for this equipment has not been able to get this equipment to operate successfully. Instead, a manual work-around solution is being used based on observation and self-reporting. As a result, we concluded that the Province is not effectively measuring and reporting on highway reliability.

## *Capacity enhancement measurement*

“Highway capacity” refers to how well the Sea-to-Sky Highway improvements accommodate economic development and community growth along the corridor. There is no mechanism within the concession agreement to measure capacity enhancement, and we found that the ministry is not measuring or reporting on the enhanced capacity objective it identified for the Sea-to-Sky Highway Improvement Project.

## *Achieving value for money*

“Value for money” is the relationship between costs and benefits, which includes both objective (i.e. factual) and subjective (i.e. interpretive) considerations. In its 2005 *Achieving Value for Money* report, the ministry asserted that the Sea-to-Sky Highway Improvement Project achieved value for money because additional improvements above baseline highway improvements had been made, which in turn enhanced user benefits beyond baseline highway improvements.

The current lack of monitoring and reporting on the key objectives of the project makes it impossible for the ministry to report effectively on whether it is achieving value for money. As the Sea-to-Sky Highway and other early highway-type P3s move into the operations phase, it is important that the ministry measure whether it is achieving value for money in order to assess the effectiveness of the P3 approach for future highway procurements.

**RECOMMENDATION 4:** *We recommend that the Ministry of Transportation and Infrastructure measure and monitor the achievement of its main objectives for the Sea-to-Sky Highway Improvement Project.*

**RECOMMENDATION 5:** *We recommend that the Ministry of Transportation and Infrastructure report publicly on how well it is achieving its value for money and risk transfer objectives outlined in the Sea-to-Sky Highway Concession Agreement.*

## BACKGROUND

### Britannia Mine and its environmental impacts

The site of the former copper mine is located at Britannia Beach, about 50 kilometres north of Vancouver on the Sea-to-Sky Highway. This high-traffic corridor runs between Vancouver and Whistler, much of it along the eastern shore of Howe Sound (see Exhibit 1). The area, home to about 17,400 people, includes the communities of Britannia Beach and Squamish and those of the Squamish First Nation. The key economic activities there today include tourism, logging, ranching, farming and trade at a deep-sea port.

Britannia Mine operated from the early 1900s until 1974. At its peak, it was the largest producer of copper in the British Empire.

Mining operations resulted in about 80 kilometres of underground tunnels as well as several open pits and “glory holes” (created when the ground collapses into a depression because of mining activity beneath). These operations exposed the naturally occurring underground sulphides to air and water. The ensuing chemical reaction between the sulphides and the elements caused concentrated acidic, metal-contaminated water (called acid rock drainage) to form.

**Exhibit 1:** Location of the former Britannia Mine, north of Vancouver



Source: Office of the Auditor General of British Columbia

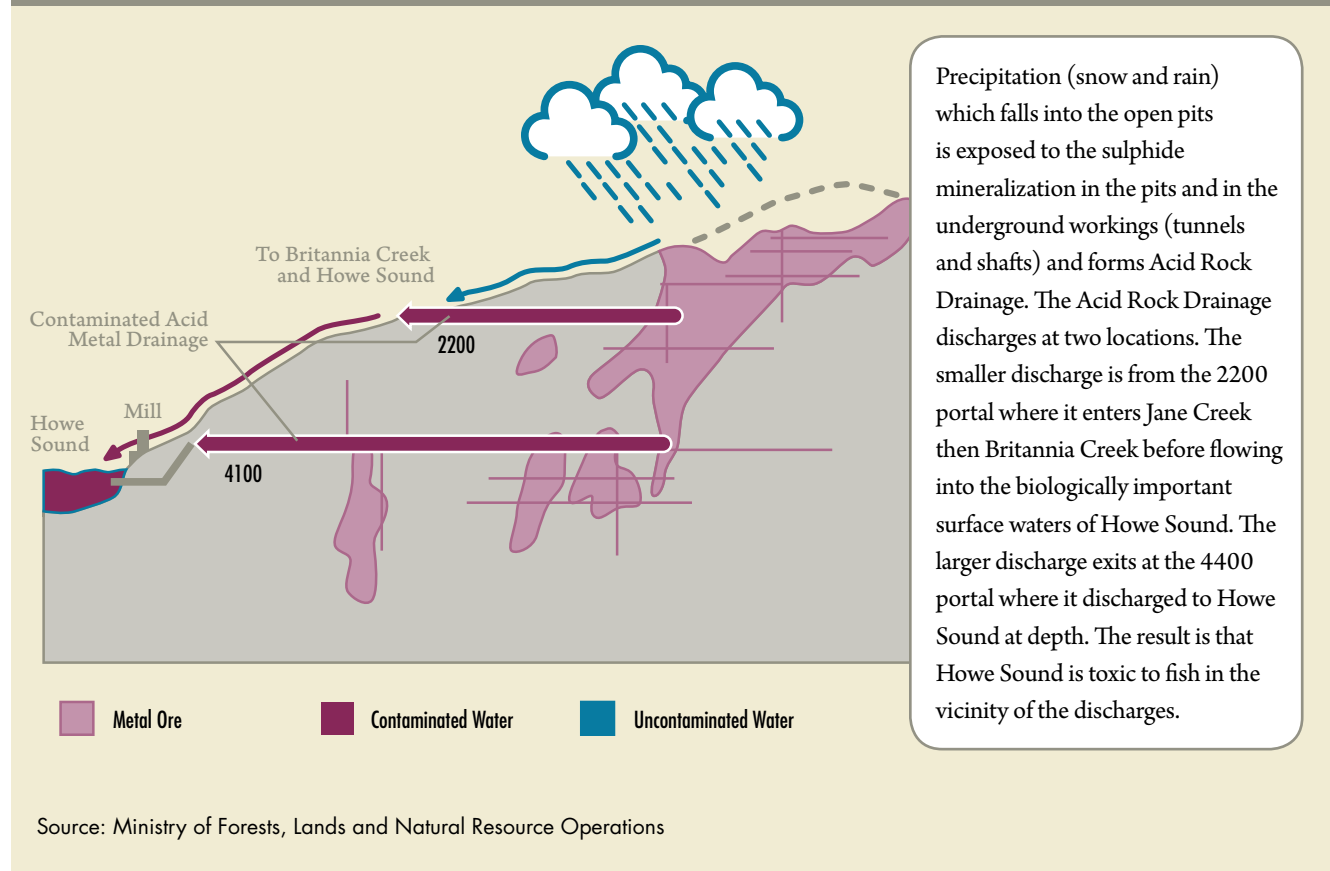


The total area affected by the mine activity is about 4,000 hectares. The site spreads over two watersheds (Britannia and Furry Creek) and extends to the Howe Sound shoreline at Britannia Beach, where most of the ore-processing once took place.

The outflow of metal-contaminated water from Britannia Mine – during its operations and even after its closure – made it one of the largest sources of metal pollution in North America. The size of the mine site and the high levels of precipitation in the region contributed to the acid rock drainage problem.

Before the Province took action in 2005 to begin addressing the pollution problem at the site, water flowed untreated through the mine and into local waterways and Howe Sound (see Exhibit 2). Marine plants and animals, including juvenile salmon, were significantly affected. The government estimates that before it intervened, about 5 million cubic metres of untreated acid rock drainage discharged from the mine site every year – an amount of water equal to what it would take to fill about 2,000 Olympic-size swimming pools.

**Exhibit 2:** Environmental conditions at the Britannia Mine site after mining operations ended



## The Britannia Mine Remediation Project

In the mid-1990s, the Province began pursuing the former mine owners for compensation to remediate the site. These efforts resulted in a \$30 million settlement that absolved the mining companies from any future liability. In 2003, the Province reached an agreement with the then landowner and took ownership of the mine site.

The Province used the financial settlement to begin the Britannia Mine Remediation Project, an initiative led by the Ministry of Forests, Lands and Natural Resource Operations. The project is expected to cost about \$76 million. Its primary goal is to reduce the environmental impacts from the former mine site.

To track the project's effectiveness, the ministry implemented an environmental monitoring program that measures the changes resulting from the remediation work, including changes to Howe Sound's intertidal life and water quality.

Since the project was implemented, there have been some clear indicators of improvement. For example, the Department of Fisheries and Oceans notes that pink salmon have returned to Britannia Creek.

As of mid-2010, the ministry had completed most of this project, including a key component that involves treating the mine water in order to reduce its environmental impacts on Howe Sound.

The Province developed this aspect of the project through a public-private partnership (P3).

## Construction of the water treatment plant – a P3 arrangement

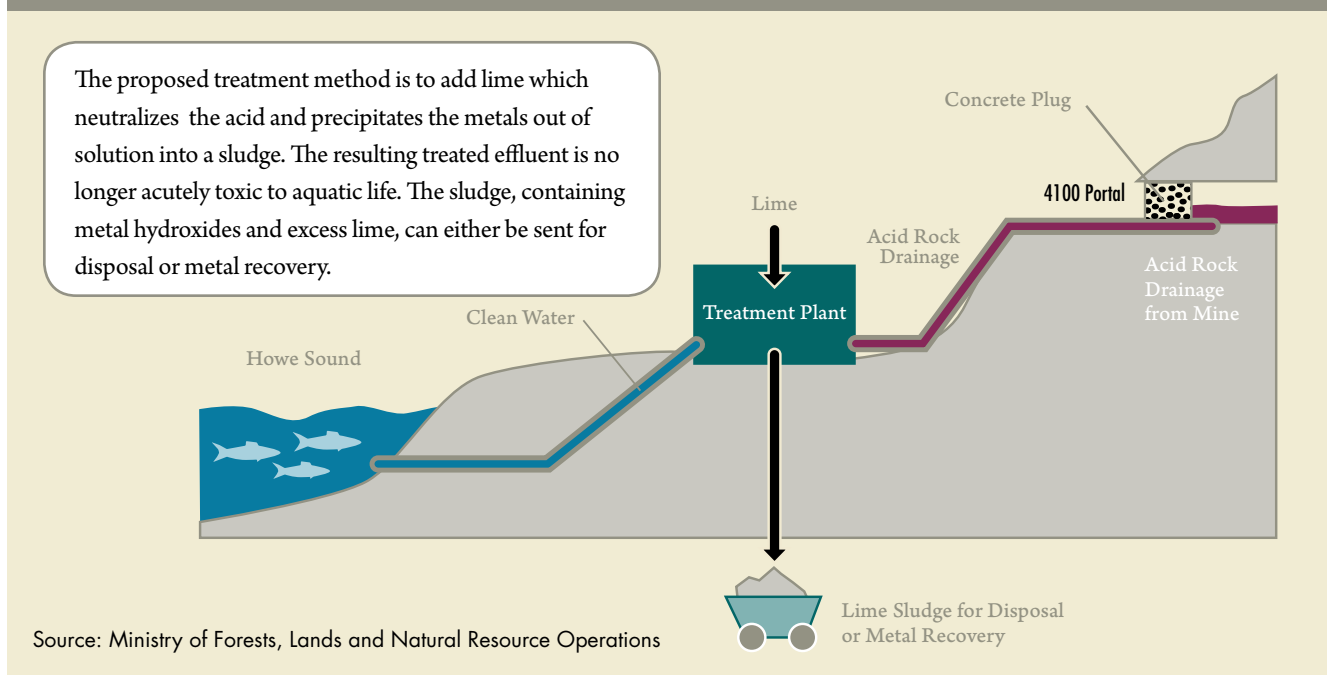
In 2005, the Province took a major step towards managing the mine-polluted waters when it entered into a P3 agreement with EPCOR Britannia Water Inc. (EPCOR). EPCOR won the contract to design, build, operate, maintain and finance the Britannia Mine water treatment plant.

This is the only provincial government project to date where the treatment of contaminated water is managed through a P3.

The water treatment plant, located on the Britannia Mine site, uses high-density sludge technology as its treatment process (see Exhibit 3 on next page). Lime added to the water adjusts the pH and draws out the dissolved metals, creating sludge, which is pressed into a "sludge cake." The treated water is discharged into Howe Sound through a deep-water outfall. The sludge is transported into the mountains and disposed of in the open pits and glory holes of Jane Basin. The Province selected this disposal site because any contaminated runoff from the sludge cakes should drain back into the mine, eventually ending up at the treatment plant.

EPCOR's contract covers an initial 20 years of water treatment (2005–2025). However, to manage the ongoing acid rock drainage problem, government will need to continue operating the water treatment plant for as long as groundwater (water that

**Exhibit 3:** Water treatment process now underway at the Britannia Mine site



seeps into the ground from above) and surface water continue to flow through the mine, or until other technologies are implemented to treat the water.

The total cost of the contract, as estimated by the Province in its 2005 report on the project (see *Achieving Value for Money – Britannia Mine Water Treatment Plant*) is \$29.1 million. That includes the total value of government’s payments to EPCOR over the lifespan of the contract (\$27.2 million) plus the cash allowance items (\$1.9 million).

### Government’s role

The Ministry of Forests, Lands and Natural Resource Operations and the Ministry of Environment both play a role in the Britannia Mine Remediation Project, including the Britannia Mine water treatment plant.

The Ministry of Environment is the regulator of the water treatment plant. It issued a discharge permit stipulating the acceptable levels of metal concentrations that can be in the water after it is treated and before it is released into Howe Sound. The Province set these levels in consultation with the federal government, since both jurisdictions have legal authority concerning water pollution.

The acceptable metal concentration levels formed the basis of the Britannia Mine Water Treatment Plant Project agreement that established the public-private partnership between EPCOR and the Province.

The P3 agreement is managed by the Ministry of Forests, Lands and Natural Resource Operations. The ministry also acts as the landowner responsible for remediating the Britannia Mine site.

**Cash allowance** – Project owners can select to provide a cash allowance for specific items if, when the contract is being signed, the owner has not yet determined the final specifications of the work.

## AUDIT OBJECTIVES AND SCOPE

We carried out this audit to assess whether the provincial government's objectives for the Britannia Mine Water Treatment Plant Project public-private partnership are being met. To do this, we sought to answer two questions:

1. Did construction of the treatment plant meet the government's objectives?
2. Are the government's financial and environmental objectives being met?

We based our audit objective and criteria primarily on guidance provided by the UK National Audit Office in its report *A Framework for Evaluating the Implementation of Private Finance Initiative (PFI) Projects (Volumes 1 and 2)*.<sup>2</sup> We also considered guidance from our Office's past work on public-private partnerships.

The focus of our audit was on the Britannia Mine Water Treatment Plant Project P3. However, because the government is monitoring the long-term effectiveness of the plant by measuring environmental changes resulting from the Britannia Mine Remediation Project, we also found it necessary to review the progress of the broader remediation work. The audit did not look at the project decisions made at the strategic analysis, tendering or contract completion phases.

We conducted the audit in the fall of 2011, in accordance with Section 11(8) of the *Auditor General Act* and the standards for assurance engagements established by the Canadian Institute of Chartered Accountants.

## AUDIT CONCLUSION

We concluded that:

- ◆ the construction of the Britannia Mine water treatment plant met government's objectives; and
- ◆ government's financial and environmental objectives with the plant are substantially being met, although both the Ministry of Forests, Lands and Natural Resource Operations and the Ministry of Environment must still prepare long-term plans and timelines to show how they expect to achieve their desired outcomes with the Britannia Mine Remediation Project – an initiative that includes the water treatment plant as a key component.

<sup>2</sup> The UK National Audit Office is a leader in the field of private finance initiative projects (also known as public-private partnership, or P3, projects), having had extensive experience in analyzing and evaluating them.

## KEY FINDINGS AND RECOMMENDATIONS

### Construction of the water treatment plant

To determine if the water treatment plant's construction met government's objectives, we assessed whether EPCOR met the specifications, costs and timelines contained in the project agreement.

We found that EPCOR did meet all of the requirements, and even started treating water two months earlier than expected.

One significant change to the scope of the project occurred in March 2005, when the government amended the signed agreement to add groundwater capacity to the treatment facility. This change increased total costs by about 11%. There was no contingency budget for the water treatment plant, so the Province funded the scope increase from the budget for the broader remediation project. We consider this cost increase reasonable because the addition complied with the change requirements of the project agreement. Also, the addition of groundwater treatment has expanded the capacity of the plant beyond what was set out in the project agreement.

### Design and construction risk transfer

A key principle of P3 agreements is that project risks be allocated between the public- and private-sector partners based on which party can most cost-effectively manage each risk.

We reviewed all approved changes to the signed P3 agreement for the water treatment plant project, including modifications to the construction work, timelines and amounts paid to EPCOR. We looked for any examples where these change orders shifted additional risk or responsibility onto the Province.

Appendix C in this report details the project's risks and how they were allocated in the agreement between the Province and EPCOR. Overall, we found that design and construction risks were appropriately managed and in keeping with the risk allocations shown in Appendix C.

### Financial and environmental objectives

The project agreement requires EPCOR to operate and maintain the Britannia Mine water treatment plant for 20 years following completion of its construction. During this time, from 2005 to 2025, it is the Province's responsibility to manage the contract to ensure its financial and environmental objectives are effectively met. These objectives include ensuring that the plant is performing and costing as expected in the contract.

## *Cost management*

We found that, in most cases, the government is meeting its financial and environmental objectives for the water treatment plant.

To determine government's effectiveness in meeting its financial objectives, we compared the actual costs of operating the plant with the Province's projected costs. We also assessed how the Ministry of Forests, Lands and Natural Resource Operations managed its contract with EPCOR.

The agreement specifies the government's projected costs for the operation of the treatment plant. This includes the amount the Province agreed to pay for inputs to the plant, such as the lime used to draw out the heavy metals and the hydropower required for pumping some of the water. We found that the actual costs of operating the water treatment plant were close to what was budgeted for the project, with the exception of lime and hydroelectricity. Under the terms of the agreement, the Province retained the risk of cost inflation for raw materials (e.g. lime), while EPCOR bears the risks of treatment process efficiency. We found that the higher costs are due to inflation (and not to a lack of efficiency) and are therefore borne by the Province.

## *Contract management*

In terms of contract management, we found that the ministry is doing a good job of managing the contract with EPCOR. The ministry has implemented and are following processes to review reports, authorize invoices, make payments and stay informed about EPCOR's performance.

## *Achievement of environmental objectives*

The government's key environmental objective for the water treatment plant was to reduce the amount of contamination in the water that drains into Howe Sound from the Britannia Mine site. To achieve this objective, the treated water from the plant must not exceed the levels of metals stated in the permit issued by the Ministry of Environment. From reviewing EPCOR's monitoring and reporting results, we found that the plant is meeting the water quality requirements, thereby reducing the amount of metal contaminants entering Howe Sound.

Although we found that government is meeting its environmental and financial objectives in most cases, we did note some areas in need of improvement.

**Auditing of test results** – We expected the Ministry of Forests, Lands and Natural Resource Operations to have a process for verifying the results of EPCOR's water quality testing.

Instead, we found that the ministry relies on EPCOR's self-reported results. This presents a risk of overpayments, because EPCOR is paid according to the volume of water it processes and its ability to meet the water quality requirements. The project agreement includes a clause providing the government with broad rights to conduct audits and verify results, but these provisions have never been exercised by the ministry.

**RECOMMENDATION 1:** *We recommend that the Ministry of Forests, Lands and Natural Resource Operations obtain periodic independent verifications of EPCOR Britannia Water Inc.'s water quality testing results over the remaining life of the project agreement.*

**Long-term record-keeping** – It is important to maintain a history of key decisions with P3 contracts because of their long-term nature. During the life of P3 agreements, key staff often move on to other work or leave the organization. This makes retention of key documentation essential to supporting future team members. In addition, the government risks being at a disadvantage when managing or negotiating with its private-sector partners if it does not maintain a history of key interpretations and decisions regarding these agreements.

We found that the Ministry of Forests, Lands and Natural Resource Operations and the Ministry of Environment both have substantial project records. However, they have not always documented their key decisions about and changes to the project agreement and permits.

**RECOMMENDATION 2:** *We recommend that the Ministry of Forests, Lands and Natural Resource Operations and the Ministry of Environment each develop and use a clear and concise method of maintaining records of key decisions about, interpretations of and amendments to the Britannia Mine Water Treatment Plant Project agreement and permits, respectively.*

**Planning for long-term success** – As previously discussed, the Britannia Mine water treatment plant is meeting the government's key objective – namely, ensuring that the quality of the treated water flowing from the mine site complies with the regulations set out in the permits.

The long-term goal for the Britannia Mine Remediation Project (which includes the Britannia Mine water treatment plant as a key component) is to obtain closure under the Environmental Management Act. In 2010, an Overall Closure Plan Framework for the Britannia Mine Remediation Project was completed. For the last three years, the Ministry of Forests, Lands and Natural Resource Operations has prepared annual project work plans to guide the remediation efforts. However, we found that the Ministry of Forests, Lands and Natural Resource Operations and the Ministry of Environment have not developed longer-term plans and timelines for the broader remediation project. Long-term planning would allow the Ministry of Forests, Lands and Natural Resource Operations to demonstrate how it will work towards the long-term goal of meeting the closure requirements of the Act.

**RECOMMENDATION 3:** *We recommend that the Ministry of Forests, Lands and Natural Resource Operations work with the Ministry of Environment to develop long-term plans and timelines for meeting their goal of closure of the contaminated site under the Environmental Management Act.*

**WE WILL FOLLOW UP** on the ministries' implementation of the recommendations arising from both of these audits in our April 2013 follow-up report.

As well, the Office plans to conduct further performance audit work on the effectiveness of public-private partnerships, contract management and performance reporting within the public service.



Risks relating to:	Risk Allocation		
	Public (MoT)	Private (S2S and/or sub-contractors)	Shared
Design of highway and structures.		√	
Construction of highway and structures (risk of time and cost overruns experienced by S2S).		√	
Majority of the risks associated with environmental factors including changes to restrictions and permitting (with the exception of permits that are to be acquired by MoT).		√	
A significant number of the operations and maintenance risks including the risk of latent defects in the upgraded sections which are undertaken by S2S.		√	
Increases in operations and maintenance costs as a result of changes in the composition of traffic (for example, if heavier use of highway by heavy trucks was to cause more damage to the highway).		√	
Protest or trespass actions related to S2S construction activities (up to a pre-determined limit).		√	
Geotechnical (for example, soil below the highway surface) site conditions except for specified sections.		√	
Acquisition of property required for highway construction – including risks related to cost and timeliness to acquire such property.	√		
Responsibility for repairing any latent defects in work which was completed prior to the contract commencement date or for works undertaken by the other MoT contractors (for example, the work on Sunset Beach to Lions Bay).	√		
Bringing the highway back into agreed-upon condition after the occurrence of significant natural events (such as landslides).	√		
Changes in certain types of laws (generally relates to those laws which are targeted at S2S or the contractor's industry and can be characterized as discriminatory).	√		
Requirement to undertake soils or other remediation as result of the discovery of undisclosed contaminated soils.	√		
The adequacy of geotechnical information regarding matters such as conditions below the highway surface. (MoT is responsible for the accuracy of some of the data that it provides, and S2S is responsible for interpretation of all of the data provided).			√
Unexpected site conditions at locations where MoT has provided a benchmarking mechanism.			√
Requirements for moving utilities to construct the highway and structures and the risk that utility companies will not move quickly enough to meet S2S's schedule or that they will levy higher than expected charges for the relocation work.			√
Impact of delay in proceeding with construction schedule caused by the discovery of archaeological findings during construction.			√
Increases in the future general insurance premium cost charged by the insurance industry for the insurance required by the contract (benchmarking for future insurance premium increases).			√
Changes in certain types of laws which are not characterized as discriminatory or targeted at S2S or S2S's industry.			√

Source: B.C. Ministry of Transportation and Infrastructure. Project Report: Achieving Value for Money – Sea-to-Sky Highway Improvement Project. December 2005.

## Expected User Benefits

One of the goals of any road improvement project is to produce benefits for road users, such as improved safety or shorter trip times. For example, the purpose of adding a passing lane would be to improve the capacity of that section of the road and to reduce the number of collisions.

MoT believes that one indication of the value for money provided by the DBFO is a calculation of the anticipated user benefits resulting from the additional physical improvements provided under DBFO.

Road user benefits can be calculated as:

- ◆ those benefits that would be expected from the construction of the baseline improvements; and
- ◆ those benefits that result from the additional improvements that S2S will provide through its contract with the Province.

The MoT project team calculated the expected road user benefits arising from the highway improvements that private sector proponents included in their proposals in response to the RFP. In this exercise, not all benefits could be quantified. For example, today's highways throughout B.C. include many features that provide for a safer highway relative to the design criteria that were not in place when the road was first constructed. Although these improvements are not specifically calculated (and thus any estimation of their value is a professional engineering judgment factor), they include things such as:

- ◆ wider shoulders, with allowance for bicycle passage;
- ◆ highways designed for larger vehicles; and
- ◆ interchanges to provide safe entrance and exit to the highway for vehicles.

To estimate the expected user benefits, there is a common international approach used for estimating travel time savings and safety benefits in transportation projects. By applying this approach, along with a degree of professional judgment, MoT estimates the user benefits for major transportation projects in B.C.

By applying this quantitative approach to the additional improvements obtained through the DBFO, MoT has estimated the expected benefits to be realized by road users as (all benefits are presented in net present value (NPV) terms):

1. Road improvements that result in reduced travel times and thus generate travel time savings. When people use their time to travel there is an opportunity cost equal to the value they place on the next best alternative activity.
  - a. Estimated anticipated user benefits from incremental improvements: \$48 million from completion of construction in 2009 to end of contract term in 2030.
  - b. Estimated benefits provided by baseline improvements over existing highway: \$279 million.
3. Safety improvements reduce accidents. Current standard values for accident costs have been derived from international research by MoT.
  - a. Estimated anticipated user benefits from incremental improvements: \$74 million from completion of construction in 2009 to end of contract term in 2030.
  - b. Estimated benefits provided by baseline improvements over existing highway: \$148 million.
3. Additionally, by S2S reducing road closures by 50 percent over the road closure plan developed by MoT for the baseline improvements, savings in travel time costs will be generated by reducing the number and duration of delays incurred by road users.
  - a. Estimated anticipated user benefits: \$9 million. These benefits are realized only during the 2005-2009 construction period.

The sum of the expected user benefits from the incremental improvements is estimated to be \$131 million NPV over the life of the contract. To put these in perspective, benefits provided by the baseline improvements are estimated to be \$427 million NPV over the life of the contract. In the opinion of MoT and its advisors, the benefits resulting from the incremental improvements are in the order of 15 to 30 per cent above the expected benefits of the baseline improvements.

The generally accepted method for evaluating a project's costs and benefits is to compare the incremental differences between undertaking and not undertaking the project. If MoT had chosen to leave Highway 99 as is (i.e. not undertake either the DBFO or the PSC), it would still have operations, maintenance and rehabilitation (OM&R) costs. In MoT's opinion, the OM&R costs it would have incurred if it had not undertaken the project would have been similar to those of the PSC. Therefore, MoT would determine the benefits of the Sea-to-Sky Highway Improvement Project by comparing the total incremental benefits of the project to the incremental costs, which are approximated by the total costs of the DBFO less the OM&R costs of the PSC. Please refer to page 17.

Source: B.C. Ministry of Transportation and Infrastructure. Project Report: Achieving Value for Money – Sea-to-Sky Highway Improvement Project. December 2005.

# APPENDIX C: BRITANNIA MINE WATER TREATMENT PLANT PROJECT - RISK ALLOCATION

The following table provides a summary of risk allocation for the project, including risks transferred to EPCOR and risks retained by the Province. Detailed risk allocation is formalized in the project agreement.

Risk Description	EPCOR	Province
Operations, maintenance and repair costs	√	
Construction costs and schedules	√	
Water treatment technology (effectiveness and efficiency)	√	
Project financing	√	
Catastrophic events		√
Project scope definition and changes, including changes to government regulations		√
Risks associated with the existing mine infrastructure, such as the possible collapse of the inner workings		√
Volume Risk: the performance payment to EPCOR is dependent on the volume of water treated. This means that as volume of water treated increases, so does the payment to EPCOR.		√
Environmental Liability: EPCOR is environmentally liable throughout the water treatment process. Once the treatment process is complete and the sludge is disposed of in an appropriate manner, the Province remains ultimately liable under the Energy and Mines Act as owner of the site.	√	√
Inflation Risk	√	√
Risk associated with the water chemistry	√	√
Geotechnical Risk		
◆ Unanticipated subsurface conditions for plant site only transferred to EPCOR	√	√
◆ Geotechnical risk associated with outfall (the pipe that discharges the treated water into Howe Sound) remains with the Province.		

Source: Project Report: Achieving Value for Money – Britannia Mine Water Treatment Plant, March 2005.