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Front Matter

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Business Case

Integrated Land & Resource Registries Project

Ministry of Sustainable Resource Management

1.0 Executive Summary

British Columbia has over 947,800 square kilometers of resource-rich terrain. Over 93% of this land area (and 100% of water resources) are owned by the Crown, which is responsible for sustainable management of this resource. Provincial resources include a wide variety of valuable Crown assets such as land, water, forestry, oil, gas, minerals, heritage sites, fish & wildlife, parks, and the transportation system, to name but a few. Effectively managing these resources is essential to conserve the sustainability of these resources for future generations.

However, while conserving and protecting the resources, sound land and water management also has the potential to provide the Province with huge economic benefits. One of the most fundamental and essential elements of sound management of resources is being able to account for land and resource encumbrances. This requires having rapid, efficient and accurate access to the status of all the Province's resource rights and encumbrances.

The Integrated Land & Resource Registry Project (ILRRP) is envisioned to be a spatially enabled, accurate, efficient and accessible electronic register of all legal interests in Crown and private land and resources, that serves the business needs of a diversity of users and clients.

Approach

Central to the Lime Kiln approach to this business case is reliance on the "lower-bound estimate." This 360° conservative rule ensures that all outcomes in the business case will be those of the *least optimistic* possible conclusion. All financial metrics (including the Internal Rate of Return and Net Present Value) therefore conform to a lowest possible estimate.

In addition, the business case is constructed so that only tangible benefits that accrue directly to the Provincial government are considered, despite the documentation of numerous indirect and intangible benefits. While contributing to the 360° conservative viewpoint, this approach is designed to provide effective discipline in the magnitude of benefits claimed for the preferred solution.

While we were able to identify a number of tangible financial benefits that could be assigned directly to the Provincial government, we opted to limit the cataloguing and analysis of these benefits to those that were most directly attributable to the ILRRP. Conducting exploratory

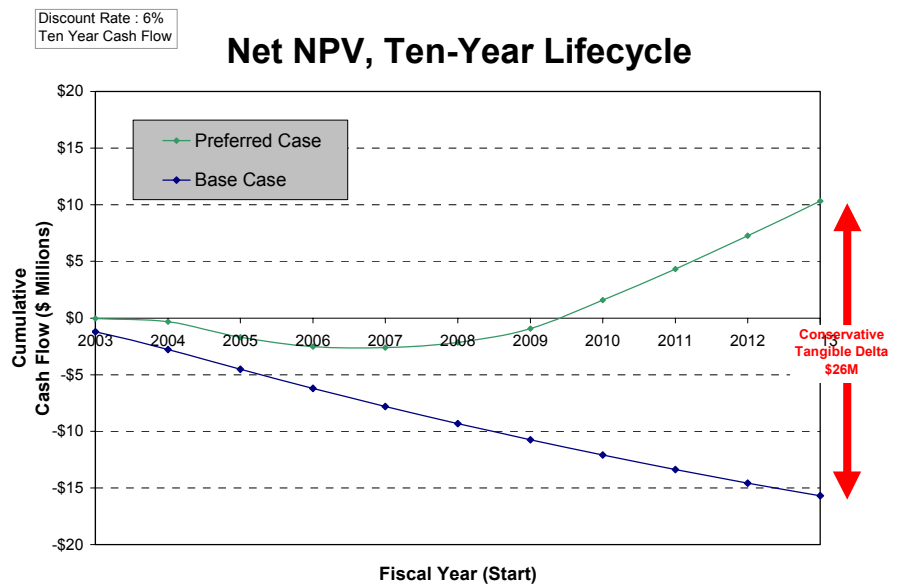
research with a broad cross-section of Ministries and their customers, we identified financial benefits associated with such agencies as the Treaty Negotiation Office, the Ministry of Forests, Land and Water BC, and the Ministry of Sustainable Resource Management. Given the limitations on time and budget, however, we opted to concentrate on those components that provided only the most reliable, defensible direct benefit stream. These included selected revenue sources from the Ministry of Energy & Mines and the Oil & Gas Commission.

Findings

The central findings of this business case are simple: the ILRRP appears to be a viable project, on the basis of intangible net benefits alone. Benefits include cost avoidance in terms of reducing risk, mitigating liability, and avoiding potential political embarrassment. They address fostering a truly competitive environment for effective business on business's terms, in an increasingly global competitive marketplace; and leveraging the opportunity to produce viable, sustainable economic development of the Province's natural resources.

Solid tangible benefits, in terms of direct revenues or cost avoidance, were identified to accrue to the Provincial government. While some benefits were exposed, far larger benefits—in real dollars to government—were identified but were difficult to quantify given limitations on schedule, budget, and limited business requirements assessment conducted in advance of the business case.

We exposed tangible benefits in a number of program areas, including such agencies as Land & Water BC and the Treaty Negotiation Office. However, it was a conservative set of tangible benefits identified from the royalty revenues on natural gas, as well as the emerging coalbed methane industry, that were responsible for driving the largest proportion of these benefits.



Given a social discount rate of 6% and a ten-year project lifecycle (relatively short given the durable nature the investment in legacy data conversion), the net NPV of the integrated registry project was calculated at \$26.01 million. Given a 15-year lifecycle, the net NPV climbs to \$47.71 million. Sensitivity analysis of the discount rate (from 4% to 8%) yielded an internal rate of return that varied between 29.5 and 40.6 per cent.

Shorter project lifecycle (such as three or five years) do not reflect the considerable investment—nor the ongoing value—of the legislative, business practice, and data capture and reconciliation activities that comprise the largest part of the ILRRP proposed budget. While a 15- to 20-year project life would better reflect these durable benefits, we opted for a more pragmatic lifecycle of ten years (and indicated key metrics for the 15-year time frame as well).

Taken on only a limited number of benefits that could be conservatively quantified, these values strongly suggest the financial viability of the ILRRP.

In addition, we exposed a number of benefits that dwarf any payback to government: benefits to private sector, to economic development with its attendant tax revenues and local multiplier effects on the Province's economy. Also a focus on stewardship of valuable economic resources—in the rediscovered “heartland” of British Columbia—that form the bedrock riches of our extraordinarily rich Province.

Recommendations

Our recommendations are directed toward the successful implementation of the ILRRP, and relate toward adding value to the process of implementation:

- Consider implementation of a registration fee for each transaction that affects the centralized registry. This fee would be charged to SRM customers (and “passed through” Ministry customers to their end user clients), and would be set to recover some of the costs of registration and data update under the ILRRP. The fee would be positioned strictly as value-for-service, and would be reflected in terms of better, faster service for registry users. To be within reach of small or single-time users, and to limit impact on large-volume users such as forest companies, the fee should be in the \$100-200 range.
- Deliver the ILRRP integration in a phased approach, to provide performance benchmarks to Treasury Board to limit exposure, and permit program progress to drive continued investment.
- Continue to evolve the implementation strategy to accommodate enhanced coordination with key revenue-generating stakeholders, especially gas exploration, coalbed methand, and transportation.
- Consider alternative service delivery once legacy data have been converted and integrated, and the ILRRP is implemented. In our opinion, government's role must be in data standards and stewardship, and ownership of the registry itself; all other

functions could be delivered through alternative service delivery (ASD).

- Formalize the risk management process throughout the project lifecycle.
- Evaluate statusing business processes, particularly with reference to oil & gas sector. It appears that some processes, particularly external reviews, add significant lag time to the adjudication timeline.
- Conduct thorough business requirements analysis with key stakeholders, with a focus on risk and liability issues.
- Even a fully-implemented ILRRP will not drive economic development without appropriate messaging to better position the Province to the key sectors it relies on. This positioning should leverage the utility of *certainty of access, title, or right*, as well as the economic benefit of speed of tenure issuance.
- Implement an independently-managed, formalized Systems Engineering Management Plan (SEMP) to ensure delivery of adequate system within timelines and budgets established.

2.0 Integrated Land & Resource Registry Project

2.1. Mandate & Background

British Columbia, through the *New Era for Business, Investment and Opportunity* initiative, is committed to making BC the most competitive business and investment location in the world. Some of the stated goals of this initiative are:

- Reinvigorating valuable resource sectors
- Creating a cost competitive business climate
- Enabling efficient global access
- Revitalizing the economy
- Enabling competitive business costs
- Developing a business friendly Government
- Restoring sound fiscal management
- Cutting red tape

In the area of land administration and resource rights there are significant impediments to be overcome to achieve these goals. Current processes and data characteristics represent a significant risk to sustainable use of valuable resources. The Ministry has been directed by the Premier to create a centralized registry that will overcome the limitations in the existing diffuse registry apparatus. Government, in its direction to the Ministry, considers it essential to transition from the existing, mutually exclusive and diverse information systems to a new, efficient, and accurate integrated system of registries (the Integrated Land & Resource Registries Project or ILRRP).

In order to support the commitment to the New Era goals, increase governmental and societal benefits, and reduce risks of the existing system, the MSRM initiated a *Business Strategy and Transition Plan*² for constructing a government-wide registry of land and resource encumbrances. This report outlined the need, the solution, and benefits of an Integrated Land & Resource Registry System (ILRRP) and developed a business strategy and transition plan for the ILRRP. It was completed in October 2002 and the strategic solution was subsequently endorsed by the Deputy Ministers' Committee on Natural Resources and the Economy.

In addition to endorsing the plan, the Deputy Ministers' Committee requested a Business Case be developed for the ILRRP and submitted to Treasury Board and Cabinet. The purpose of the requested Business Case was to:

- provide a detailed cost of the preferred (or target) ILRRP system;

² MSRM (Fujitsu). *Business Strategy and Transition Plan: Integrated Registry Project*. October 31, 2003.

- determine the cost savings and efficiencies to government;
- estimate the increased incremental revenue possible to government by a fully functioning integrated registry;
- estimate the efficiencies and economic benefits to end clients; and
- identify the risks to government associated with the proposed investment.

MSRM released an RFP for a Business Case on January 21, 2003, and engaged the Lime Kiln Group on February 4 to deliver the business case. This report provides the Ministry with necessary information to aid Treasury Board and Cabinet in deciding whether funds will be allocated to the project.

2.2. Problem Description & Service Challenge

As the owner and manager of most of the land and resources in British Columbia, the government of British Columbia has been granting rights to develop and use resources to individuals and companies for over 100 years. This resulting investment continues to fuel the province's economic engine by providing jobs, economic rent through taxation, community development, and thousands of secondary and spin-off benefits. It follows that the efficiency with which the rights are managed has a direct bearing on benefits to the province.

Initially, the province administered land and resources according to a simple and straightforward method. A proponent would request a grant and the province would refer to the ministry responsible for those types of grants who would review the merits of the request, check the availability and, if both were acceptable, grant the request by issuing a document to the proponent. This system of administration worked well as long as land and resources were plentiful and potential conflicting uses were few and far between.

Over time as more and more grants took place, and the types of grants grew, the administration of this mosaic of land and resource tenures has become not only more complex and expensive to operate but has led to delays in responding to proponent requests. In the worst cases, these delays are measured in years, seriously impeding the use of the land and resources.

This complexity is due to one simple fact: the province does not register land and resource grants in a formal register, nor does it require that owners of these rights register changes with the province.

3.0 Approach & Methodology

3.1. Business Case Approach

The Lime Kiln Group has adapted a proven business case approach that combines the methods endorsed by the Ministry of Finance Best Practices Office and the Capital Asset Management Framework.³

We identified one key exception to our general approach: while a business case of this magnitude should encompass a variety of potential solutions and evaluate their costs relative to one another, the ILRRP case has already garnered endorsement in principle at the Deputy Minister level in the Committee on Natural Resources and the Economy in December 2002. Therefore, we determined that this business case need not consider alternatives beyond the endorsed preferred option (go) and the reference or “base case” (no-go) option.

Conservative estimates. Central to the approach to this business case is reliance on the “lower-bound estimate.” This 360° conservative heuristic ensures that all outcomes in the business case will be those of the least optimistic possible conclusion. The lower, or most conservative, bound of every range is applied. Assumptions are driven downward. As a result, all financial metrics (including the Internal Rate of Return and Net Present Value) therefore conform to a lowest possible estimate.

Tangible benefits. The business case is constructed so that only tangible benefits are considered, despite the documentation of numerous intangible benefits. While contributing to the 360° conservative viewpoint, this approach is designed to provide effective discipline in the magnitude of benefits claimed for the preferred solution. The business case also is constructed to limit calculated tangible benefits to those accruing to the Provincial government—not to other government levels or to private interests or other third parties.

3.2. Report Overview

The business case incorporates several discrete sections, including an assessment of the service challenge inherent in the base-case scenario; a description and assessment of the preferred or target scenario, including financial analyses; a summary of risk; and evaluation and recommendations given the alternative solutions.

General assumptions. This section articulates the fundamental assumptions we made to complete the business case analysis.

Base-case scenario. This section reviews the base case, or reference, option: the most likely sequence of results expected if the proposed preferred option does *not* proceed. The scenario extends the *status quo* (“as-is, where-is”) through the project lifecycle given the trajec-

³ Ministry of Finance, Best Practices Office. *Business Case Methodology* (unpublished draft, 2000). Ministry of Finance. *Guidelines—Capital Asset Management Framework* (May 2002).

tory of anticipated conditions over time. The base case component includes:

- Problem and challenge description;
- Detailed assumptions;
- Issues to be resolved and barriers to be overcome;
- Influences driving or affecting the “no-go” scenario; and
- Financial metrics of costs & benefits.

Preferred scenario. This section constructs and assesses the preferred ILRRP implementation option under scrutiny with similar elements, and incorporates an evaluation of the two options, including:

- Quantitative and qualitative measures and standards used to compare options;
- Financial metrics on tangible benefits, including net present value (NPV), internal rate of return (IRR), break-even, and pay-back time;
- Sensitivity analysis of financial metrics, including variance around the Treasury Board social discount rate (SDR)
- Preferred solution financial analysis: annual breakdown of forecast costs and revenues
- Estimated intangible efficiencies and economic benefits to end clients, economic development benefits, and other public interests issues for external stakeholders;

Evaluation. This section reviews the tangible costs and benefits from both the base-case and preferred scenarios, developing a measure of the difference (the “Δ”) between the two cases to measure the net benefit of implementation of the ILRRP.

Risk evaluation. This section offers tools and measures for risk assessment and management over the lifecycle, including identification, analysis, mitigation/treatment of identified risks, evaluation and communication of risks, project lifecycle risk management tools, and case histories that impact on risk management.

Action. This section includes recommendations to key senior decision makers and potential funding agencies relative to the successful navigation of the project through Cabinet approval, and for future ILRRP implementation from the perspective of the initial business case.

3.3. Business Case Methodology

Our methodology incorporates a System Engineering approach into business case analysis; new ways of viewing financial data, their trends and sensitivities; and risk management. We have developed these tools in order to provide decision-makers with intuitive decision-aiding tools to allow them evaluate the viability of specific initiatives.

Research design. We developed an overall methodology, with key milestones and dependencies, to provide sufficient depth of research in all areas of the business case research within the time and budget

limitations imposed by the Ministry. This overall methodology was approved by the Ministry, and included substantive (twice-weekly) meetings with project staff for update, fine-tuning, and additional direction.

Data capture. We assembled an extensive listing of key stakeholders and information resources both inside and outside government, under the direction of SRM management. Initial resources contacted are listed in Appendix 1. We developed and conducted structured interviews with five key resources with the dual purposes of eliciting detailed tenure, status, and related process data; and determining which questions were critical for subsequent data collection steps. Interviews were conducted in person where possible, and by telephone when respondents were not located in Greater Victoria.

On the basis of these pilot interviews, we developed a focused set of questions that were asked of all other respondents in e-mail or structured interview format. A sample instrument (variant designed for statusing organizations) is shown in Appendix 2. While most respondents were unable to provide the level of detail requested in the instrument, we were able to guide the interviews toward the quantifiable answers desired. When necessary during the analysis of data, we were able to recontact respondents or approach executive staff with directed questions. While we were unable to complete interviews with all those contacted, all respondents we contacted were highly responsive.

Red team. A “red team” is a simulation that places knowledgeable staff in an oppositional position, often used in large procurements to simulate the customer or a competitor. The red team process often sheds light on perspectives and critical points that would not otherwise be exposed. We held an extensive, half-day roundtable session for a dozen SRM professionals with extensive domain knowledge in all key registry areas.

In our red team session, we requested that the SRM staff design a base-case scenario, with the hypothetical “given” that ILRRP was a no-go. Our key assumption was that legislation and regulations affecting the workload would *not* be altered by a no-go, but there would be no access to integrated registries or its precedent data update and correction (*see also* Section 5.2).

Working as a collaborative team, we developed “best engineering estimates” of the impacts of a no-go for the ILRRP:

- What happens if ILRRP is a no-go?
- What will the costs (\$, FTE, delays, etc.) be for MSRM?
- What will the costs be for end user Ministries and customers?
- What structures (data, systems and business processes) will be required to support the functions?
- What additional risks would be incurred by government?
- There was a broad appreciation that this quantification was empirical rather than based on any precise scientific measure-

ments. We relied on the team's system expertise and insight to draw logical conclusions and associate some sound metrics.

Financial assessment modeling & evaluation. Once data were collected and verified, we developed financial models to accommodate the quantitative tangible benefits and costs for all scenarios. We established basic performance metrics, including Internal Rate of Return (IRR), net present value (NPV), and break-even points for a number of scenarios. We conducted assessments using project lifecycles of 10 and 15 years, and assessed the sensitivity of outcomes to variation in the social discount rate (SDR) of 4%, 6%, and 8%, in accordance with current Treasury Board practice. We applied a proprietary financial analysis tool, TransitPlot™, to assist decision makers in visualizing the impacts of various excursions from expected cost and benefit values to better grasp sensitivities.

Finally, our assessment concluded with an evaluation of net benefits including tangible and intangible variables, and a series of recommendations.

Risk management. Risk management can be defined as the process of identifying, analyzing and addressing risks and opportunities on an ongoing basis. Lime Kiln's ILRRP risk assessment is based on industry-standard Systems Engineering practices, and has been informed by the provincial *Capital Asset Management Framework* guidelines published and maintained by the BC Ministry of Finance, as well as the guidelines of the Risk Management Branch. Risk is explored in detail in Section 8.0.

We established a comprehensive risk register (Risk Log) for the ILRRP (see Appendix 3). This log identifies and ranks risks, identifies risk ownership, rates likelihood and consequence values, and tracks the status of risk reduction plans. Also in Appendix 3 are Risk Data Sheets, which track each risk in greater detail through the project lifecycle.

4.0 Assumptions

Given the early stage of development of specific ILRRP architecture, limited metrics on certain costs, and the fluid state of the governance of the ILRRP, the business case project was undertaken with a disciplined approach to assumptions. When assumptions were required for input to methodological, financial modeling, or outcomes for the business case, we have ensured that they are noted explicitly.

The following assumptions apply to the overall parameters of the business case; see also Sections 5.2 and 6.2 for assumptions that relate to details of the base-case and preferred scenarios, respectively.

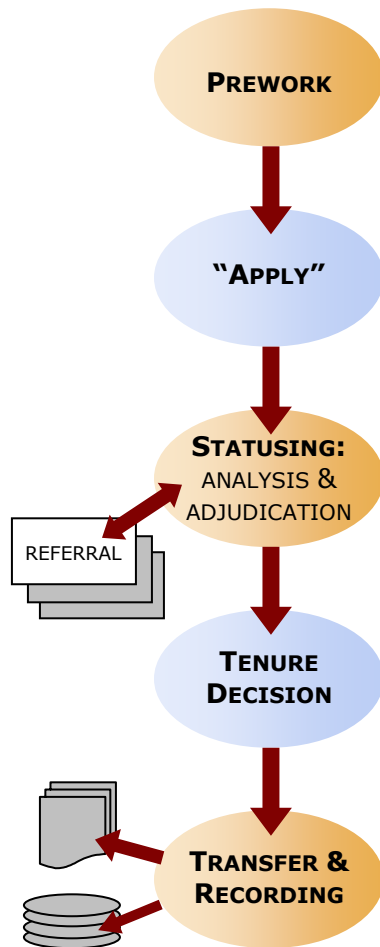
- No alternative scenarios beyond the base case need be considered, since the Deputy Ministers' Committee on Natural Resources and the Economy has already approved the overall ILRRP strategy in principle.
- Benefits and costs in business case are only those that accrue to Provincial government, not end users or other government levels (Federal, Regional District, municipal).
- All quantified values for the preferred scenario are driven to *lower-bound estimates*, yielding a defensibly conservative result; conversely, we have not focused on the most pessimistic end of the worst-case continuum for the base case.
- As the business case is being prepared, project costs have not been assembled formally. The Ministry initially estimated a budget over the next three years of \$2.08 million⁴, principally focused on system costs. The externally-prepared *Strategy* document⁵ estimates, while fairly broad at this time, are in the \$2.4 million range for system construction, which is the cost we have assumed.
- Specific data preparation costs are unknown at this time. The *Strategy* document estimated a data preparation cost of approximately \$7.9 million. A more comprehensive evaluation of these costs is currently underway, and preliminary results are in the \$5–8 million range. At the direction of SRM, assessment of these costs are out of scope for the business case. As directed, we have applied a cost of \$8.5 million to data preparation.

⁴ MSRM. *Project Charter*, Section 17. February 27, 2002.

⁵ MSRM (Fujitsu). *Business Strategy and Transition Plan: Integrated Registry Project*. October 31, 2003.

5.0 Base-Case Scenario

5.1. Description



Based in large part on the simulation provided by the Red Team, we were able to construct a plausible scenario on the base-case scenario, the situation that would take place if the ILRRP were not implemented. The purpose of this base case is to provide a service and cost baseline against which to measure the preferred case costs and benefits.

Since government is shifting, and all Ministries have experienced (and will continue to experience) the challenge of performing increasing workloads with shrinking resources, the service challenges associated with the base case cannot simply extend the *status quo* (of, for instance, Fiscal Year 2002/03) into the future. The approved Service Plans of all related Ministries, beginning with SRM, are driven by reduced budgets.

Even if there were significant changes to legislation affecting management of the land base in British Columbia, the central tasks of determining parcel status, evaluating requested uses of Crown land against existing tenures, and allocating permitted uses would continue to play a central role in land and water rights allocation.

The Red Team was able to produce a generalized flowchart of the typical statusing process, from initial research of areas of interest by the end user through the final disposition of rights on the parcel. We further generalized the exercise by enforcing a transactional model on this flow, following the course of each request, application, or other resource transaction through its process.

The actions in the base-case scenario that would be streamlined by ILRRP are shown in tan in the diagram (left), including prework (particularly in the case of forest tenures), statusing of areas of interest, and transfer of rights and appropriate recording processes.

Design of the base-case future revolved largely around the uncertainties inherent in the scattered and disintegrated resource data extant today. We exposed several situations where key data for the same Ministry was stored in Victoria, and regional staff often had to guess whether conflicting tenures existed. Increasing competition for natural resources, increasing impingement of resource exploitation on areas that have had lengthy history of settlement (and, as a result, a longer legacy of conveyed land rights), increasing public interest in stewardship of preserved areas (including parks, heritage sites, and archeologically significant sites), and First Nations claims affecting land use and conveyance of Crown rights all conspire to point to *greater*—not reduced—potential for conflicts as well as statusing workloads.

The Red Team concluded that *if* resourcing were to be reduced as currently planned, no integrated ILRRP provided, and work loads increased slightly (or even remaining unchanged), that the only possible outcome would be a poorer job of determining status, which would

lead to increases in errors and conflicts in allocation of rights (as well as generation of revenues off the land base). Even optimistic simulations of transactional processes led to missed referrals, lack of follow-up on referrals, and errors introduced due to time pressures and growing backlogs.

The likely trajectory for the base-case scenario, therefore, will include increased errors, high potential for embarrassment of Ministers accountable for management of public resources and landscapes, and spiraling costs of settlements, in and out of court, for liabilities incurred. It also is likely to fail to foster a competitive business climate, an additional government objective.

5.2. Detailed Assumptions

The regulatory & legal registry statusing obligations that ILRRP would address will be unchanged.

- Transaction volume will increase, resulting in increased work loads. This anticipated increase is not modeled in costing, but instead is assumed to be reflected in introduced errors, incomplete or skipped referrals, and other performance-related consequences.
- No additional hardware or software costs will be incurred by MSRM.
- FTE reductions made in anticipation of ILRRP implementation will total 14 FTEs in SRM, and none elsewhere in government; these reductions represent a recurring cost for the project life-cycle.
- Several specific assumptions relate to modeling liability settlements, and are discussed in the section below.

5.3. Costs

The costs associated with the base-case scenario are significant, increasing, and potentially damaging to government interests in the present and the foreseeable future. There are no non-recurring costs associated with the base case.

FTE reductions. Our research suggests that several Ministries, including SRM, have made plans to reduce their FTE complement dedicated to statusing functions in out years. Significant reductions of staff (21 FTEs) in the Registries Department of SRM are planned for FY 2004/05. Likewise, although client Ministries could not provide specific FTE counts, further cuts in FTEs dedicated to registry statusing and referral are planned concurrent with ILRRP implementation.

These reallocations, planned in anticipation of ILRRP, may still proceed if ILRRP was a no-go. It is not our intent to suggest that a base-case scenario would reverse these staffing decisions, requiring a “backing out” of planned personnel cuts or reallocations. Whether or not these reductions are made or backed out, however, they provide a tangible

financial metric that attaches a direct cost to the workload component of the ILRRP base case.

Liability, litigation, & settlements. The other principal cost assigned to the base-case scenario is that of settlement liability (through litigation or out-of-court agreements) driven by errors that the base case will propagate. While it is impossible to expose the full magnitude of these liabilities, the Province currently “risk manages”⁶ the conflicts that emerge from errors and misallocations of Crown (and, increasingly, misidentified private) land and water rights.

Although some client Ministries indicated that they suffer literally “thousands” of conflicts leading to hundreds of settlements per year, we were unable to uncover exact accounting of these events; however, we did determine that virtually all of the registries were affected to some degree. As a result of interview findings, we maintained a lower-bound conservative stance by assuming the assignment of one (1) settlement per year to each of 15 key registries. Each such settlement would be settled for an average of \$100,000 in cash, and \$50,000 in tangible non-monetary value (e.g., waived stumps or real property adjustments). In addition, each settlement would require commitment of .25 FTE-years.

In addition, we assumed that—although lack of ILRRP would be a key enabler of rights conflicts—only a portion of the costs of such settlements could be justifiably assigned solely to ILRRP. As a result, we reduced the overall modeled cost of settlements by an ILRRP impact factor of 50%. The resultant modeled cost is \$800,000 annually on a continuing basis.

Finally, although it is clear that the number, complexity, and potential impacts of land and water registry conflicts are all increasing (and domain experts throughout government have indicated that growth in such conflicts is accelerating), we chose to model the costs as a constant across the out years.

Other costs. An assumption that certain system upgrades—currently unknown but anticipated—would be incurred over the lifecycle of the base case. Such system upgrades might involve new stovepipe systems, or efforts to provide some level of integration between key systems. Our model assumed a low recurring cost of \$5,000 annually, starting in FY2005/06, to simulate these expenditures.

Intangible costs. Intangible costs of the base case include potential collapse of the system, increased potential for embarrassment of the government as conflicts and liability grows, loss or damage of First Nations and other heritage cultural resources, diminishment of the brand value of British Columbia among key global economic sectors, including oil & gas, minerals, and—perhaps more importantly—the flow of capital.

These costs can be illustrated in the relatively recent situation where a pipeline was erroneously built to cross through a Provincial park; the error in granting the development rights was caught so late in the con-

⁶ Sadly, this label is used almost exclusively as a synonym for “self-insure,” indicating a nearly universal acceptance that risk cannot be transferred, avoided, or mitigated; but only addressed with settlements when failure results in liability.

struction process that the only solution was to remove the right of way from the jurisdiction of the *Parks Act*, grant special rights to construct the pipeline, and to then rededicate the right of way back to park status once the pipeline was installed and surface restoration complete. The real costs included substantial Provincial legal (and public relations) costs, public embarrassment of the Minister responsible, and considerable loss of confidence in the capability of the Province to adequately manage the lands under its responsibility.

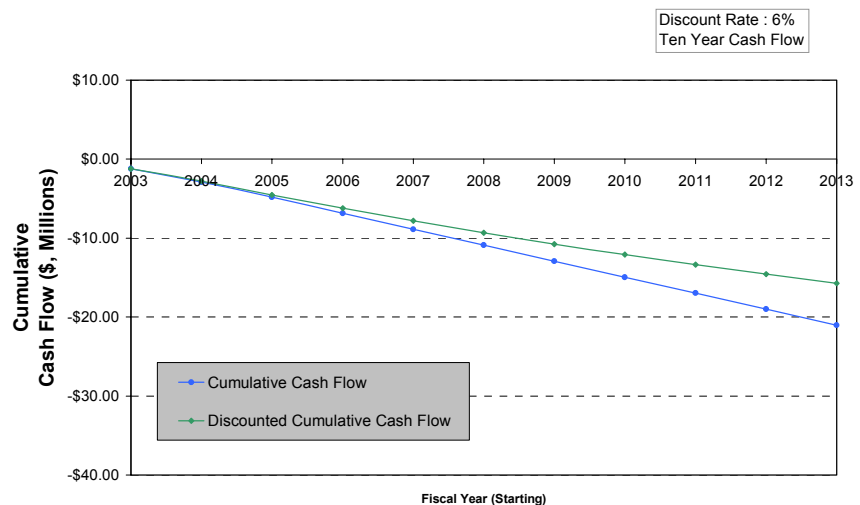
Also included in intangible costs are the multiple layers of opportunity cost of lost economic activity, diminishment of competitiveness on the global stage, cost to municipal tax bases, and increased imbalance of urban centers over economic opportunity versus the heartland—none of which can be adequately measured, but all of which will ultimately cause impacts on the Province’s economic well-being.

5.4. Benefits

The business case was constructed with an assumption of zero benefits in the base-case scenario, including tangible as well as intangible benefits. Even the benefit of maintenance of the status quo was discounted, since the base case is in a state of change—and because the risks tied to the continuation of the base case, even into the near future, are too great.

5.5. Financial Metrics

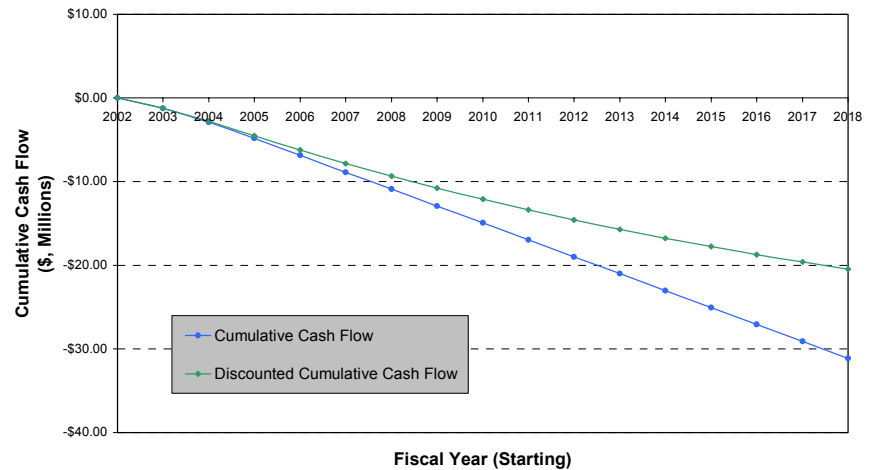
Financial analysis of the base-case scenario yielded a discounted NPV of -\$15.70 million, given a SDR of 6% and a ten-year project length. See Appendix 5 for detailed calculation parameters. The nondiscounted and discounted cumulative cash flow projections are shown in the chart below.



Financial analysis of the base case did not include calculation of IRR, ROI, or breakeven point, since none of these statistics apply meaningfully to a case with negative NPV.

Based on Treasury Board guidelines, we also calculated NPV for a range of SDRs, bracketing the current 6% rate. For a 4% discount rate, the NPV was -\$17.21 million; for an 8% rate, the NPV was -\$14.39. We concluded that NPV was not highly sensitive to SDR in this scenario.

We also tested the net present value of the base case under a 15-year project term. Not unexpectedly, given the recurring costs of the scenario, the NPV (at an SDR of 6%) was -\$20.46 million. The cash flow curve for this scenario is shown below.



We evaluated ten- and fifteen-year project lifecycles since the ILRRP is intended as a long-term data enhancement project with an ongoing system refresh. The data capture and reconciliation component will have durable benefit over an indeterminate (and essentially infinite) time period, and represents the majority of system investment. While many government projects are geared toward short-term capture of benefits, the ILRRP is geared toward the long term. We opted to test returns at the intermediate points of ten and fifteen years as a means of capturing a broader continuum of the lifecycle.

6.0 Preferred Scenario

6.1. Description

The preferred scenario incorporates the Integrated Registry Project implemented over the time scale presented in the *Strategy* document. This implementation includes both business (governance and process) elements and technical system implementation. It is bounded by the assumptions that have been detailed in Section 4.0 above, as well as in the scenario assumptions section below.

Business elements include regulatory and legislative changes, as well as process-based system changes (such as the centralization of all registered encumbrances and rights on Crown land and water). Technical systems include a significant effort to convert, reconcile, register (spatially), and in some cases capture spatial and associated attribute data from a variety of registry sources; and the systems development (database, software, interfaces, etc.) associated with ILRRP. These components are described fully in the *Strategy* document.

For additional detail on development of the preferred case scenario financial model, see Appendix 5.

6.2. Detailed Assumptions

- Given our conservative approach, the ILRRP project life is assumed to be ten (10) years; however, in view of the far longer-term durability of integrated registry data—regardless of systems and interfaces—the scenario was also calculated for a fifteen-year life cycle.
- System software engineering and integration costs are those stipulated in the *Strategy* document, and will be straight-line amortized over five years. These costs will be recurring, given that system refresh will need to take place continually.
- Annual system maintenance costs are assumed to be 15% of software cost, over the life of the project.
- Costs for systems hardware, including network bandwidth, server(s), storage, and access are estimated at \$50,000-100,000.⁷ The assumed cost is \$100,000.
- Systems hardware will require full refresh after five years, and will be amortized on a recurring basis.
- Hardware costs will be billed to MSRM under the CITS Service Level Agreement, and will assume a straight-line depreciation over five years. This service fee will continue unchanged through the life of the system.

⁷ Provided by Fujitsu Consulting.

- Additional data management, update, and maintenance costs are assumed to be \$850,000 per year after initial data costs are amortized.
- A fee of \$100 is charged on each transaction to accommodate data costs; we assume 10,000 transactions annually.

6.3. Costs

System cost. Systems costs include all system development, hardware, and associated costs.

- System development cost was determined by the Ministry, with reference to the *Strategy* document, to be \$2.4 million.
- Costs for systems hardware, including network bandwidth, server(s), storage, and access are estimated at \$50,000-100,000. The assumed cost is \$100,000; under CITS amortization standards, the cost to the Ministry will be \$20,000 annually over five years. Our model incorporates this cost into the full project lifecycle, assuming systems hardware will require full refresh after five years.

Data cost. While the least certain of all costs, the best engineering estimate of data preparation has been provided by the Ministry.

- Nonrecurring costs for data capture, preparation, reconciliation & cleaning; and for systems engineering, are estimated at \$8.5 million; this cost, while incurred in the first two years, will be straight-line amortized over five years.
- Additional data management costs are estimated at a recurring cost of \$850,000 per year (a high estimate of 50% of amortization cost) after initial data costs are amortized.
- A fee of \$100 is charged on each transaction (at an estimated 10,000 transactions per year) to accommodate data costs.

Other costs. The business case does not incorporate overall program costs such as full overheaded FTE and other current expenditures, since its goal is to measure the net benefits between base-case and preferred scenarios, and such costs are cancelled out in the calculation. To accommodate such costs, we made the following assumptions to reflect in the financial model, including:

- Training costs of \$10,000 annually, starting in FY2005/06;
- Initial R&D and business analysis costs, set at \$50,000 annually for FY2003/04 and 2004/05; and
- Costs of legislative/regulatory change, estimated at \$250,000 annually for FY 2004/05 and 2005/06.

Total investment in ILRRP (including recurring and nonrecurring costs) as estimated by the financial model is \$20.01 million over a ten-year project; and \$28.61 million over a 15-year lifecycle. Distribution of all costs across the full project life cycle for all scenarios is shown in Appendix 5.

6.4. Benefits

Research exposed a number of tangible direct benefits, indirect benefits, and a broad array of benefits that we classed as intangible. Although many intangible benefits can thread to a savings of dollars by the Province, the complexity or difficulty of respondents to adequately quantify those benefits led to their classification as intangible.

Benefits include reduced cycle time, enhanced revenues, cost avoidance, and such intangible benefits as increased public confidence and facilitation of economic development.

Several examples of client benefits in the preferred case will illustrate this suite of benefits, and place a better definition on the tangible benefits selected for further analysis.

Treaty Negotiation Office. Fully half of the Treaty Negotiation Office's (TNO) activity revolves around issues of rights to land. The current disintegrated system, characterized by fragmented, often stale information, tends to have long cycle times driven by stultifying research. The ILRRP would significantly shorten these lead times, avoid the costs of errors and settlements, and lead to quicker deals on tabled settlements with First Nations claims. Not only would the backlog of stalled tables be reduced, but the certainty of accurate status data—particularly if shared with all interests—would lead to greater confidence in the treaty settlement process.

The TNO also identified the ability to better value land, to avoid outsourcing of status activities, permitting bands to “self-research” potential claims, and even to implement reformation of rights transfer that would be associated with ILRRP. Furthermore, access to synoptic status information would greatly streamline the investigative process, which today is reactive to native claims, and must follow an iterative process to gradually narrow claims to a manageable scope.

In addition to these substantive intangible benefits, the TNO estimates that a recurring cost of between \$125,000 and \$200,000 annually could be saved or reallocated on the basis of a successful ILRRP system. (We did *not* include these benefits in our cost model.)

Ministry of Forests. Principal tangible benefits in the forestry sector relate more to business process and the reduction in liability for erroneous assignment of rights. As an example, working with “Exhibit A” applications on forest tenures, the Ministry of Forests may know what Forest Licences there are but often must assume there are no conflicting *Lands Act* tenures. When there is a conflicting land use (a not uncommon occurrence in some Districts), MOF must pay compensation.

The benefit in this case is a real reduction in risk and consequent cost avoidance in terms of financial liability arising from conflicts caused by government action (taking risks with insufficient due care and diligence, or inaccessible data—leading to political embarrassment), as well as improved client service in the forest industry.

Since these liabilities are calculated as a cost in the base case, they were not considered as quantifiable benefits in the preferred case.

Land & Water BC. Land & Water BC is a “major beneficiary” of the ILRRP, according to Corporation managers. Currently dependent on maps, mylars, and referrals to other agencies, LWBC conducts status-ing of land and water (in relation to “appurtenant land”) in a total of ten offices, eight of which are regional. Typically the encumbrances they must research are non-digital cartographic sources.

For example, if LWBC wants to sell Crown land for use as a camp-ground, the parcel must be surveyed and “tied in” to the cadastral fabric. Data are sent to the Surveyor General’s office, tied in, and QA’ed. It is re-entered, from rough notes, into the LWBC database. The cycle time can be one year, which is a woefully low level of service. Certain water rights issues are backlogged for years (one exceptional case noted was backlogged for 17 years).

They view the consolidation and digital capture of legacy information to be of the most value to their operations. Although no objective benefit data was captured, the respondents indicated that ILRRP would save on the order of “years and millions [of dollars].” Based on highly variable parameters, we did not consider LWBC benefits in the financial model.

Ministry of Transportation. The Ministry of Transportation sees a critical need for ILRRP in two primary areas of responsibility: first, in the inventory, management, and oversight of highway rights of way (including surplus parcels that could be sold), and highway construction, that often is driven by access to gravel, arguably the most significant non-fossil mineral resource to the government in BC.

The Ministry is starved for integrated tenure, parcel, rights assignation, and related Crown land data; the settlements the Ministry undertakes on an annual basis numbers in the thousands. If it can capture and maintain the level of data needed for their tasks, the ILRRP could drastically reduce liability, leading to cost avoidance in settlements as well as risk mitigation. Furthermore, ILRRP could provide a more effective tool to inventory parcels owned by the Crown that could be declared surplus, yielding another direct revenue benefit for the government.

However, although there is ample anecdotal evidence, solid estimates are impossible to provide. In addition, many data issues remain to be identified, much less scoped and costed. As a result, we consider these benefits to be intangible for purposes of the business case, and have not introduced them into our financial model.

Oil & gas sector. The burgeoning oil & gas sector dwarfs all other economic sectors that are influenced by ILRRP. Competition in this established, commodity-priced marketplace is severe, and the influence of such factors as time of exploration or drilling approval can often drive business toward (or away from) a jurisdiction. The industry reports a 30-40 day cycle time in BC; this experience is in the Western Canada Sedimentary Basin, in the northeastern BC area, which represent the “best-functioning part of the province” in the vertical. It also is the area with the most experience and possibly the least potential for friction with conflicting land interests.

The marketplace is global, and oil & gas are in ample supply across the globe—not just across the line in Alberta. Given the short winter drilling season, even reducing cycle time by a few days can spell the difference between drilling this year or next—or even losing a time-sensitive tenure.

With the advent of an accurate, robust ILRRP, with its impact on both the certainty and timeliness of status requests, respondents believe that it is reasonable to impute some portion of drilling growth to the ILRRP. It stands to reason that being more responsive to industry and shortening the cycle time can only increase BC's competitiveness and attractiveness to the industry. That being said, there is a high degree of uncertainty as to exactly the magnitude of this increased business opportunity (solely due to a faster, more efficient business process) can be.

As a result, we extensively tested and calibrated a highly conservative financial model that accommodates potential growth in tight gas (conventional drilling in the northeast) and coalbed methane (exploiting methane occurring in proven coal deposits) elsewhere in the Province. This model is reviewed in detail in Appendix 4.

Intangible benefits. Among the many benefits considered intangible for purposes of this business case are those *tangible* benefits in key applications that we found difficult to assign a specific monetary value. For example, the Exhibit A applications discussed above yield direct benefits, but are resistant to tight quantification. Other intangible benefits identified include:

- significant increases in data accuracy and currency, increasing the level of confidence with which rights can be apportioned or refused; yielding certainty in access to and security of economic utilization of the public land base;⁸
- timeliness in responding to registry requests, yielding reduced cycle time;
- transparency in data sharing, yielding more equitable, informed decisions by tenure referral organizations (in the business process) and opposing parties;
- specific New Era commitments designed to cause both direct and indirect benefit to economic development, particularly in the province's heartland (the designation applied to the vast, non-urbanized portions of BC that have been underutilized, underrepresented, and underappreciated);
- risk avoidance, including risk of public embarrassment;
- demonstrated potential to yield higher levels of service, competence, and stewardship of valuable resources, including protection of certain critical environments;
- staff efficiency and reduction of resourcing for statusing activities;

⁸ Certainty in land rights is cited as the primary engine of economic development, according to many authorities. See the Bathhurst Declaration, jointly issued by the UN and the International Federation of Surveyors (FIG), intended as a reference document for land tenuring systems in the Third World, but tragically applicable to British Columbia Crown lands.

- business process improvements and streamlining, leading to reduced cycle times;
- benefits that accrue to other levels of government, to industry customers; and
- enhancement of the general level of competitiveness of BC, and the spinoff benefits of accelerated economic development.

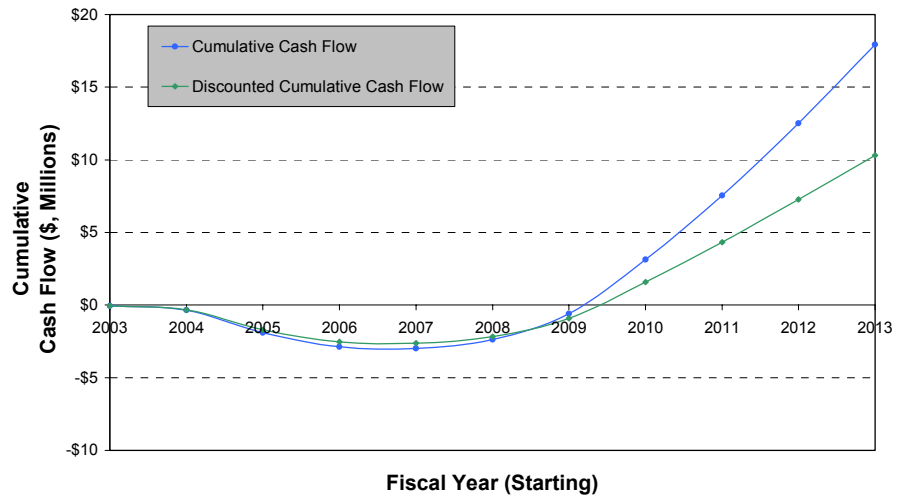
By their nature, none of these intangible benefits were considered in the financial model; nonetheless, they combine to offer a compelling argument in favour of the ILRRP.

We recognize that the ILRRP is not the sole source of these intangible benefits. It is apparent, however, that the lack of an integrated registry system does represent a *barrier to the realization of these benefits*. As such, the ILRRP is a *necessary* (even if not a *sufficient*) condition for the realization of benefits that could be characterized as shared.

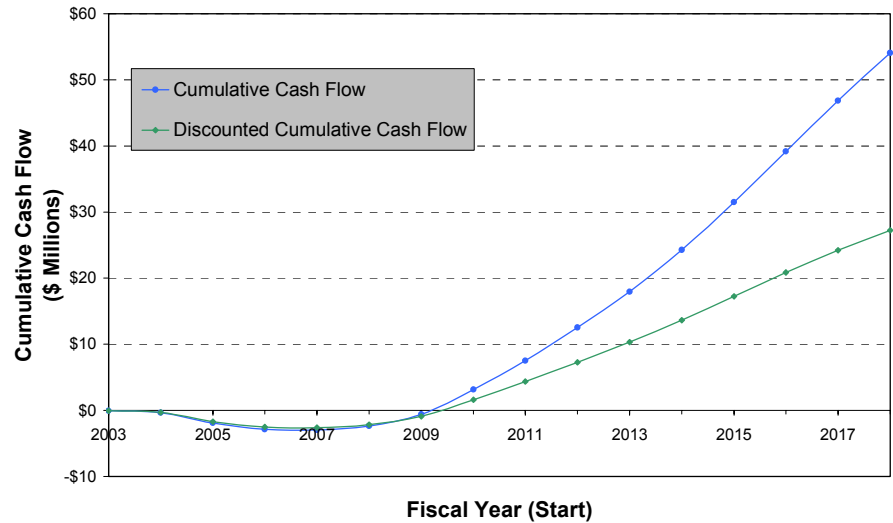
6.5. Financial Metrics

The overall NPV of the preferred solution, given a ten-year lifecycle, is \$10.31 million. Calculated on a 15-year lifecycle, the NPV grows to \$27.25 million. The following charts show cumulative cash flows for the ten-year and 15-year scenarios, both with an SDR of 6%.

*Ten-Year Lifecycle
6% discount rate*



**15-Year Lifecycle
6% discount rate**

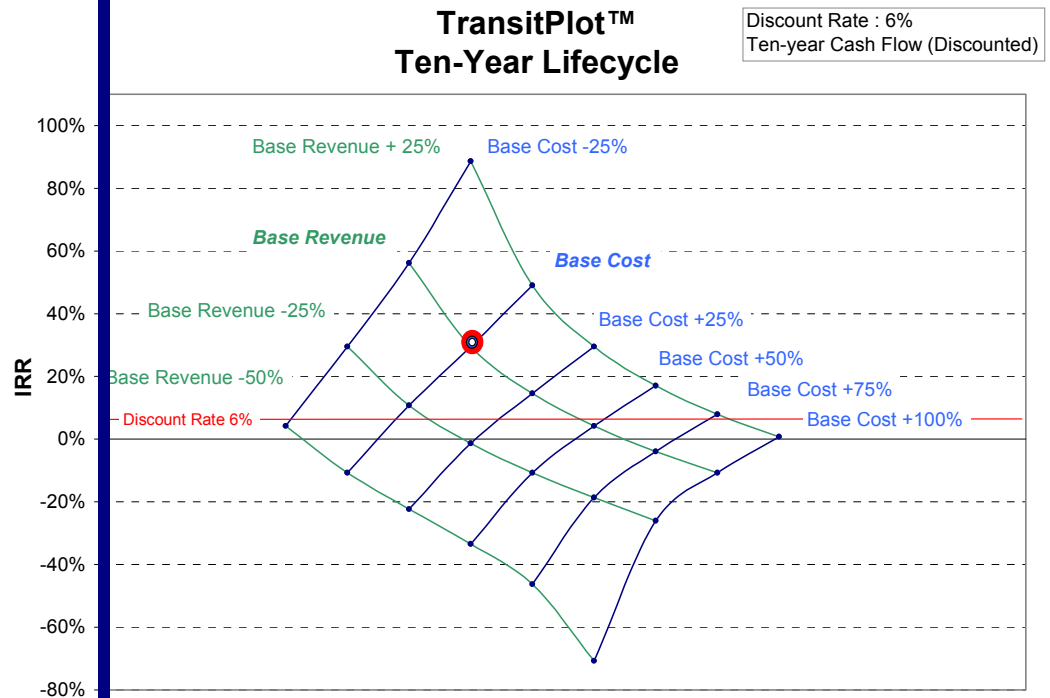


The following table summarizes the key metrics for a ten- and 15-year project lifecycle. The table reports key economic metrics including Net Present Value, Internal Rate of Return, Return on Investment, breakeven date, and project payback period. Sensitivity to SDR is illustrated with the current discount rate (6%), with excursions of 2% in either direction.

	10 years		15 years	
4% SDR	NPV	\$12.39 million	NPV	\$34.08 million
	IRR	34.46%	IRR	40.63%
	ROI*	60.40 %	ROI*	117.07 %
	Breakeven	Q1 Year 6	Breakeven	Q1 Year 6
	Payback*	13.2 years	Payback*	12.8 years
6% SDR	NPV	\$10.31 million	NPV	\$27.25 million
	IRR	31.92 %	IRR	37.98 %
	ROI*	50.27%	ROI*	93.62 %
	Breakeven	Q2, Year 6	Breakeven	Q2, Year 6
	Payback*	15.8 years	Payback*	16.02 years
8% SDR	NPV	\$8.58 million	NPV	\$21.89 million
	IRR	29.48 %	IRR	35.42 %
	ROI*	41.84 %	ROI*	75.18 %
	Breakeven	Q2 Year 6	Breakeven	Q2 Year 6
	Payback*	19.1 years	Payback*	20.0 years

*ROI & Payback period are deceptive; see discussion of relevance in Appendix 6

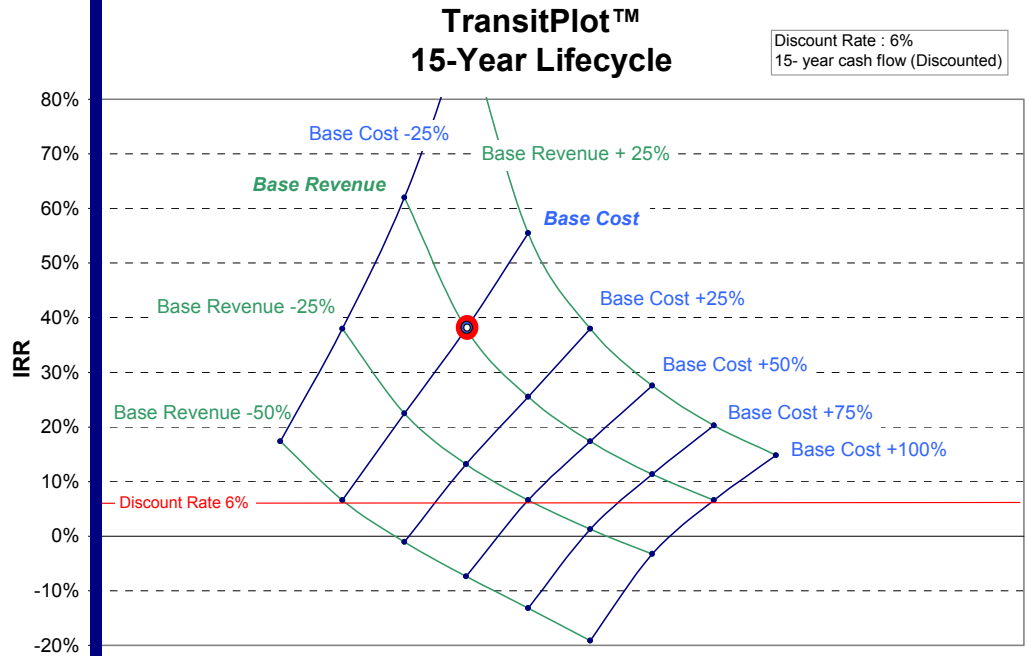
To better illustrate the sensitivity of the preferred solution to excursions from predicted costs and tangible benefits, Lime Kiln employed our proprietary TransitPlot™ tool to provide a graphic representation of the impacts of relative increases or decreases in project costs and revenues. The TransitPlot demonstrates the sensitivity of the solution in terms of impact on IRR.



The TransitPlots show a “base cost” and a “base revenue.” These values are the discounted cash flows arrived at in the preferred scenario. This base value is represented as a red dot at the juncture of the Base Revenue and Base Cost curves. The purpose of the TransitPlot is to demonstrate graphically the impacts of excursions, or quantified departures, from these base values. In the case above, for example, the IRR is calculated for conditions in which the estimated costs are reduced by 25% from base costs, as well as increased by increments of 25% (up to a doubling of estimated costs). Similarly, the base revenue is adjusted by increments of 25%, primarily downward. We linger only briefly on the excursions that improve the financial situation, since further improvements that further strengthen the overall business case do little to inform the process.

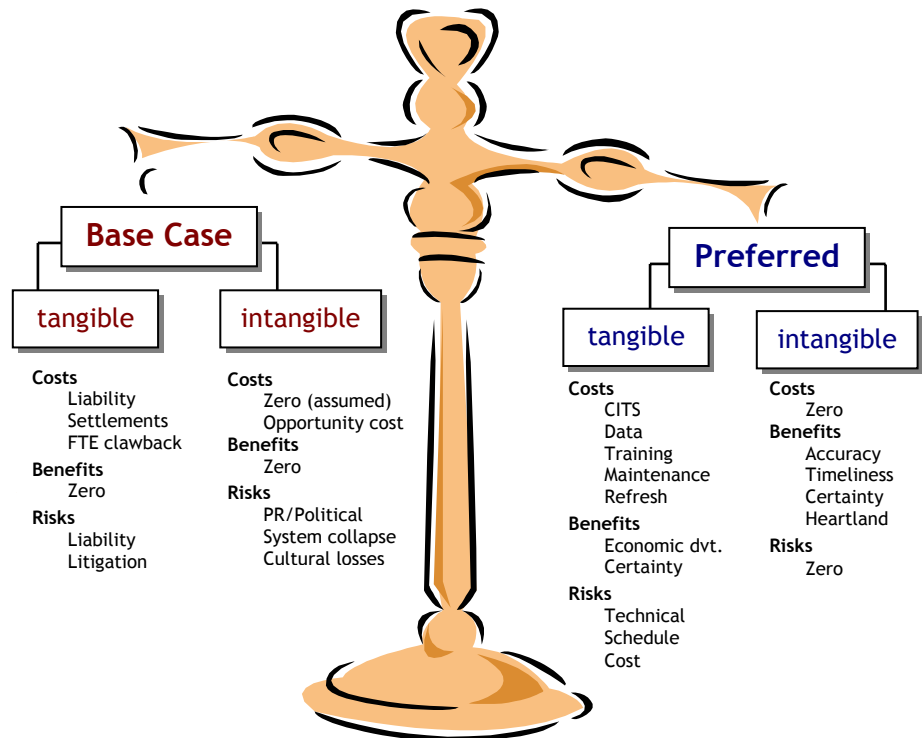
The project becomes nonperforming if the IRR falls below the social discount rate, and is more robust the more of the “transit” framework is above the SDR line. In the TransitPlot, the predicted intersect of cost and revenue is shown with a red highlight. The TransitPlot for the 15-year lifecycle is shown on the following page. Contrasting the ten-year lifecycle with the 15-year, it is apparent that the longer project term yields substantially higher IRR, as well as showing a more robust positive outcome (since more of the plot “floats” above the discount rate line).

Although the likelihood of higher-than-modeled revenue is great, in view of the lower bound estimate heuristic, the TransitPlot only models the impacts of higher returns at the +25% level. This is not to indicate a lack of faith in the polarity of anticipated benefits; rather, it is because revenues above this level will significantly exceed anticipated IRR, and as a result, modeling higher return scenarios is unnecessary.



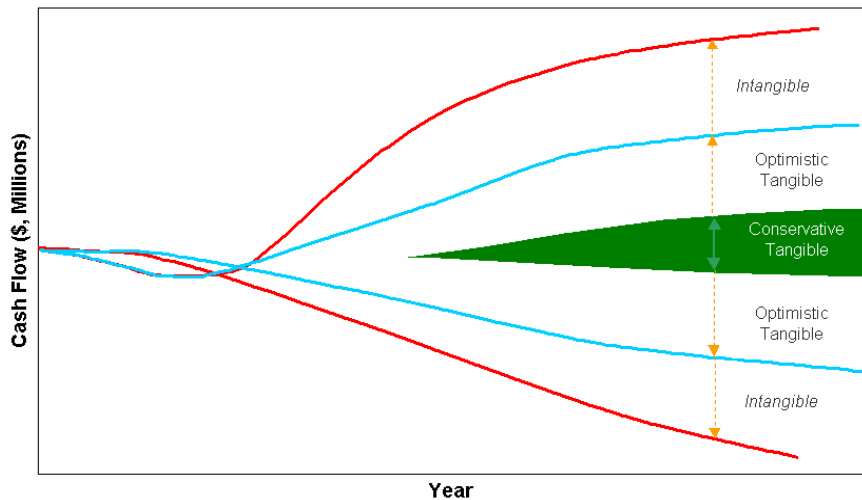
7.0 Evaluation

Respondents and stakeholders across the spectrum of our research were universal in their expectation of an integrated registry, and all pointed to the obvious need for the ILRRP in their own domain. Our research exposed many compelling arguments that supported the ILRRP, and generally suggested that the existing piecemeal approach to granting tenures, with its reliance on “risk managing” errors and conflicts, was in the process of collapsing. Some of these arguments have been presented as intangible benefits in Section 6.4.



The business case is built on the quantification of some key tangible financial benefits, presented in the sections above. The overall benefit of implementing ILRRP Benefits are measured as the net difference (the “ Δ ”) between the base-case scenario and the preferred case scenario. These values are detailed in Section 7.2 below.

Our approach focused on the “lower-bound estimate” heuristic, which has a significant impact on the net benefits of ILRRP over the base case. The diagram below illustrates this concept. The reported Δ indicates the “conservative tangible” measurement between the two scenarios; a more optimistic estimate of tangible benefits would yield a more substantial benefit, adding the two “optimistic tangible” measures. Finally, incorporation of the intangible measures—including real dollar benefits to non-Provincial government entities, as well as benefits that cannot translate into dollars—increases the eventual Δ even more. The diagram is depicted without scales, as a conceptual illustration.



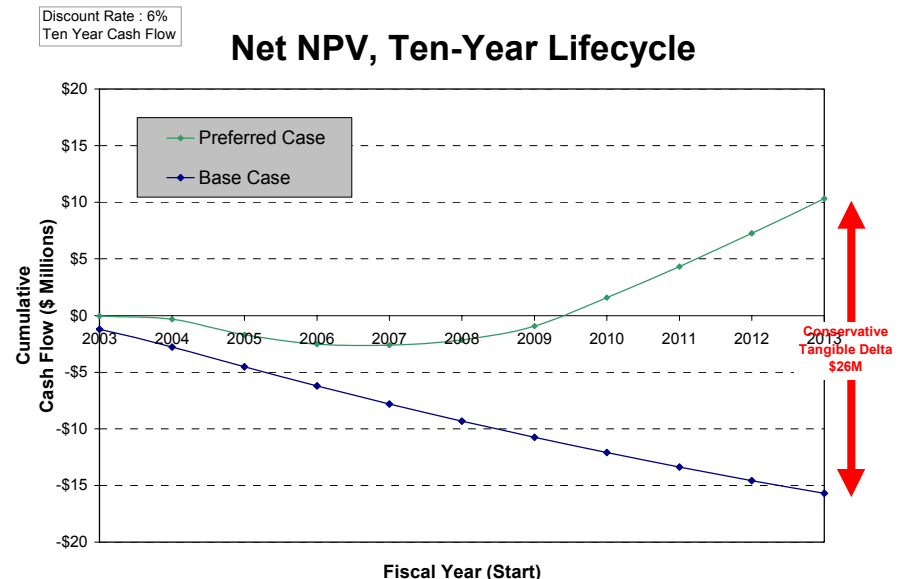
7.1. Net Intangible Benefits

Net intangible benefits can only be expressed ordinally: the intangible benefits of the base case are either negative (all costs) or were assumed to be zero. The preferred case registered strong positive intangible benefits, which are discussed in Section 6.4.

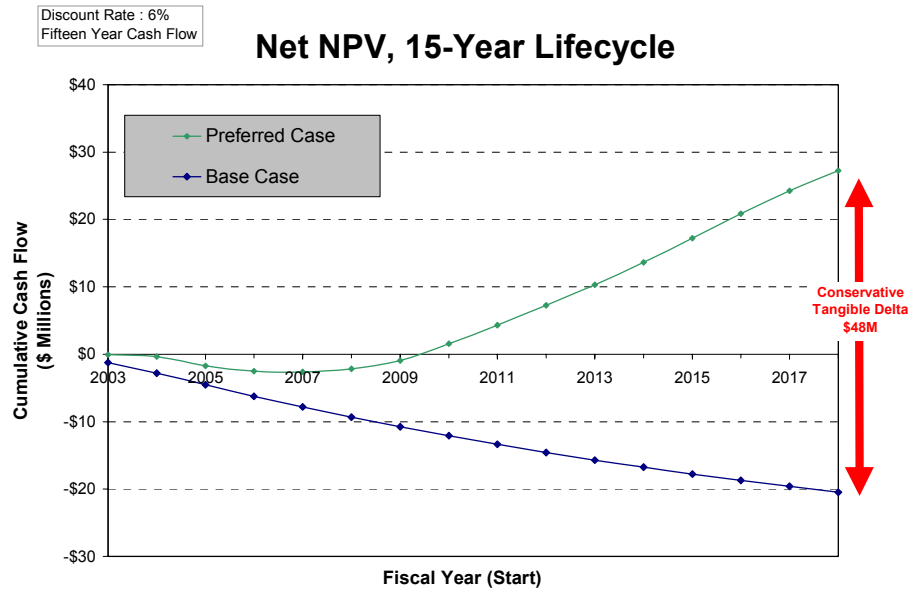
Of these many collateral benefits, the competitive landscape of BC, particularly to the oil & gas vertical; economic development potential; and installation of certainty in the process of acquiring tenure rights on Crown property are the most significant to the Province, in terms of both direct and indirect benefits.

7.2. Net Tangible Benefits

All analysis to this point has sought to define the base case and preferred case in isolation. The measure of *net* Net Present Value lies in the difference, the “Δ,” between the NPV of the base case and the NPV of the preferred case.



This statistic is reliable in that benefits for one scenario were not mirrored as costs in the other; we placed a single attribute in only one of the two scenarios. Thus, a cost item in the base case, such as liability, was not also added as a cost avoidance to the preferred scenario. This discipline permits us to simply calculate the Δ by subtraction. The chart above shows this overall NPV for the ten-year lifecycle, calculated for a 6% SDR. The net NPV for this solution is \$26.01 million. For the 15-year scenario, the net NPV rises to \$47.71 million.



7.3. Dependencies

Several elements external to the ILRRP have emerged as key dependencies, and will influence the outcome of the implementation business case if they are not delivered as anticipated. The ILRRP has little or no influence over the outcomes of these dependencies:

- successful technical system design and engineering, leading to an effective, robust, and simply implemented ILRRP;
- complete and timely completion of the Integrated Cadastral Fabric, which is dependent on the funding, participation, and timeliness of the ICI initiative;
- source data for all key customer groups, in a format and of sufficient completeness and quality to cost-effectively complete data preparation tasks;
- promotion, positioning, and other influencing of economic development in the oil & gas sector; and lack of unforeseen barriers to continued development, particularly of coalbed methane;
- global-scale demand for energy resources (e.g., effective implementation of Kyoto accords, peace and stability in the

Middle East) may reduce demand for energy or depress energy revenues to adversely affect royalties;

- effective implementation of improvements in tenuring business processes, including regulatory or statutory reductions in referral timelines, which can combine with synoptic, accurate data to shorten the awkward approval cycle; and
- unimpeded changes to registry-related legislation in accordance with the ILRRP strategy.

7.4. Alternative service delivery

We conducted a brief assessment of alternative service delivery (ASD) options for the ILRRP, particularly in reference to impacts on the business case from a cost/benefit perspective. While this review was limited and nominal only, it appears that the ILRRP *implementation* phase is not amenable to ASD. Costs, risks, and data ownership issues contribute to this conclusion.

However, it is not at all unlikely that portions of the eventual implemented system, including such elements as data updates, registry applications, system queries, and other components—particularly those with a potential e-government or Web interface—would be potentially strong candidates for some level of ASD. ASD opportunities include customer interface (using BCOOnline, for example), spatial data updates, and system operations. In our opinion, government's role must be in data standards and stewardship, and ownership of the registry itself; all other functions could be delivered through ASD.

8.0 Risk Assessment

8.1. Overview

Successful risk mitigation cannot be accomplished by ignoring risks. Through a systematic and candid appraisal risks can be identified, monitored and effectively managed throughout a project's lifecycle.

In the *Capital Asset Management Framework*, risk is defined as the chance of something happening that will have an impact, either positive or negative, on objectives and/or outcomes. Risk management is not just about avoiding negative outcomes. It also helps agencies recognize, and make the most of, emerging opportunities.

Risk management can also be defined as the process of identifying, analyzing and addressing risks and opportunities on an ongoing basis.

Lime Kiln's ILRRP risk assessment is based on industry-standard Systems Engineering practices, and has been informed by the provincial *Capital Asset Management Framework* guidelines published and maintained by the BC Ministry of Finance, as well as the guidelines of the Risk Management Branch.

We have established a comprehensive risk register (Risk Log) for the ILRRP (see Appendix 3). This log identifies and ranks risks, identifies risk ownership, rates likelihood and consequence values, and tracks the status of risk reduction plans. Also in Appendix 3 are Risk Data Sheets, which track each risk in greater detail through the project lifecycle.

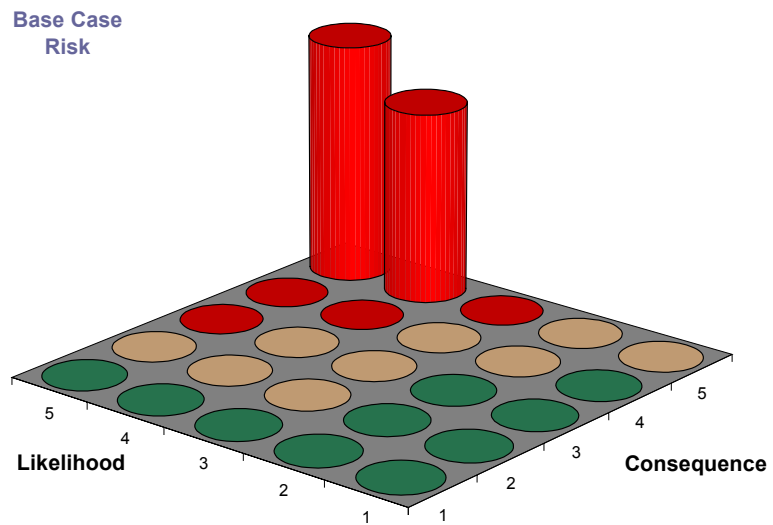
As outlined in the Government Enterprise-Wide Risk Management (ERM) model, "Monitor and Review" is an essential element of the risk management process. The ILRRP Risk Log is envisioned to be a dynamic part of the ILRRP throughout the project's lifecycle. We recommend this log be monitored and updated on a regular basis as part of an ERM Risk Management Plan. The Ministry of Finance, Risk Management Branch can help institute this Risk Management Plan as part of a comprehensive risk management program.

In British Columbia, dollar value is not used as a primary indicator of capital-related risk. Instead, the Province takes a holistic approach, recognizing the broad range of factors that contribute to an agency's or project's risk profile and acknowledging that these factors may well change in the course of an asset's life cycle. This is an important Provincial distinction, and represents a significant departure from a private industry perspective where dollar value is often the only motivation for managing capital-related risk.

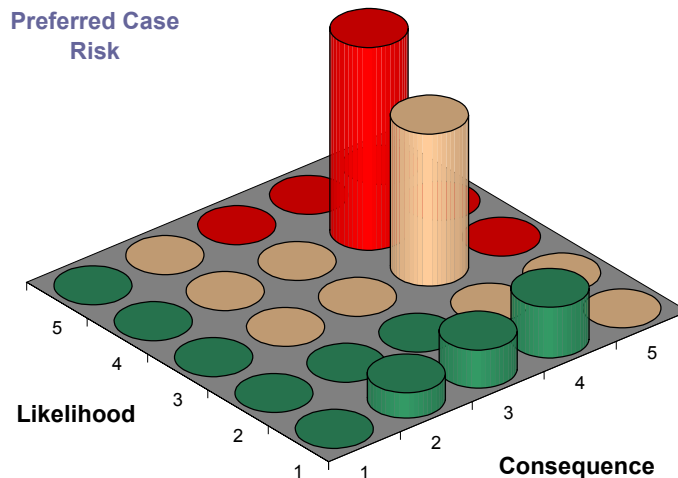
In relation to the ILRRP, it is intuitively evident that some of the benefits of transitioning to the ILRRP and some of the risks of not transitioning, are best viewed in a holistic perspective. While inherently difficult to quantify, some of these holistic costs and benefits can be extrapolated through review of some specific case histories (see Section 8.4 below).

The Lime Kiln Group also recognizes the importance of quantifying a dollar value to be used as an important indicator of capital-related risk. To this end, we have also endeavored to document and capture all associated system dollar values.

We identified risks through our Red Team meeting, as well as face-to-face, telephone and email interviews with multiple users, customers, and system experts. The risks are characterized as either technical, schedule, or cost. In our methodology, risks qualify either as low, medium, or high based on an assessment of the risk's likelihood and consequence. We use a standardized 5x5 Risk Grid to graphically and intuitively display the risk level. ILRRP risks that fall into either the high (red) or medium (yellow) categories of the grid have specific risk mitigation plans. Risks that are assessed to be low (green) at this time do not have risk mitigation plans.



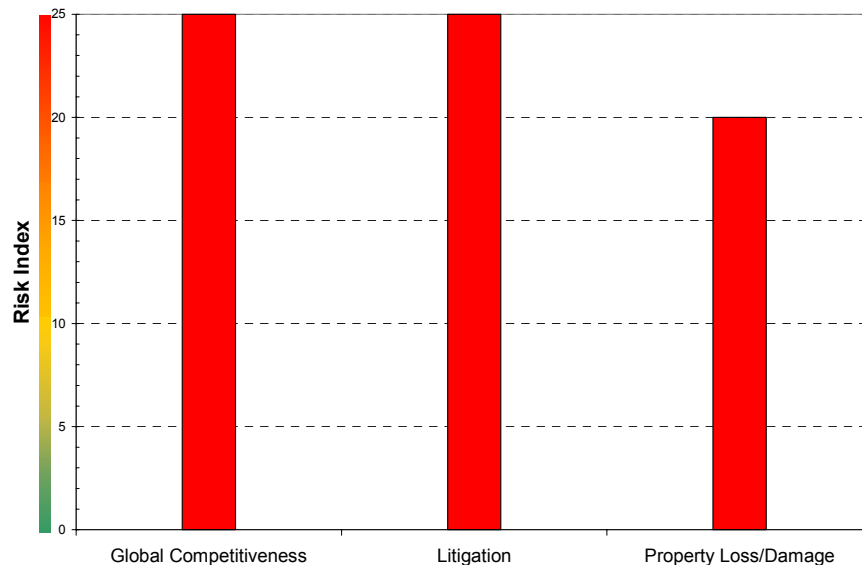
In general, we found the risks associated with the base case system to be far greater than those associated with the preferred case system. All the base case likelihoods were higher (scoring either a 4 or 5 on the 5-point scale); their consequences were all higher, too (all scoring 5).



A more detailed discussion of each of the system’s risks follows.

8.2. Base Case Risk: Risk of Doing Nothing

The risks associated with staying with the base case system are extreme; they all ranked high in both likelihood and consequence. A summary of the base case risk log is shown in the chart below. Each identified risk for the base case scenario can be reviewed in detail in the risk logging tools (Appendix 3).



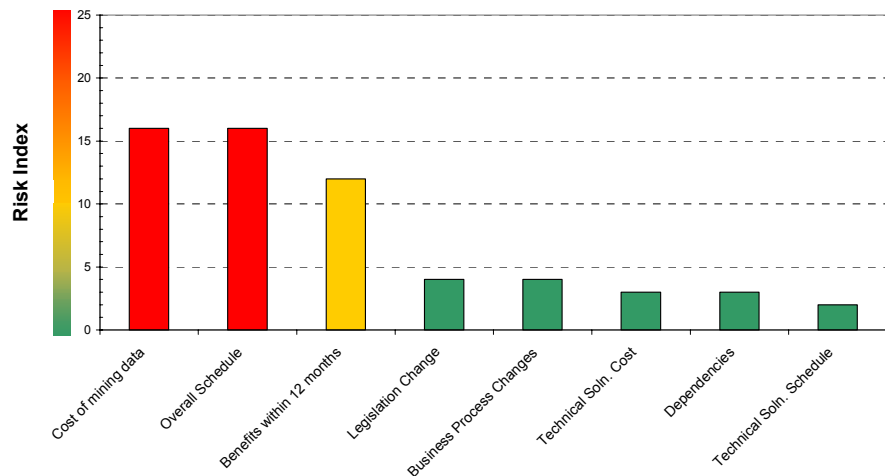
Although the risk of not being globally competitive is very real, for the purposes of this business case it is intangible. As such it has an intangible cost associated with it and we have not included this cost in this business case’s financial analysis. This is in keeping with our lower-bound estimates approach. It can safely be assumed that whatever the

magnitude of the cost associated with the risk of not being competitive, it will adversely affect the NPV of the base-case system as described in Section 5.5.

However, the risk of damage to public and private property, and the associated risk of litigation are tangible and represent a significant dollar cost to the Province each year. Respondent interviews revealed a profile of costs associated with conflicts over tenures suggestive of a cost per year to the province of tens of millions of dollars in settlements alone. In keeping with our lower bound estimating approach, we have conservatively estimated the litigation cost per year to be \$800,000 for the purposes of this Business Case's financial analysis. Again, this is a best-case scenario for the base case system; it is more likely that costs per year will be significantly higher.

8.3. Preferred Case Risk: Risk of Implementation

A summary of the preferred case risk log is shown in the chart below. Each identified risk for the preferred case scenario can be reviewed in detail in the Risk Log (Appendix 3).



The preferred case's red and yellow risks (higher consequence, higher likelihood) are all associated with cost and schedule of the proposed ILRRP system. There are no anticipated risks of implementing a good ILRRP—in other words, if the ILRRP is well designed and efficiently implemented, there are no foreseen risks to the Province. However, at this point in the project's lifecycle the system is not well defined. The only design details available are high-level specifications outlined in the *Business Strategy and Transition Plan* document. Many systems architecture, design and implementation details are presently unclear and hence have risk associated with them.

Risks such as business process changes, system dependencies, and legislative changes are assessed to be low at this point.

8.4. Risk Management Case Histories

The following case histories represent a sampling of the types of problems encountered by the existing system. A preliminary review of the base case system indicates that there are thousands of cases per year that involve conflict over rights and tenures, most of which never go to court as they are settled prior to litigation. Dollar value per settlement varies from the thousands of dollars to the multi-millions. Litigation and settlement costs over trespassing or tenure conflict liability represent a huge cost to the Province each year. It should be noted that not all conflicts will be resolved by an ILRRP system; but based on our research it is reasonable to expect that a significant number of these cases would not develop if an accurate picture of tenure status had been readily available to the decision makers.

Carrier Lumber Ltd. v the Province of British Columbia. The well-publicized Carrier Lumber Case is a near worst-case example of the impact of unclear or unknown land rights in the forestry sector. In this case ignorance of conflicting rights quickly cascaded into a high-profile legal and political battle. While an ILRRP system would not remedy all the issues raised during this case, it would have certainly addressed (and possibly negated) one of the root causes: ignorance of land rights.

As such, although ILRRP would not be considered *sufficient* to avoid all risk demonstrated in this case, it would be considered *necessary* to avoid such risk.

The ILRRP, with a clear discipline of the “booking principle,” would have permitted removal of title *only with the approval of* the registered party. Lack of an ILRRP thus acted as a key enabler of the incurred cost.

Background. The Ministry of Forests asked for bids on a salvage operation to resolve an infestation of mountain pine beetles spread out of the Kleena Kleene Valley. The government wanted five million m³ of wood cut so the forest could be replanted. Carrier Lumber started building roads, logging, and constructing new mills. A group of Chilcotin chiefs argued they should be the ones logging in the area.

There were many complicating factors in this particular case, not all of which fall within the bounds of unclear land ownership. However, the end result was a cancellation of Carrier’s license in 1993 when only half the volume had been logged. Carrier launched a lawsuit in 1994, leading to favorable ruling in 1999.

Consequence. The settlement consisted of cash, land, and timber rights. The provincial government agreed to pay \$30M, provide two parcels of land purchased from BC Rail, and rights to 1.5 million m³ of timber. The timber, to be harvested over five years, is free of stumpage charges. The cost to the province also includes a five-year legal battle.

Electrical power generation. This case highlights the types of problems encountered by large companies trying to invest in BC and finding “speed-bumps” that impede business development. The following is a good example of an intangible cost of the existing system at a high-level (i.e. lost future opportunity). It also hints at the link between

ILRRP and other important initiatives such as “New Era” and data warehouse.

Lime Kiln interviewed a major electrical generation investor regarding his experiences with investing in BC. The company representative’s overall impression could be summarized as frustrating and unnecessarily time/cost consuming. His concerns were over the convoluted business process involved in permitting and the associated excessive taxation. In BC he had to address numerous levels of government in sequence, rather than in parallel and at the same forum. This caused uncertainty and added time and expense to the project compared to other provinces.

His story also highlighted other uncertainties regarding land rights and the First Nations. In this particular case his company made a pre-emptive offer to First Nations to ensure no future conflicts even though there were no current land ownership/rights issues.

There were other minor issues that in other provinces could be easily and quickly dealt with, but in this case were sources of great anguish for the investor. In one instance a squabble over a local sub-contractor cost the investor 5-6 weeks construction time and much frustration.

Finally, the company representative expressed concern over the allocation of water rights. In his view there were a host of prospectors “gumming up” the system by holding water rights without using them. They were, in his view, holding out waiting for a major development to buy out their claims. He felt there should be an ongoing charge for holding rights—in other words, “use it or lose it.”

His overall impression was that he would only do business in BC for major projects; all the smaller ones are not worth the frustration and additional effort, given intervening opportunities elsewhere.

9.0 Action

Implementation strategy recommendations are directed toward the goal of successful implementation of the ILRRP, and relate toward adding value to the process of implementation:

- Consider implementation of a registration fee for each transaction that affects the centralized registry. This fee would be charged to SRM customers (and “passed through” Ministry customers to their end user clients), and would be set to recover some of the costs of registration and data update under the ILRRP. The fee would be positioned strictly as value-for-service, and would be reflected in terms of better, faster service for registry users. To be within reach of small or single-time users, and to limit impact on large-volume users such as forest companies, the fee should be in the \$100-200 range.
- Deliver the ILRRP integration in a phased approach, to provide performance benchmarks to Treasury Board to limit exposure, and permit program progress to drive continued investment.
- Continue to evolve the implementation strategy to accommodate enhanced coordination with key revenue-generating stakeholders, especially gas exploration, CBM, and transportation.
- Consider alternative service delivery once legacy data have been converted and integrated, and the ILRRP is implemented. ASD opportunities include customer interface (using BCOOnline, for example), spatial data updates, and system operations. In our opinion, government’s role must be in data standards and stewardship, and ownership of the registry itself; all other functions could be delivered through ASD.
- Formalize the risk management process throughout the project lifecycle.
- Evaluate status of business processes, particularly with reference to oil & gas sector. It appears that some processes, particularly external reviews, add significant lag time to the adjudication timeline. Incorporate synoptic integrated data access to all parties through web-based interface, so that referral organizations have transparent access to data. In return, reduce referral timelines for external organizations, such as First Nations.
- Conduct thorough business requirements analysis with key stakeholders, with a focus on risk and liability issues.
- Even a fully-implemented ILRRP will not drive economic development without appropriate messaging to better position the Province to the key sectors it relies on. This positioning should leverage the utility of *certainty of access, title, or right*, as well as the economic benefit of speed of tenure issuance.

- Implement an independently-managed, formalized Systems Engineering Management Plan (SEMP) to ensure delivery of adequate system within timelines and budgets established.

10.0 Appendices

Appendix 1: Data Collection/Interview Contacts

Appendix 2: Data Capture Instrument

Appendix 3: Risk Logs & Tracking

Appendix 4: Oil & Gas Production Model

Appendix 5: Financial Model Inputs

Appendix 6: Glossary of Terms

Appendix 7: Company Profile

Appendix 1 Data Collection/Interview Contacts

This roster represents a partial listing of participants in interviews, data collection, and other contacts in the course of the business case preparation.

Internal Government Contacts

Colin Magee	Ministry of Energy & Mines
Dave Molinski	Ministry of Energy & Mines
Mike Lambert	Land & Water BC
Pat Jackson	Land & Water BC
Elisabeth Wipfli	AG/Treaty Negotiation Office
Neil Hamilton	SRM/Resource Information Department
Gary Cooney	SRM/Information Management Branch
Jim Hester	Ministry of Transportation
John Ward	Ministry of Water, Land & Air Protection
Connie Fair	BC Assessment
Larry London	Oil & Gas Commission
Jane Spackman	Ministry of Forests
Jim Langridge	Ministry of Forests
Gerald German	Ministry of Energy & Mines
Bill Munn	Ministry of Water, Land & Air Protection
Karen Koncohrada	Ministry of Energy & Mines
Olga Kopriva	SRM/Resource Information Department
Glen Davidson	Land & Water BC

Primary External (Customer) Contacts

Dave Sheffield	Weyerhaeuser Canada
Dan Jepson	BC/Yukon Chamber of Mines
Boyd Porteus	Agricultural Land Commission
Chuck Salmon	Corp of Land Surveyors of BC
Stephen Ewart	Can Assoc of Petroleum Producers
Ron McDonald	Council of Forest Industries
Brian Williams	Integrated Cadastral Information Society
Brent Taylor	Polaris Land Surveying Inc
Steve Bennett	McElhanney
Tim Boyko	Cossak Land Services
Larry Coghlan	BC Hydro
Charles Smith	Weyerhaeuser Canada

Red Team Participants

Jim Sutherland
Jack Leedham
Paul Hagen
Adam Dewey
Scott MacPhail
Jon Meeres
Brian Williams
Janet Adams
Doug Glaum
Dugald Smith

Appendix 2 Data Capture Instrument

CONFIDENTIAL DOCUMENT

CONTACT _____ ORG _____ DATE _____

Preferred Case Costs	\$ Costs	FTEs	Notes
Capital			
Hardware			
Software licenses			
Infrastructure			
Implementation			
Training			
Contract/consulting			
Software acceptance/test			
Opportunity cost			
Legacy absorption			
Productivity losses			
FTE losses			
Policy/legislation			
Other nonrecurring			
Operating			
Amortization			
Support			
PAB			
Corporate overheads			
System maintenance			
Data maintenance			
Management			
Office space			
Client costs			
Benefits	\$ Savings	FTEs	Notes
Tangible			
PAB Δ			
Operating cost Δ			
Other tangible			
Intangible			
Accuracy			
Timeliness			
Risk reduction			
Other customer benefits			
Government savings/revenue opportunities			
Customer savings/other ILRRP end-user impacts			
Other issues (agency budget trend, royalties, fees, previously committed savings)			

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Appendix 3 Risk Logs & Tracking

Base Case

Risk						Risk Reduction Plan		
	Type	Consequence	Likelihood	Risk Factor	Owner	In Work	Not in work	Date last reviewed
Liability/Compensation	Cost	5	5	25	TBD			
Economic Development	Cost	5	5	25	TBD			
Loss/Damage of Property	Cost	5	4	20	TBD			

Preferred Case

Risk						Risk Reduction Plan		
	Type	Consequence	Likelihood	Risk Factor	Owner	In Work	Not in work	Date last reviewed
Cost of Data Preparation	Cost	4	4	16	TBD			
Overall Schedule	Schedule	4	4	16	TBD			
Early Benefits	Cost	4	3	12	TBD			
Legislation Change	Schedule	4	1	4	TBD			
Business Process Changes	Schedule	4	1	4	TBD			
Technical System Cost	Cost	3	1	3	TBD			
Dependencies	Technical	3	1	3	TBD			
Technical System Schedule	Schedule	2	1	2	TBD			

Risk Title: Liability & Settlements

Risk Owner: Dave Chater/ MSRM **Date:** 10 Feb, 2003

Description:
Some cross-referencing of data is already being missed or skipped due to system inefficiencies or manning/workload issues. This will likely increase in the future causing more errors, more conflicts and legal issues

Root Cause:
Fewer FTEs, assumed more workload due to increased economy drivers

Consequence:
More litigation, more settlements, more legal staff workload. Expected settlement costs conservatively in the multi-millions per year.

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
1) Increase staff for MSRM to handle increased Work flow due to New Era and other External workload drivers	TBD		Medium	
2) Provide additional funding of AG due to legal cases and settlements	TBD		High	
3) Legislate that all agencies must check with all other agencies prior to issuing tenures.	TBD		Medium	Will impede MSRM workload

Risk Type

Schedule Cost

Technical / Quality Other

Likelihood

Consequence

Risk Title: BC will be less competitive in a global marketplace

Risk Owner: Dave Chater/ MSRM **Date:** 19 Feb, 2003

Description:
Excessive timelines and slow responsiveness to business information needs may push private industries from BC - companies have other options for investment (e.g. oil/gas doing business in Alberta; Timber companies doing business in WA, Scandinavia...)

Root Cause:
Global marketplace; more responsiveness business processes elsewhere (e.g. Alberta's "1-800" system); business decisions are time sensitive

Consequence:
BC will loose out to more competitive locations because of perceived or real lack of responsiveness

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
Encourage other "non-resource" focused economic development – not oil/gas, logging, skiing/tourism, fishing, power generation, agriculture..., but software development, financial centers....	TBD			Realistic?

Risk Type

Schedule Cost

Technical / Quality Other

Likelihood

Consequence

Risk Title: Loss/damage of heritage sites, public property and natural resources

Risk Owner: Dave Chater/ MSRM **Date:** 19 Feb, 2003

Description:
BC will incur more environmental damage, and loss/damage of heritage sites/First Nations property due to unknown property rights

Root Cause:
Difficult to determine land ownership, resource rights and boundaries

Consequence:
Loss/damage of property, sites, resources (e.g. archaeological sites, First Nations monuments/cultural sites...)

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
1) Increase staff for MSRM	TBD			
2) Provide additional funding of AG due to legal cases	TBD			
3) Legislate that all agencies <u>must</u> check with all other agencies prior to issuing tenures.	TBD			

Risk Type

Schedule Cost

Technical / Quality Other

The Lime Kiln Group, Inc. RISK DATA SHEET

Risk Title: Cost of Data "Mining"

Risk Owner: Dave Chater/ MSRM **Date:** 7 Feb, 2003

Description:
Estimated \$8.5M to mine all data and populate the IRP database. Although initial data quality assessment report is complete, it recommends additional follow-on data assessments be performed for forest tenure data, Crown land parcel/tenure data and MOT datasets.

Root Cause:
Volume of data and data quality are not yet fully quantified or understood – there is missing historical data from Crown Lands Parcel and tenure data and potential data accuracy and completeness issues with forestry tenures. There is also accuracy and completeness issues with MOT data.

Consequence:
Cost overruns

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
Perform additional data assessment reports for areas that currently have unclear data quality or quantity	TBD	Clear understanding of scope and cost of data mining	Low	
Risk transfer by acquisition strategy (e.g. contractual penalties to contractor for cost slip)	Pre Contract award	Recoup some costs	Medium	

Risk Type

Schedule Cost

Technical / Quality Other

The Lime Kiln Group, Inc. RISK DATA SHEET

Risk Title: Overall Project Schedule

Risk Owner: Dave Chater/ MSRM **Date:** 7 Feb, 2003

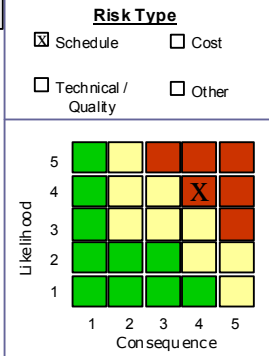
Description:
The 3.5 year schedule is aggressive considering the scope of work to be completed and degree of uncertainty regarding data

Root Cause:
Global and local inexperience developing large scale GIS based systems, uncertainty with data quality and quantity

Consequence:
Schedule overruns, associated cost overruns

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
1) Review/analyze additional data assessment reports	TBD	Clear understanding of scope and cost of data management	Low	
2) Risk transfer by acquisition strategy - Contractual penalties to contractor for schedule slip - Two stage project: - Design System & complete pilot study - Option to continue remaining phases pending successful stage one	Pre Contract award	Recoup some costs, limit risk	Medium	



Risk Title: Project Benefits within 12 Months

Risk Owner: Dave Chater/ MSRM **Date:** 7 Feb, 2003

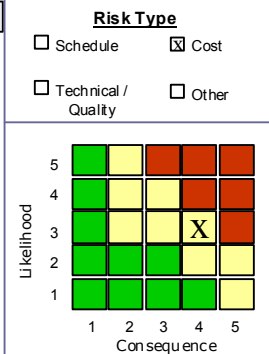
Description:
Expectation of full business benefits for NE pilot area realized within 12 months of project start. Is this realistic and how will we know if it happens?

Root Cause:
Volume of data and data quality are not yet quantified. No implementation strategy for NE pilot area yet or metrics defined to measure expected improvements

Consequence:
Delay in payback at early stage of project will have large negative impact on financial metrics and overall project credibility

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
Work closely with Ministry Energy & Mines to define Pilot system requirements and an implementation strategy that will enable quickest payback (e.g. detailing subsurface Vs subsurface rights first)	TBD			
Project Management: Track actual progress and results against the planned strategy	TBD			



Risk Title: Legislation Change

Risk Owner: Dave Chater/ MSRM **Date:** 7 Feb, 2003

Description:
Current legislation defines the point of conveyance as the point at which the conveyance document is signed or executed; changing to a register-based conveyance must be accounted for in the legislation

Root Cause:
Old legislation

Consequence:
IRP system will not function legally

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
Not Applicable				

Risk Type

Schedule Cost

Technical / Quality Other

Likelihood

Consequence

Risk Title: Business Process Changes

Risk Owner: Dave Chater/ MSRM **Date:** 7 Feb, 2003

Description:
The new system will require new business processes in many organizations.

Root Cause:
Existing business processes harnessed to the existing system

Consequence:
IRP system will not function efficiently

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
Not Applicable				

Risk Type

Schedule Cost

Technical / Quality Other

Likelihood

Consequence

Risk Title: Technical Solution Cost

Risk Owner: Dave Chater/ MSRM **Date:** 7 Feb, 2003

Description:
Estimate design and development of the system will be \$2.5M

Root Cause:
No detailed system cost breakout or detailed design

Consequence:
Negative impact on financial metrics due to NRE growth

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
Not Applicable				

Risk Type

Schedule Cost

Technical / Quality Other

Likelihood

Consequence

Risk Title: System Dependencies

Risk Owner: Dave Chater/ MSRM **Date:** 16 Feb, 2003

Description:
IRP is envisioned as an important element of a larger provincial level push with a goal of having easy access to data, having higher quality data and getting the provincial economy in-gear. Risk is not developing these other related systems

Root Cause:
IRP by itself will have a lesser effect unless it is implemented with other planned system level improvements (new era initiative, data warehouse, LIBC, cadastre 2014, marketing effort..)

Consequence:
Less effective system, less payback

Risk Mitigation Plan:

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
Not Applicable				

Risk Type

Schedule Cost

Technical / Quality Other

Likelihood

Consequence

Risk Title: Technical Solution Schedule

Risk Owner: Dave Chater/ MSRM **Date:** 7 Feb, 2003

Description:
Estimate technical solution (hardware, software infrastructure...) will be complete with 6 months

Root Cause:
Software may require some custom development & support structures

Consequence:
Slip in implementation schedule; but primary schedule hurdle is anticipated to be data

Risk Mitigation Plan:

Risk Type

Schedule Cost

Technical / Quality Other

5	Green	Yellow	Red	Red	Red	
4	Green	Yellow	Yellow	Red	Red	
3	Green	Yellow	Yellow	Yellow	Red	
2	Green	Green	Green	Yellow	Yellow	
1	Green	X	Green	Green	Yellow	
		1	2	3	4	5

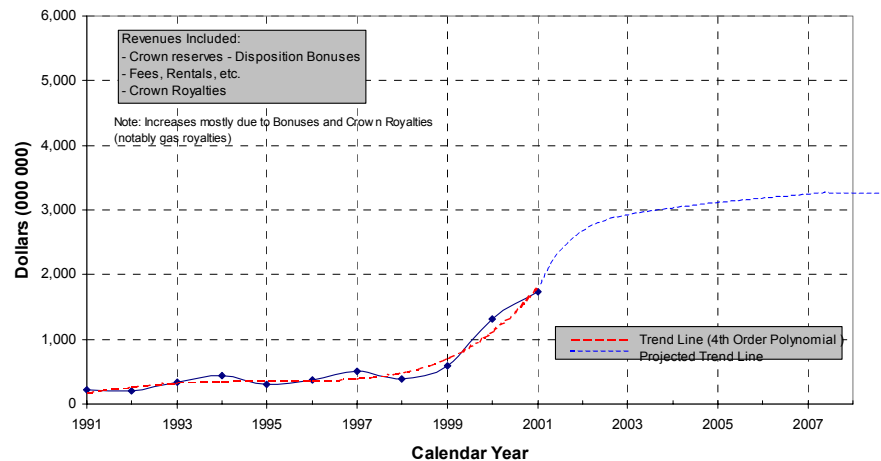
Consequence

Action/Event	Date	Success Criteria	Risk Level if Successful	Comments
Not Applicable				

Appendix 4 Oil & Gas Production Model

The oil & gas vertical represents the richest resource potential in British Columbia. Sales value of oil & gas production was \$4.6 billion in 2000, which was before the Ladyfern discovery in 2001, the largest strike in Canada in over 15 years.⁹

Oil & Gas Historic Revenue



The industry can deliver significant direct benefits to the Province, in the form of direct Provincial revenues from production operations (such as royalties, that amount to roughly 75% of such revenue; and bonuses, which account for the remaining 25%). Oil & gas can also deliver indirect benefits to the government, including payroll tax revenue, corporate income tax revenue, and revenues from local economic multiplier effects. The intangible benefits stream can be even larger, including benefits to the Province of enhanced profile and competitiveness on the global stage, spinoff economic development, development of sustainable domestic energy supply, and cultivation of a large economic engine to supplement decreasing forest and mining sectors.

In addition, substantial direct and indirect benefits accrue to other players in the economic field, such as private industry and workers.

Based on our 360° conservative approach, and given the limits on the scope of the business case, we opted to ignore all benefits with the exception of direct, tangible royalty revenues to the Province for natural gas production.

Natural gas benefit drivers. Among the potential petroleum resources that the ILRRP could induce, we looked at the three strongest candidates:

- expanded drilling in the Western Canada Sedimentary Basin in northeast BC,
- exploration and drilling of natural gas in the Bowser, Nechako, and Fernie Basins in the BC Interior, and

⁹ Ministry of Energy & Mines. *Oil and Gas in British Columbia, Canada*. 2002.

- recovery of coalbed methane (CBM) from proven reserves in coalfields across the Province.

Based on advice from Energy & Mines, we did not inspect oil production or offshore resources, given the complexity or lengthy lead times to production.

Energy & Mines estimates suggest that a synoptic, accurate view of all tenure, registration, and other interest data could cut as much as 30 days off the permit processing times they currently experience; however, other groups, such as First Nations bands, would need reductions in their review periods to obtain maximum traction from such time savings.

Northeast gasfields. Well over 500 gas wells were drilled in 2001 in the northeast, and with the emergence of the Ladyfern field (and infill drilling in existing fields) the government hopes to provide capacity to drill up to 1,500 wells annually in the next two to three years. All stakeholders in the oil & gas value chain, including Energy & Mines staff, the Oil & Gas Commission, and industry, indicated the critical nature of turnaround time in permit approval to the northeast. Industry reports that typical turnaround times for processing approvals for exploration and drilling is in the 30-40 day range. The drilling season is limited to a few winter months, and delays of only a few weeks can mean the entire season (or an entire tenure) is lost. Our research indicated that reducing permitting time even by a few days to a week would significantly enhance the competitiveness of BC to production companies, keep industries more engaged in BC gasfields, and would in itself tend to induce more well drilling. The ILRRP would contribute significantly to this goal by consolidating and aggregating tenure data in georeferenced datasets, and providing synoptic access to data to shorten the oil & gas “backend” processing time.

Although successful improvements in data access and related business and regulatory processes from the ILRRP could yield dramatic reductions in registration times in the northeast, no stakeholders had a solid, defensible metric with which to measure the efficacy of the ILRRP. All agreed, however, that more wells would be induced in the existing gasfields of the northeast.

Following significant research, testing, and modeling, we determined that the only appropriate approach was to assume that, from the over 500 wells annually, that implementation of the ILRRP would induce one (1) average well annually that would not otherwise have been drilled. While this value may be absurdly low, it does respect the “lower-bound estimate” heuristic guiding the business case: it is the lowest non-zero whole number. As such, the business case’s estimates would not be expected to be any lower than the values reported; however, revenues in the northeast attributable to ILRRP might be underreported by a huge factor.

Tangible benefits, limited to royalties only, are based on an average first-year royalty of \$360,000, with declining royalties for the following seven years. The resultant benefit stream is shown in the following table:

Fiscal Year	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	Σ
Number new wells in northeast	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Revenue per well (in \$000 000)

0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14													2.1
	0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14												2.1
		0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14											2.1
			0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14										2.1
				0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14									2.1
					0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14								2.1
						0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14							2.1
							0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14						2.0
								0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14					1.8
									0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14				1.5
										0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14			1.3
											0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14		1.0
												0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.14	0.7
													0.36	0.33	0.31	0.28	0.26	0.23	0.19	0.4

Total Royalties: Northeast (\$000 000) 0.00 0.00 0.36 0.69 1.00 1.28 1.54 1.77 1.96 2.10 2.10 2.10 2.10 2.10 2.10 2.10 2.10 2.10 23.3

Interior basins. Preliminary geologic analysis suggests that three stratigraphic basins, the Bowser Basin, the Nechako Basin, and the Fernie Basin could contain as much as 23.6 TCF (trillion cubic feet) of natural gas, a resource nearly half the size of the vast gasfields of the northeast. The potential for exploration and eventual exploitation of this resource is likely to require ILRRP support, since these fields lie in areas of the province that are more heavily settled than the northeast, and settlement has an history stretching back over a century in most of these sites. The impact is on the complexity of claims, staking, and interests on these lands; the cycle time for oil & gas registries may greatly exceed the patience of the industry.

However, the lack of certainty (these areas are not proven reserves; exploration has not been conducted), lack of infrastructure, and ready access to intervening opportunities suggests that development of these fields should not be expected to take place for 5 to 15 years; and until exploration is conducted and drilling takes place, it will be impossible to apply any reliable quantification to the potential benefits. As a result, we did not include any interior gasfields in our gas model.

Offshore resources. Likewise, we avoided the large—and unproven—basins offshore of the Queen Charlottes and Vancouver Island. Development of these offshore fields is dependent on many factors, from environmental approval at the federal level to development of drilling technology that can sustain the sea states encountered off the coast of BC. In addition, the utility and role of ILRRP in offshore applications is uncertain.

Coalbed methane. Coalbed methane (CBM) represents a vast, proven, and relatively precisely located reserve of fossil fuel in BC. Reserves in the northeast, the southeast, and Vancouver Island may exceed 89 trillion cubic feet, and up to 250 trillion cubic feet of resource have been estimated. Although technical challenges still remain, Energy & Mines anticipates supporting development of operational projects, each involving a hundred or more wells, within the next two to three years.

According to our respondent, based on calculations employed by Energy & Mines for a typical coalbed methane development, the estimate “for a ‘typical’ development would produce approximately \$100 million of undiscounted royalties over the life of the project. CBM pays out over 20 years and peak production doesn't occur till about year 5.”

We also determined that CBM developments, while benefiting from ILRRP anywhere in the Province, would most likely be directly induced

by ILRRP on Vancouver Island, where tenure data conflicts and voids have tied up interests for years. Based on conservative estimates, we built a CBM model that accommodated the development of only two CBM projects Province-wide, one beginning in FY2007/08 and another single project five years later, in FY2012/13.

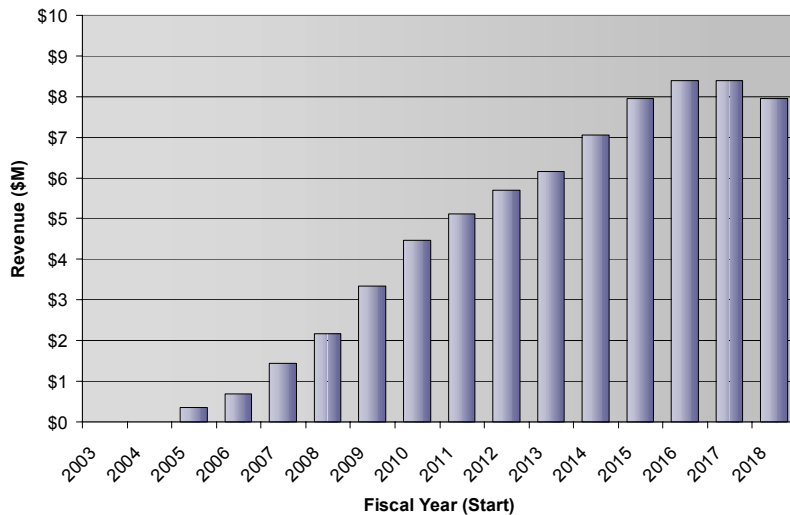
We developed a table of contributing factors to the inducement of a CBM development. Based on a best engineering estimate, the factors provide a measure of the percentage of benefit that can be attributed to ILRRP as opposed to other enabling or limiting factors.

Development Factor	Influence
Land tenure/interest certainty	45%
Intervening opportunity	10%
Social/environmental barriers	10%
Technological challenges	35%
Total	100%

ILRRP can contribute only to the *land tenure* factor, which accounts for 45% of the benefit of the CBM development. The resultant benefit stream is shown in the following table:

Fiscal Year	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	Σ
Number new CBM developments	0	0	1	0	0	0	0	1	0	0	0	0	0	0	
Revenue per development (in \$000 000)			1.0	2.0	4.0	6.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.0	68.0
Development factor			.45	.45	.45	.45	.45	.45	.45	.45	.45	.45	.45	.45	.45
Total Royalties: CBM (\$000 000)	0.0	0.0	.45	.90	1.8	2.7	3.2	3.6	4.1	5.0	5.9	6.3	6.3	5.9	45.9

The final contribution of the oil & gas royalty stream to the ILRRP preferred scenario model combined these two tables.



Appendix 5 Financial Model Inputs

Preferred Case Costs

Project year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Fiscal Year (Start)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Legislation change	-	0.25	0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	0.50
Total Legislation Costs	-	0.25	0.25	-	-	-	-	-	-	-	-	-	-	-	-	-	0.50
Data, amortized	-	-	1.70	1.70	1.70	1.70	1.70	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	16.15
System design, refresh	-	-	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	6.72
CITS hardware etc.	-	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.28
System maintenance	-	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	5.04
R&D, analysis	0.05	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10
Training	-	-	0.10	0.10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.32
System Costs	0.05	0.05	2.66	2.66	2.57	2.57	2.57	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	28.61

Preferred Case Benefits

Project year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Fiscal Year (Start)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Gas royalty revenues	-	-	-	0.69	1.45	2.18	3.34	4.47	5.11	5.70	6.15	7.05	7.95	8.40	8.40	7.95	69.20
Fee recoveries	-	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	14.00

Base Case Costs

Project year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Fiscal Year (Start)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Liability, settlement	1.572	1.572	1.572	1.572	1.572	1.572	1.572	1.572	1.572	1.572	1.572	1.572	1.572	1.572	1.572	1.572	
ILRRP factor	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Total Legal Costs	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	0.786	12.576
Number FTE clawbacks	5	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	14
Cumulative FTE	5	10	13	14	14	14	14	14	14	14	14	14	14	14	14	14	
FTE rate (overhead)	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	0.088	
Total FTE Costs	0.44	0.88	1.144	1.232	1.232	1.232	1.232	1.232	1.232	1.232	1.232	1.232	1.232	1.232	1.232	1.232	18.48
Existing system upgrades	0	0	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.07
Total System Upgrade	0	0	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.07

All dollar values in 000 000

Appendix 6 Glossary of Terms

The following is a brief review of some of the technical terms and abbreviations used in this report. They are included for information only.

Heuristic

A rule of thumb.

Tangible

Tangible benefits and costs are those that can be expressed directly in dollar terms.

Intangible

Intangible benefits and costs may be real, but cannot be directly expressed in terms of dollars.

SDR

Social Discount Rate. The rate at which analysts should discount future benefits and costs of a project. Treasury Board sets the SDR for provincial projects; the current rate is 6% +/- 2%.

IRR

Internal Rate of Return. The discount rate at which the NPV is zero. The IRR can be used as a decision rule for selecting projects when there is only one alternative to the status quo. An IRR greater than the discount rate implies the project should be undertaken.

ILRRP

Integrated Land & Resource Registries Project.

NPV

Net Present Value of an asset. NPV is the difference between the present value of the benefits and the present value of the costs of any given program.

Since the canned NPV routine in Microsoft Excel contains internal limitations on cash flow timing (it is fixed at End-of-Period or EOP), we utilized the *project Net Present Value* formula that correctly calculates NPV at Beginning of Period:

$$NPV = \sum_{t=0}^n \frac{B_t}{(1+i)^t} - \sum_{t=0}^n \frac{C_t}{(1+i)^t}$$

where B represents benefits, C is costs, i is the discount rate, and t is project lifecycle in time periods (years).

Breakeven

For analysis purposes, breakeven is defined as the *breakeven terminal value*: the terminal value at which the NPV equals zero.

Payback period

Payback period and ROI are calculated, but are *not* relevant statistics in this exercise, since they are calculated on initial capital investment, anticipating a single program capital expenditure. In this business case, all cost calculations are based on lifecycle costs with amortization rules. In addition, payback seeks to determine the time in which the implemented system *earns back* the initial expenditure, which is not a substantial public interest.

ROI

Return on investment. ROI assumes a lump initial investment measured against discount rate, and—like payback period—is not relevant to ILRRP.

Appendix 7 Corporate Profile



The Lime Kiln Group, Inc. is a small strategic business consultancy based in Victoria, whose expertise lies in providing practical insights to assist client companies, agencies, and organizations in navigating to their desired destination. Named for nearby Lime Kiln lighthouse, we offer navigational guidance and positioning precision for technology and service-driven organizations, companies and institutions. We have built our practice on this navigational metaphor.

Our capabilities include significant diversity and depth of experience in business strategy for technology and government organizations, with a particular skillset in business planning and strategic consulting. We are also firmly grounded in geospatial science, with staff and Associates typically drawn from geography and related backgrounds. We provide business, market, and strategic planning; program and policy assessment; opportunity assessment; and operations implementation.

We have pioneered an approach to these organizational consulting services that views client organizations through the lens of the customers and stakeholders they serve, and rigorously applies simple marketing rules (identifying and linking ‘product’ with ‘customer’) to complex relationships and situations. We are driven by results.

Since our founding in 1995, we have carried this practical market-based approach into the intersection of technology, business practice, and government in Greater Victoria and BC in a number of contexts. In this domain, we have:

- supported the Ministry of Sustainable Resource Management in identification and assessment of partnership opportunities;
- supported and facilitated Business Process Review (BPR) discipline for the new Human Resources Organization project for PSERC;
- researched and developed the strategic plan for technology-sector development in Greater Victoria;
- developed and implemented Victoria: Open for Business, a pilot initiative supported by Industry Canada to attract investment;
- provided comprehensive formative assessments of applied research and technology investment programs managed by the Science Council of BC (SCBC) and BC Advanced Systems Institute (ASI) on behalf of Forest Renewal BC;
- supported many technology companies in their bid to enter the expansive US marketplace with their innovations (including database, softcopy photogrammetry and image transformation, public safety geomatics, forest resource GIS, Web-based tools, and GPS applications); and
- continue to assess and advocate policy issues in regional and technical concerns, from critical infrastructure to immigration barriers.

The Lime Kiln business model is simple and elegant. We are small, and therefore totally responsive and dedicated to the client. Our small staff is frequently augmented by a matrix of Associates—topical specialists—on a temporary or contract basis. This collaborative approach assures the client of receiving exactly the skills required, from subject-matter specialties to Web design to database to facilitation, without the overhead of in-house staffing.