



Coalbed Methane

A BC Local Government Guide

May, 2006

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By Karen Campbell and Susan Rutherford



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Our Sustaining the Land Program exists to provide legal support to communities and individuals dealing with the environmental impacts associated with resource extraction industries, and works to ensure that a strong regulatory regime is in place to protect the environment and the people who are affected by resource extraction.



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DISCLAIMER

This Guide is intended to provide information to local government representatives about the law relating to coalbed methane development. It is based on the law in place in British Columbia as of September 2005. Readers are reminded that this Guide is educational only and does not constitute legal advice. We recommend that local governments adopting bylaws to regulate coalbed methane or oil and gas development seek legal advice.

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EXECUTIVE SUMMARY

As conventional oil and gas resources are being depleted worldwide, coalbed methane is being touted as one means to fill the supply and demand gap for gas. The British Columbia government views coalbed methane as “an important new energy source that will diversify our energy supply and contribute to British Columbia’s economy through revenue and jobs.” However, because the economics of coalbed methane development are still uncertain, the Province is offering \$50,000 royalty credits for every well drilled before December 2008, and it is working to make its regulations more “coalbed methane friendly.” Industry has responded to the Province’s invitation: as of the fall of 2005, over 40 coalbed methane wells have been drilled in BC. These have been primarily in the northeast, but also in the south central interior, the Elk Valley, on Vancouver Island and near Iskut.

With commercial production on the horizon, this Guide endeavours to encourage responsible development of BC’s coalbed methane resources, and to ensure that mistakes that were made in the United States are not repeated here. Experience with coalbed methane development in the early years in the US was largely negative, bringing with it significant impacts on private lands and changing the face of many communities. This Guide explains some of the environmental and social risks associated with coalbed methane development, and then focuses on some of the tools available for local governments to plan for, avoid and mitigate the potential negative consequences.

We discuss regulatory tools that are set out in the *Local Government Act* and *Community Charter*, and apply these tools to the particular challenges presented by coalbed methane development. We describe and build upon the wisdom of a number of “best practices” projects initiated in the US. Finally, we conclude by encouraging BC local governments faced with coalbed methane development to:

1. Establish consultation protocols with the Oil and Gas Commission regarding coalbed methane development. Ask the BC government to pass a regulation to make it mandatory for local governments to be notified and consulted about coalbed methane applications in their community.
2. Review/revise Regional Growth Strategies and the local government’s Official Community Plan to establish clear objectives in relation to coalbed methane development. Appropriately designed development permit areas can ensure site specific noise mitigation, protection of viewscales, minimization of surface disturbances, and protection of aquifers, sensitive riparian areas and wildlife. Development approval information areas can ensure information is provided that will allow communities to assess and respond to anticipated impacts on the natural or human environment.
3. Review zoning and development bylaws. Issues to be considered include the need for bylaws restricting activities associated with coalbed methane development, guiding residential use away from areas that are or will be developed for coalbed methane, and identifying appropriate setbacks to avoid safety concerns. Bylaws can also stipulate provisions regarding location, siting and density of coalbed methane structures, setbacks from residences, noise sensitive users, streams and sensitive ecosystems, and may impose screening and landscaping requirements.

4. Protect water resources. As well as designation of sensitive riparian and wetland systems, or aquifer recharge areas as development permit areas, and setbacks between coalbed methane wells and water wells, local governments can use health related powers to restrict use of diesel based fracking fluids in proximity to water wells, and can regulate the dumping of produced water into streams where this might cause pollution or affect drinking water sources.
5. Avoid conflicts over noise. Local governments can reduce conflicts over noise from coalbed methane development by imposing zoning restrictions on noisy activities such as gas compressors in sensitive residential, commercial or institutional areas; using industrial form development permit areas to deal with siting; and establishing noise bylaws to place restrictions on noisy activities and noise levels. Local governments may wish to consider imposing variable standards that take into account sensitivities to noise in different areas.
6. Recover costs. Local governments should consider changes to building bylaws and development cost charge bylaws with a view to ensuring that coal bed methane developers assume their share of financial responsibility for any new capital costs for roads necessitated by coalbed methane development.
7. Consider road and traffic needs. Local governments should consider whether road bylaws need to be amended to place parking, load or route restrictions for truck traffic using local roads.
8. Review business regulation and licensing requirements. Municipalities might want to place restrictions on certain coalbed methane activities, such as regulating hours during which disturbing activities might be carried out, or limiting fracking fluids to non-toxic fluids. Licensing conditions may include a power to inspect or to impose penalties, or to demand financial security from non-resident businesses.

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Introduction

Oil and gas development in British Columbia is increasing. The number of wells being drilled in BC has doubled from over 600 in 2002 to almost 1300 in 2004. Increased development means that new wells will be drilled closer to homes and communities than in the past.

In the past twenty years, coalbed methane has gone from relative obscurity as an energy resource, to supplying almost 10 percent of the total US gas production. Coalbed methane's rise can be attributed to the depletion of "conventional" gas sources: as these have been depleted, industry has turned to "unconventional" sources such as coalbed methane, tight gas and oil sands, which require more work to extract but nonetheless fill the supply and demand gap. However, experience with coalbed methane development in the early years in the US was largely negative, bringing with it significant impacts on private lands, and changing the face of many communities that have had to deal with its development.

Coalbed methane exists wherever coal deposits are found. In BC, it is primarily found in the Peace country in the northeast and in the Elk Valley in the southeast. Other areas with coalbed methane potential include Vancouver Island, the south-central Interior (Hat Creek, Merritt, Princeton), northwest BC (Telkwa, Iskut), and the Queen Charlotte Islands.

To date, over 40 coalbed methane wells have been drilled in BC. These have been primarily in the northeast, and also in Princeton, the Elk Valley, on Vancouver Island and near Iskut. Commercial production is not yet underway, but we can look to Alberta to see how quickly this industry can grow. In 2000, Alberta had about 20 coalbed methane wells. In 2002, this number went up to 350, and by 2004, there were over 3,300 wells. Similarly, when coalbed methane development was initially proposed in Wyoming's Powder River Basin, the community was told that a maximum of 200 wells would be drilled. They now have 14,000 wells and this will increase to 51,000 within the next ten years.

Purpose and Outline of this Guide

One of the goals of this Guide is to encourage responsible development in BC, and to ensure that the mistakes that were made in the US are not repeated here. Many citizens and local governments want to ensure that communities have a say in how coalbed methane development proceeds. Potentially affected communities in BC are becoming increasingly concerned about how coalbed methane development will impact them, and several local governments that stand to be affected have been asking questions about what coalbed methane development will mean for their communities in the long term.

The purpose of this Guide is to provide information to local governments on coalbed methane development, and what it may mean for communities. We also outline the powers of local governments in BC to regulate coalbed methane development in order that local municipal councils and regional districts may take measures to ensure appropriate development. Even though legal jurisdiction over coalbed methane is primarily provincial, local governments do have many legal tools that they can use to regulate coalbed methane.

This Guide is divided into five parts:

- Part 1 provides background on coalbed methane environmental and community impacts.
- Part 2 discusses US local government experience with coalbed methane development, providing links to resources on best practices for local government management of coalbed methane development.
- Part 3 provides an overview of how the BC government regulates coalbed methane development.
- Part 4 is the main focus of the Guide and describes the powers of BC local governments to regulate coalbed methane development.
- Part 5 provides some recommendations for BC local government regulation of coalbed methane development impacts.

We conclude with a section on resources and sources of additional information.

What is Coalbed Methane and Its Environmental Impact

This section provides background on some of the key issues related to the impact of coalbed methane development on the environment and community. It begins with a brief overview of coalbed methane development and then discusses the various environmental and community issues that arise. Readers interested in a more detailed discussion of the phases of coalbed methane development and their environmental impacts should refer to West Coast Environmental Law's *Coalbed Methane: A Citizen's Guide* at <http://www.wcel.org/wcelpub/2003/14027.pdf>.

Coalbed methane production involves the extraction of methane – natural gas – from coal seams. The impacts of conventional oil and gas development on land, wildlife and communities can be extensive, and have been documented elsewhere.¹ Coalbed methane development is distinguishable from conventional gas extraction in three primary ways:

1. In order to access the methane gas, coal seams need to be dewatered. While the quantities of produced water will vary from basin to basin, it is possible that large quantities of brackish, saline water that may also contain heavy metals could be released for which disposal could be an issue. In some cases, this water can be appropriate for irrigation or other uses, though in many parts of the US, this water has no beneficial use, and communities have had serious problems disposing this produced water.
2. Coalbed methane wells generally require much denser spacing than conventional gas wells. In addition to the wells and well pads, other necessary infrastructure includes roads, compressor stations, gas flares, pipeline rights of way, which, when combined have the potential to dramatically alter the land.
3. Coalbed methane wells have a longer lifespan than conventional oil and gas wells, and can be in operation for up to 40 years, whereas conventional wells tend to be exhausted after 25 years.

The basic steps for coalbed methane development are as follows:

- Explore for coalbed methane prospects. A company will first want to identify where coalbed methane deposits may be found. This could include seismic testing, whereby land is cleared in order to drill a line of seismic holes in which to set off dynamite charges or use mobile machinery to set off vibrations to determine the location of coalbed methane gas underground.
- Obtain 'subsurface' rights to conduct more testing. Once a prospect is found, the company needs to acquire rights to the coalbed methane from the owner of the subsurface rights, usually the BC government. The Ministry of Energy, Mines and Petroleum Resources regularly auctions off mineral rights, including coalbed methane rights. Generally, when there is interest in an area, a company will request that the government include an area in monthly auctions of oil and gas rights.

1.1 Overview of Coalbed Methane Development

- Negotiate surface lease with landowner. The *Petroleum and Natural Gas Act* requires a company to obtain a landowner's consent and to provide adequate compensation before entering onto land.. If the landowner cannot negotiate a surface lease that is 'satisfactory' to the company, the company can apply to the Mediation and Arbitration Board for an 'entry order'.² The Board may also order the company to pay rent for the duration of its occupation or use of the land.
- Well development: evaluation, feasibility and production stages. Initially, a small number of wells will be drilled to determine whether a coalbed methane project is technically and economically viable. If test results are positive, a feasibility plan consisting of drilling 20 to 40 wells will be undertaken. If results are still positive, the company will enter the production phase and build 'tens to hundreds' more wells.³
- Dewatering, Fracturing the Coal Seam and Flaring. A company may need to dewater the coal seam in order to extract coalbed methane. Also, companies may need to fracture or "frac" the coal seam to allow methane or water to flow more easily to the well. Coalbed methane that comes up during the feasibility stage and during the dewatering at a later stage, is usually ignited or 'flared' because the company will only add pipelines once it is assured there is enough gas to make the project economically viable. Coalbed methane wells are likely to be flared for longer periods than conventional gas wells. The Oil and Gas Commission (OGC) must approve longer than normal flaring.
- Production. A successful coalbed methane well can produce a steady flow of coalbed methane for up to 40 years. The flow must be steady if the operation is to be commercially successful; if the well shuts down for any reason, water will collect at the well bore, and the company will have to 'de-water' it again.⁴
- Pipe to compressor station and on to market. Coalbed methane is piped to a central processing station (the size of a two-car garage) where the gas pressure is boosted. From there, it is piped ultimately into a high-pressure pipeline that carries it to energy markets. Pipelines and compression facilities are normally only developed during the production phase.
- Restore disturbed areas to natural state. Once a well is depleted, the company is expected to restore the area to 'close to its original state.'⁵ A company will typically use cement to permanently seal the flow of gas and water from the coal.

1.2 Environmental & Community Issues

There are a number of possible environmental and community impacts from coalbed methane development.

Concentrated Nature of Development

Coalbed methane projects can involve hundreds of wells, with each well requiring individual road access. Wells are spaced closer together than a typical natural gas project, which are generally set at one well to approximately every 259 hectares [640 acres]. Existing BC guidelines allow coalbed methane wells to be spaced “to any density” provided a “scheme approval” is in place.⁶ In the US, spacing has been as close as one well every 40 acres, although spacing of one per 80 acres or more is more typical.

Concentrated development can mean a profound impact on the land – changes to the landscape that will have long-term impacts on future use and enjoyment of the land, for communities and for nature. Wells are connected through roads, pipelines (for gas and water), compressors, and other equipment. As discussed below, local governments can minimize these impacts through appropriate zoning (see Section 4.2 – Zoning and Development Regulation) and development permit provisions (see Section 4.1.2 – Development Permit Powers).

As depicted by this test well site near Fernie BC, land disturbance extends significantly beyond the well pad.

PHOTO CREDIT: DAVID THOMAS



Coalbed Methane Produced Water

Drilling into a coal seam will not by itself cause the methane to flow. As discussed earlier, the methane gas is often held in the coal by water pressure, and a company must first decrease this pressure by “de-watering” or pumping out the groundwater. The amount of water generated in the production process will differ from basin to basin. In some parts of Alberta, very little water is being produced at all, presenting no disposal challenge. In parts of the US, pumping has been so extensive that in some cases, aquifers have been depleted, forcing local residents to drill deeper for water.

This “produced” water can vary in quality from being relatively pure to being highly polluting. It is often saline, and may contain heavy metals that can have long-term effects on aquatic ecosystems, depending on disposal practices. In the US, courts have determined the coalbed methane produced water is a “pollutant” under the US *Clean Water Act*.⁷ Surface disposal has already changed the composition and structure of soils and

Coalbed methane wells in Colorado can be spaced extremely close together. Infrastructure also includes roads, pipelines and compressor stations.

PHOTO CREDIT: ???



vegetation on many lands in the US.

In BC, produced water disposal is regulated through the *Environmental Management Act's* Code of Practice for the Discharge of Produced Water from Coalbed Gas Operations. Prior to the Code being finalized, West Coast Environmental Law released a set of recommendations to ensure minimum environmental protection for discharged water, very few of which were met in

the final Code.⁸ This Code of Practice establishes a one-size-fits-all standard for companies to meet and does not require site specific permits. Alberta however, has expressly recognized the potential for serious environmental problems from produced water disposal, and rejected this approach in favour of a site specific permitting process.

Deep well reinjection is the industry standard for best practice, but it is also the most costly to implement. The Code of Practice envisions surface disposal into streams and rivers, which, if no site specific studies are undertaken, could be inadequate to protect aquatic ecosystems.

One way to ensure that risks to watercourses are minimized is for baseline studies to be conducted. A report on potential issues in the Flathead and Elk River Basins prepared by Summit Environmental Consultants for the BC Ministry of Energy and Mines indicated that there is very little data available about water quality for streams that could be considered for produced water discharge, and that baseline water quality monitoring should be conducted for 3 years in advance of development.⁹

Coalbed methane produced water treatment pit near Fernie. Note iron oxide residue on the plastic liner.

PHOTO CREDIT: DAVID THOMAS



Potential bases for local government regulation of produced water include public health protection (see Section 4.3.3.1 – Public Health & Drinking Water), prohibition of pollution of waterways (see Section 4.3.3.2 – Environment: Pollution and Obstruction of Waterways) and municipal service bylaws (see Section 4.3.3.5 – Municipal Services).

Use of Toxics to Fracture Coal Seams

To allow water or coalbed methane to flow more easily, companies will usually inject a high-pressure compound of sand and chemicals into the well to fracture or ‘frac’ the coal seam. Fracing compounds can contain diesel fuel and other hydrocarbons.¹⁰ There is concern that the use of these fluids can travel along the cracks created by the fracing process and may contaminate groundwater and drinking water sources. Remediation of groundwater can be very difficult, if not impossible to undertake, and is extremely expensive. Given these difficulties, the use of water based fracturing fluids is preferred to oil based or toxic fracturing fluids.

Potential bases for local government regulation of fracing fluids include protection of public health (see Section 4.3.3.1 – Public Health & Drinking Water) and municipal service bylaws (see Section 4.3.3.5 – Municipal Services).

Air Quality Issues

Coalbed methane gas that comes up to the surface during de-watering is usually ignited or “flared.” Flaring may also be necessary during work to maintain or improve production levels. Flaring fossil fuels releases a large number of chemicals into the air, many of which are carcinogenic, and have been known to impact human health. While coalbed methane has fewer impurities than gas produced in conventional oil and gas wells, it remains a fossil fuel and coalbed methane operations will add to BC’s greenhouse gas emissions and contribute to climate change, through both its production and its combustion.

Noise and Nuisance

Traffic, drilling, noise and dust are continuous in some communities affected by coalbed methane development in the US. Each new well brings drilling rigs, generators, earth-moving machines, and trucks. The noise from gas compressors and pumping stations can exceed 50 decibels, from a distance of 300 feet, roughly the equivalent of being in same room as a washing machine. This noise continues 24 hours a day.

Local governments can minimize conflicts from noise through appropriate zoning (see Section 4.2 – Zoning and Development Regulation) bylaws, development permit provisions (see Section 4.1.2 – Development Permit Powers), and noise bylaws (see Section 4.3.3.6 – Noise & Nuisances).

Loss of Farmland

Direct loss of agricultural land and livestock may result from coalbed methane wells and related infrastructure. The use of farmland for coalbed methane development requires approval of the Agricultural Land Commission; note that in many respects, this power has been delegated to the Oil and Gas Commission.¹¹

Loss of agricultural land can be minimized through appropriate zoning (see Section 4.2 – Zoning and Development Regulation) bylaws and development permit provisions (see Section 4.1.2 – Development Permit Powers).

Potential Harm to Wildlife

Wildlife may be affected in a number of ways:

- new roads and pipelines will fragment wilderness and reduce large contiguous tracts of wilderness needed by some large species;
- predator-prey relationships can be altered as a result of fragmentation (wolves, for example, are able to move faster along roads than in the forest, increasing predation pressures on caribou);
- higher reproductive failure rates have been identified in bird habitats near linear disturbances; and
- poaching and hunting often increase when roads open up previously inaccessible areas.

Harm to wildlife can be minimized through appropriate zoning bylaws (see Section 4.2 – Zoning and Development Regulation) and development permit provisions (see Section 4.1.2 – Development Permit Powers).

Risk of Methane Migration into Water Supplies and Soils

The US Geological Survey reports that in some areas, methane migration may have contaminated groundwater sources. It has also been known to travel to ponds, cattle troughs, and people's basements.

The potential impact of methane migration can be minimized through appropriate zoning bylaws (see Section 4.2 – Zoning and Development Regulation) and development permit provisions (see Section 4.1.2 – Development Permit Powers).

Lessons for Local Government from the United States

It is not clear how much or which parts of the US experience will translate to BC, given differences in geology and geography. No two coalfields are alike. The common experience in the US, however, has not been positive. British Columbians have an opportunity to ensure that the US experience is not repeated here.

The following two resources provide excellent background on best practices recommended by local governments in the US for coalbed methane regulation and development.

2.1 Colorado

In October 2002, La Plata County, Colorado, commissioned a study in response to a proposal to double the number of coalbed methane and conventional wells in the county. The purpose of the La Plata County Impact Report was to identify and evaluate possible amendments to the local land use laws that would minimize conflicts between residential land use and gas development activities.¹²

Some of the study's conclusions regarding the socio-economic impacts of increased coalbed methane development underlined that while industry and local government revenues may get a boost from coalbed methane,¹³ the same does not hold true for local residents, since the industry brings few jobs,¹⁴ and development has a negative impact on property values.¹⁵

This pond on a Wyoming ranch is now contaminated with methane gas from nearby coalbed methane wells.



2.2 Western Governors' Association Best Practices Handbook

The La Plata study identified a number of issues and options for mitigating them. Many of these options will be of interest to local governments in BC. The mitigation options identified include:

- Land use planning to minimize impacts. Land use planning, zoning amendments, performance standards and use of development permits, to minimize impacts and land use conflicts;
- Tax assessment mechanisms to address property value concerns. Disclosure of mineral ownership and proposed development on land transfers; or tax assessment strategies, to deal with impacts to property values;
- Resources and means to maintain additional road infrastructure. Diversion of tax revenue or extra fees for road construction and maintenance; or alternatively, agreements with operators to construct and maintain roads affected by coalbed methane operations, or development of other performance standards, to deal with traffic and road infrastructure impacts;
- Siting requirements for infrastructure. Siting requirements and requirements for specific post-construction and operation measures for equipment and infrastructure (painting, landscaping), to deal with visual impacts of meter houses, pump jacks, condensate tanks, on-site storage tanks and produced water pits on the landscape;
- Mechanisms to address noise. Setbacks and use of berms and other obstacles to block noise; and
- Mechanisms to address health and safety. The use of setbacks and performance based zoning, and avoidance of locating well sites in unventilated deep or narrow spaces where combustible gases might accumulate, to address health and safety concerns related to methane seepage and accidental release of combustible gases.

In 2004, the Western Governors' Association released Coalbed Methane Best Management Practices: A Handbook.¹⁶ This Handbook was developed collaboratively with a broad group of stakeholders, and contains information and recommendations on best management practices for the full range of coalbed methane development impacts. It includes sections on Planning, Water, Landowner and Operator Relations and Infrastructure, and addresses the following specific issues:

- Preparation of development plans
- Water management planning, water quality issues and consideration of the beneficial use of coalbed methane water
- Protection of wetland/riparian areas
- Communication and notification of surface owners
- Plans, agreements and bonds
- Dispute resolution planning
- Roads and transportation, pipelines and power lines
- Habitat and species protection
- Wells, central gas gathering treatment, compression and metering facilities

- Pests and noxious weeds
- Visual impacts, noise abatement and air quality issues
- Public safety around coalbed methane infrastructure

Innovative ways to address the environmental and health issues associated with coalbed methane development do exist. Section 4 of this Guide draws on recommendations from both the La Plata study and the Western Governors Handbook to suggest how these recommendations might be implemented in BC. The key for local governments is to learn and anticipate what will be involved with coalbed methane, and to develop the regulatory tools and framework to manage and mitigate the impacts.

3

Provincial Regulation of Coalbed Methane

Legal and regulatory direction for oil, gas and coalbed methane development is established by the Ministry of Energy, Mines and Petroleum Resources, including royalties, tenures and operational matters. The Oil and Gas Commission (OGC) implements the legal and regulatory directions set by the Ministry, directly regulating the industry through a system of approvals and authorizations. Located in Fort St. John, the OGC was created in 1998 to provide the oil and gas industry with a “single window” approach to regulation (i.e., having the industry regulated by a single agency rather than multiple ministries).

The OGC deals with virtually every part of the lifecycle of an oil or gas development after a company purchases the mineral rights. This includes: road construction and timing of road use; well site design, use and remediation; storage, use and clean-up of potentially harmful substances like drilling muds and fracturing (fracking) liquids, which are often used to break up underground formations to increase gas flow; compressor and pipeline siting, use and maintenance; and site remediation and clean up.

BOX A: Coalbed Methane and Environmental Assessment

Coalbed methane projects are not subject to the BC *Environmental Assessment Act*, which is designed to assess the impacts of projects and identify means to avoid or reduce impacts before irreversible decisions are made. West Coast Environmental Law has urged the BC government to designate coalbed methane developments as reviewable projects under the Act. We encourage local governments to do the same, to ensure that these projects receive the scrutiny they deserve.

3.1 Regulatory Reform Proposals

Recent policy changes, and the Oil and Gas Regulatory Improvement Initiative anticipate even further streamlining of oil and gas regulation, further diminishing the role played by other agencies such as the Ministry of Environment.

The Oil and Gas Regulatory Improvement Initiative proposes a set of regulatory changes that will further entrench results based approaches, further streamlines regulatory approvals within the OGC, and allows for single activity approvals for multiple activities (instead of on a well by well basis).

The general policy direction of this initiative is of concern to West Coast Environmental Law. Some of these concerns include:

- Results-based approaches are not precautionary and will not guarantee against irreparable harm. These approaches are not recommended for activities that can cause serious harm, such as situations where the threat of groundwater contamination exists, or where sour gas (hydrogen sulphide) leaks are a possibility. One of the issues with results-based approaches is that problems may not come to light until there has been a failure in the system, and harm has already occurred to the environment or human health.
- Single window streamlining within the OGC will further reduce the oversight role of other ministries, such as the Ministry of the Environment.
- Allowing single approvals for multiple activities will further diminish the opportunities for accountability and individual oversight of oil and gas activities.

On this final item, it is noteworthy that multi-agency oil and gas compliance reviews conducted by the BC government have revealed persistent problems with compliance. While some problems are being addressed, overall non-compliance remains a challenge.¹⁷ This is of particular concern given that the number of wells drilled in BC is dramatically increasing.

As the government considers possible reforms under the Oil and Gas Regulatory Improvement Initiative process, local governments may wish to consider asking for regulatory requirements that would make it mandatory for local governments to be consulted whenever applications for oil and gas development, including coalbed methane development, are made within local government boundaries.

BOX B: UBCM and the Oil and Gas Regulatory Improvement Initiative

In 2004, the Union of BC Municipalities passed a resolution calling upon the provincial government to consult directly with local governments regarding the Ministry of Energy and Mines' Oil and Gas Regulatory Improvement Initiative, a process that is expected to significantly overhaul BC's oil and gas regulatory regime, including coalbed methane.

Local Government Regulation of Coalbed Methane Development

While the Province is the primary regulator for coalbed methane, local governments also possess the authority to regulate for the general welfare of the local community on a range of topics that are relevant to coalbed methane development. This Section discusses the potential of local governments to regulate coalbed methane surface activities, infrastructure and impacts in a local community, using a variety of powers under the *Local Government Act* and the *Community Charter*. Some of the powers include strategic planning for growth and development, zoning powers to regulate use and density, and powers to pass bylaws related to environment, disturbances and economic development.

4.1 Shaping Growth: Regional Growth Strategies, Official Community Plans and Key Powers for Planning Development

Regional Growth Strategies and Official Community Plans are the highest level strategic planning tools that local governments have to shape the growth of their communities. Regional Growth Strategies are policy statements developed at the regional level to guide decisions on growth, change and development within the regional district. Their explicit legislative purpose is to "...promot[e]... human settlement that is socially, economically and environmentally healthy and that makes efficient use of public facilities and services, land and other resources;"¹⁸ the Act provides criteria and direction on both required and discretionary content.¹⁹ Regional Growth Strategies are adopted at the regional district level, but must be accepted by any affected local governments before they can be adopted by the regional district.

Official Community Plans²⁰ lie at the core of a local government's ability to regulate development. Official Community Plans include statements of objectives and policies relating to matters such as social development, maintenance of farming land and protection of the environment, and map designations indicating future land uses. If a regional growth strategy applies to all or part of the same area of a municipality as an official community plan, the official community plan must include a regional context statement that is accepted by the board of the relevant regional district. The context statement identifies the relationship between the regional growth strategy and the official community plan, and further identifies how the official community plan will be made consistent with the regional growth strategy. The regional context statement and the rest of the official community plan must be consistent.

Official Community Plans do not directly regulate land use. Official Community Plans operate by controlling the actions of local government through a requirement that all new bylaws and works undertaken by the local government must be consistent with the Official Community Plan,²¹ though this control can be circumvented, since local governments can (and sometimes do) amend Official Community Plans to allow re-zonings. Official Community Plans also create the basis for a number of other important tools available to local governments: development permit areas, development approval information areas, and policies for temporary use permits.

Using Official Community Plans in the Context of Coalbed Methane

Besides establishing the basis for various tools such as development permit areas, Official Community Plans can play an important role, by establishing general policies in relation to environmental protection, as well as social and economic development. Policies could include statements regarding the objectives of the local government in relation to coalbed methane development, e.g. protection of views, ecological resources, groundwater quality and quantity, minimization of surface impact.

Development Permit Powers

Official Community Plans can also establish development permit areas for purposes including:

- (a) protection of the natural environment, its ecosystems and biological diversity;
- (b) protection of development from hazardous conditions; and
- (c) establishment of objectives for the form and character of industrial development.²²

Development permits are not intended to regulate land use or density, and development permits cannot vary allowable uses or density. For any development permit area created by the Official Community Plan, the local government must describe the objectives or special conditions that justify the development permit area designation, and specify guidelines that indicate the manner by which the special conditions or objectives will be addressed. Guidelines may effectively rule out a particular use.²³

Once the Official Community Plan creates a development permit area, a development permit is required prior to construction or alteration of buildings or other structures, unless the Official Community Plan specifically exempts a particular type of construction or alteration. For development permit areas created under paragraphs (a) or (b), a development permit is also required prior to altering the land. Development permits are binding on both local governments and developers, and the land subject to the permit must be developed “strictly in accordance” with the development permit.²⁴

The actual contents of the development permit will depend on the purpose for which the development permit is created and the guidelines in the Official Community Plan. So long as the conditions relate to the objectives and guidelines in the development permit area, all development permits can vary zoning requirements such as setbacks, siting, screening, landscaping and structure location. Table 1 at the end of this Guide gives examples of how development permits might be used to address coalbed methane-related activities and infrastructure.

Local governments may also wish to consider whether to require companies to post security as a condition of a development permit, to guarantee the performance of the terms of the development permit.²⁵

Development Approval Information Areas or Circumstances

Another useful power is the designation in an Official Community Plan of development approval information areas or circumstances.²⁶ These involve the specification of areas or circumstances for which environmental or social impact assessment information may be required in connection with development permit and rezoning applications. Development approval information areas and circumstances can be used to ensure that local

4.2 Zoning and Development Regulation

governments have the necessary information to make appropriate decisions in relation to rezonings, development permits or temporary use permits. Development approval information can include any information on the anticipated impact of a development on the community and its environment, including crucial issues such as:

- Requirements to provide information that will allow precise setting of setbacks, etc.
- Proposals for the disposal of produced water.
- Details of the proposed development and options to mitigate impacts through techniques such as alternate locations of wells, directional drilling, sharing of well pads, etc.
- Proposals for the mitigation of noise, and certified professional engineers' estimates of resulting noise levels.
- Estimates of the impacts on wetlands, riparian areas or streams. Proposals for mitigation of impacts on wetlands or riparian areas.
- Information on socio-economic impacts, including impacts on public facilities, demands on infrastructure and utility services, traffic generation and patterns, public safety, and local work force services and demands.²⁷

Temporary Use Permits

Coalbed methane development in BC is at the exploratory stage, thus a local government's power to issue temporary use permits may be important.²⁸ Local governments may identify in Official Community Plans where temporary industrial uses may be allowed, and set conditions for the issuance of permits. If a company does not follow the general conditions of a temporary use permit, it may be denied the permit. Conditions can include requirements that industrial users provide security for performance of permit terms, and restore lands after temporary use is completed. Temporary use permits expire after two years.

The *Local Government Act* provides local governments (both municipalities and regional districts) with a range of powers to pass bylaws that regulate how land is used and developed. Zoning bylaws can regulate:

- **Land use.** Local governments can regulate allowable land uses within different zones;
- **Density.** Local government can regulate the density of a use of land, and the density of buildings and other structures within different zones;
- **Siting, size and dimensions of buildings and structures and uses that are permitted on the land;** and
- **The location of permitted uses.**²⁹

The requirements of zoning bylaws can vary based on the zone, the use, the location within a zone, and different siting circumstances.

Development bylaws can regulate the following topics which may be relevant to coalbed methane development:

- **Screening and landscaping.**³⁰ Screening or landscaping may be required for purposes of separating different uses, or restoring, enhancing or protecting

the natural environment or preventing hazardous conditions. Standards for landscaping and screening can vary by zone, uses within a zone, and location with a zone (e.g., more rigorous screening in the context of coalbed methane in a residential zone, or within 300 ft of a property line); and

- **Run-off control.**³¹ Where development involves construction of paved areas or roofs, requirements can be imposed for disposal of surface run-off, and limits can be placed on total impermeable surfaces. These standards can vary by use, zone and terrain or groundwater conditions.

Limits on the Zoning Power

The zoning power is limited in relation to coalbed methane development. “Land” in the *Community Charter* and *Local Government Act* is defined as excluding mines or minerals, and recently the term “minerals” has been defined to specifically include coalbed methane.³² It is therefore our view that the local government power to regulate land use does not extend so far as to allow zoning bylaws that prohibit extraction of coalbed methane.

While local governments cannot prohibit coalbed methane extraction, they can regulate associated land uses as well as other important issues such as set backs, density of structures, location of structures, and landscaping. Courts have upheld zoning bylaws that stopped a mine from storing and processing minerals,³³ and gravel pit operators from crushing gravel,³⁴ or from mixing gravel to produce ready mix.³⁵ They have even held that processing which was essential to the economic viability of a mine could be prohibited.³⁶

BOX C: Regulation in Alaska

Last year, the borough of Matanuska-Susitna broke new ground by becoming the first local government in Alaska to regulate shallow gas development. In March 2004, the borough passed a local ordinance that restricts the density of coalbed methane wells to roughly two wells per square mile, or no more than one well per 360 acres (146 hectares).

Practically speaking, the ordinance essentially bans drilling in the densest residential areas outside communities. The ordinance also establishes a minimum setback requirement of one quarter-mile between wells and homes, property lines, schools, churches and hospitals.³⁷

In passing the ordinance, borough officials were motivated by a desire to protect landowner health and safety, and to guard the right of residents to peacefully enjoy their property.³⁸ New legislation at the state level explicitly grants the state government the right to overrule local ordinances, on grounds of “overriding state interest”. Initial reactions of state officials indicated that they do not intend to exercise their power in respect of the new ordinance.³⁹

All of this suggests that local governments can regulate surface uses and structures associated with coalbed methane development, including processing, pumping etc. Indeed, the Peace River Regional District has used its zoning power to restrict a number of above ground oil and gas pumping stations, compressors and dehydrators in residential commercial and institutional zones (see Box D).

BOX D: Peace River Zoning Restrictions on Oil and Gas

Peace River Regional District's zoning bylaw places restrictions on a number of activities associated with oil and gas development.

Oil and gas facilities – including batteries, pumping stations, compressor stations, dehydrators, water disposal facilities, and waste processing – are not permitted in residential, commercial or institutional zones.

In agricultural zones, the bylaw prohibits:

- battery sites and compressor stations that cover an aggregate building and/or structure floor area of greater than 450 square metres;
- oil field waste management facilities that require a permit under the *Waste Management Act* [repealed and replaced with the *Environmental Management Act*] or which cover an aggregate building and/or structure floor area of greater than 450 square metres; and
- land treatment facilities (land on which soil or other facilities is contaminated with petroleum products and hydrocarbons are decomposed by being composted) must not exceed 2 hectares (5 acres) in size.

Local governments also have a continuing power to regulate the density and siting of structures. Regulations on density of structures can vary according to use, suggesting that local governments could regulate density of coalbed methane structures such as well pads. However, it is questionable whether local governments can impose density standards that would make coalbed methane extraction technically impossible or which would make compliance with provincial spacing requirements impossible. Overly stringent restrictions on density of essential coalbed methane structures such as well pads might be interpreted as an indirect attempt to prohibit extraction running afoul of the principle that local governments cannot do indirectly what they cannot do directly.⁴⁰

Also, if restrictions on surface uses and structures are overly restrictive there is a possibility that they may conflict with provincial regulations that require drilling in a manner that makes effective use of the resource. For instance, a density restriction on above ground structures that made it impossible for developers to access coalbed methane deposits using directional drilling might be inoperable to the extent of the conflict.

Using the Zoning Power in Relation to Coalbed Methane

Thus, coalbed methane related measures that local governments might adopt using their zoning power include:

- Prohibitions against using land for coalbed methane processing and transportation purposes, so long as these purposes are not an essential part of coalbed methane extraction.
- Restoration of well sites within a reasonable time frame.
- Restrictions on the density of associated uses such as roads and transportation right-of-ways.
- Restrictions on the density of above ground uses, buildings and structures, e.g., well pads, battery sites and compressor stations. Such restrictions are

likely to be challenged if they are technically impossible to comply with, but might be used to encourage use of techniques such as directional drilling, multiple wells from the same pad, use of existing wells, appropriate road design.

- Set backs of compressors and pumps from noise sensitive uses (e.g., residences, agricultural areas).
- Requirements to landscape or screen coalbed methane equipment and structures both to protect views and to protect neighbours from noise.
- Restrictions on location of coalbed methane infrastructure in residential or commercial zones.
- Restrictions on the size of coalbed methane buildings and structures in agricultural areas, or on the size of land treatment facilities.
- Identification of methane seepage areas, with associated restriction on residential use or coalbed methane and residential siting to ensure safety and avoid water well contamination.⁴¹
- Use of “comprehensive development zones” to create site-specific zoning for coalbed methane operations.⁴²

While these powers exist, note the Province’s authority to by order override bylaws, zoning and land use contracts respecting environmental management/disposal issues, discussed in section 4.5 below.

BOX E: Development Approval Information as a Tool to Regulate

By using the development approval information power, local governments could require coalbed methane developers to provide an assessment of the impacts of their activities on the local area. This could be particularly helpful given that environmental assessments are not being required or undertaken in advance of coalbed methane exploration or production.

4.3 Other Regulatory Powers for Municipalities and Regional Districts

Beyond the broad powers to regulate land use and development under the *Local Government Act*, both municipalities and regional districts have authority to govern in the community's interest on other issues relevant to coalbed methane development. These powers are distinct from land use powers; indeed, a municipality cannot use *Community Charter* powers to do anything that a council is specifically authorized to do under the planning and land use management provisions of the *Local Government Act*.⁴³

Municipal Powers versus Regional District Powers

While there is little distinction between the powers of regional districts and municipalities to regulate land use and development, the same is not true of other regulatory powers. The powers of local governments to regulate pollution, buildings, business, the environment, soil deposit and various other subjects is different for regional districts and municipalities.

The *Community Charter*, the 2003 codification of municipalities' regulatory powers, generally only applies to municipalities. However, in many cases, the *Local Government Act* gives regional districts parallel powers, sometimes making provisions of the *Community Charter* applicable to regional districts. Also, the province can grant individual regional districts regulatory powers beyond those given to all districts by the *Local Government Act*.⁴⁴

Sometimes Provincial Approval is Required: Concurrent Powers

The *Charter* creates two classes of municipal regulatory powers. In some areas – such as regulation of business and regulation of nuisances – municipalities can pass regulations without any special provincial approval beyond the terms of the *Community Charter*.

In other areas, known as “spheres of concurrent authority”, municipalities have the power to regulate, but can only adopt bylaws if they are consistent with *Community Charter* regulations, consistent with agreements between the Minister of Community Services and the municipality, or are approved by the Minister.⁴⁵ The discussion below focuses on powers that either are not concurrent, or are concurrent but can be exercised pursuant to *Community Charter* regulations without any special provincial approval or agreement.

Powers to Regulate in the Public Interest

Public Health & Drinking Water

Coalbed methane development (especially the use of toxic fracturing fluids and the disposal of produced water) may create concerns regarding contamination of drinking water. Risks may be reduced by prohibiting the use of diesel based fracturing fluids in formations that contain present or future underground sources of drinking water. Similarly, requiring sufficient distances between coalbed methane wells and water wells might help to avoid contamination or methane seepage.⁴⁶ Strategies for dealing with produced water also need to be developed to avoid impacts on drinking water aquifers and surface sources. Such strategies need to be tailored to local conditions, considering the attributes of the produced water, the capacity of the receiving aquifers to handle the produced water, local hydrology, local fisheries and water uses.

Community Charter regulations allow both levels of local government to pass bylaws for the protection and promotion “of the health of individuals”, or the maintenance of sanitary conditions in the municipality,⁴⁷ which suggests that bylaws might be passed to implement such preventative measures. We interpret the power to protect health of

individuals as being similar in scope to a power to regulate to protect public health.⁴⁸ Ministerial approval is not needed for these bylaws; however, public health bylaws can only be adopted if a copy is deposited with the Minister, and the council or regional board first consults with the local regional health board or the medical health officer. Regional districts and municipalities may also use zoning bylaws (see Section 4.2 – Zoning and Development Regulation), development permits (see Section 4.1.2 – Development Permit Powers) and environmental protection powers (see Section 4.3.3 – Powers to Regulate in the Public Interest)⁴⁹ to address risks associated with produced water disposal.

While these powers exist, note the Province's authority to by order override bylaws respecting environmental management/disposal issues, discussed in Section 4.5 below.

Environment: Pollution and Obstruction of Waterways

The US experience has also given rise to concerns over impacts on water ways. Best practices to avoid these impacts include:

- Development of strategies for dealing with produced water that consider the attributes of produced water, the capacity of the receiving aquifers to handle the produced water, local hydrology, local fisheries and water uses.
- Locating drilling mud pits and waste material outside of riparian areas, wetlands, floodplains, and natural drainage areas.
- Scheduling construction near streams and wetlands during dry times, avoiding spawning times or during times when the ground is frozen.

Local governments have bylaw making powers that may address these issues. Municipalities have a concurrent power to regulate, prohibit and impose requirements in relation to protection of the natural environment,⁵⁰ and regulations specifically allow municipalities to, without any special ministerial approval, prohibit or regulate polluting, obstructing or impeding the flow of waterways.⁵¹ Regional districts have a similar power.⁵²

This treated coalbed methane produced water entered a tributary of the Elk River. Bioassays conducted with rainbow trout fry frequently showed this water to be lethal to fish.

PHOTO CREDIT: DAVID THOMAS



Local governments also have powers to protect waterways using zoning bylaws (see Section 4.2 – Zoning and Development Regulation), development permits (see Section 4.1.2 – Development Permit Powers) and public health bylaws that protect drinking water sources (see Section 4.3.3.1 – Public Health & Drinking Water). Local government powers to regulate deposit of contaminated soil will also be relevant in relation to deposits of drilling muds (see below).

While these powers exist, note the Province’s authority to by order override bylaws respecting environmental management/disposal issues, discussed in Section 4.5 below.

Environment: Spread of Weeds

Soil disturbances and changes to soil characteristics can lead to problems with invasive weeds. In coalbed methane development, best management practices for avoiding the spread of invasive weeds include: requirements to reclaim the condition of surface lands after holding ponds have been drained; requirements for prompt re-vegetation of moist soils affected by construction; and requirements that mulch used in reclamation be certified weed free.⁵³

Current regulations allow municipalities to, without any special ministerial approval, pass bylaws to prohibit, regulate or impose requirements for the purposes of controlling or eradicating alien invasive species.⁵⁴

Regulation of Contaminated Soil Deposit and Soil Removal

Local governments may wish to impose restrictions on soil removal, or the disposal of drilling muds or other contaminated soils. Both regional districts and municipalities have powers to regulate deposit of soil, although provincial approval is required if bylaws prohibit the deposit of soil or other material making reference to the contamination or quality of soil.⁵⁵ Minor controls, limits or restrictions on the deposit of drilling muds in sensitive areas should not require provincial approval. Local governments can also regulate soil removal, but prohibitions on soil removal (e.g., gravel pits) will require provincial approval.

While these powers exist, note the Province’s authority to by order override bylaws respecting environmental management/disposal issues, discussed in Section 4.5 below.

Municipal Services

Municipal councils may regulate, prohibit and impose requirements in relation to municipal services.⁵⁶ This becomes relevant to coalbed methane development if such development affects a municipal service: for example, the disposal of coalbed methane produced water, which may be saline or contain heavy metals, could have an impact on the quality of water used in a municipal water utility (depending on local water conditions). Similarly, the extraction of large quantities of groundwater may have an impact on groundwater levels, which could affect the municipal supply. A municipality may therefore want to pass bylaws that protect municipal water services from disposal and extraction activities.

Noise & Nuisances

Well site drilling and operation may cause disturbances, particularly if conducted close to homes and communities. For example, noise may be generated by gas compressors, motors that power pumps, drilling rigs, seismic explosions, heavy equipment and/or truck traffic, potentially negatively impacting on local quality of life.

Both regional districts and municipalities have powers to regulate, prohibit and impose requirements in relation to nuisances, disturbances and other objectionable situations,⁵⁷ This includes the power to set maximum decibel levels or to prohibit activities that disturb the peace and quiet of neighbours. Noise bylaws are most likely to be upheld if they are relatively precise prohibitions.⁵⁸

Local governments can also pass bylaws outlawing activities that are nuisances, but only if the prohibited activity constitutes a legal nuisance. At law, nuisances are unreasonable interferences with the use and enjoyment of land by its occupier or with the use and enjoyment of a public right to use and enjoy public rights.⁵⁹

Municipal councils are authorized to declare that certain things, including a building or other structure, a ditch, pond or watercourse, are nuisances, and can require the landowner or occupier to remedy the nuisance.⁶⁰ It is possible, for instance, that in appropriate circumstances, municipalities might be able declare a sump pit⁶¹ to be a nuisance and order waste to be shipped off-site.

Compressor stations in Wyoming's Powder River Basin hum around the clock.



This open and unlined "sump" pit located in northeast BC is used to store waste drilling muds which may contain toxins that pose a hazard to wildlife, livestock and human health.⁶² Municipalities should consider passing bylaws to prohibit, control or regulate access to any sump pits associated with coalbed methane development.



Roads and Traffic

Increased traffic on roads within communities resulting from drilling and servicing of wells and other infrastructure is another potential impact of coalbed methane development. Municipalities can pass bylaws regulating development of new roads, as well as traffic and parking uses on roads that are not provincial arteries.⁶³ Regulations may establish load limits and truck routes.

The La Plata Study, discussed at Section 2.1, refers to the importance of diverting tax revenue or extra fees for road construction or maintenance. Unfortunately, local government powers are limited in this regard. Although municipalities generally own secondary roads within their boundaries,⁶⁴ their power to impose fees for use of municipal property or for municipal services does not extend to imposing a highway toll.⁶⁵ Thus, it is questionable whether they can charge fees in relation to coalbed methane developments that increase the costs of maintaining local government roads.

Municipalities may impose development cost charges to cover capital costs of any new roads, road expansions or road upgrades necessitated by new developments. This can include contributions to future capital expenses made necessary by the combination of coalbed methane development and other anticipated development. However, development cost charges can only be charged on building permits, and only if the development allowed by the permit is worth more than \$50,000. Development cost charges can vary by use, allowing municipalities to designate higher fees for uses that impose greater demands on roads.

Business Regulation and Licensing

The *Community Charter* allows municipal councils to “regulate in relation to business” and impose licensing systems for business.⁶⁶ Both these powers may be used in relation to coalbed methane operations. Regional districts do not have business regulation and licensing powers, unless specifically granted as an additional power by the province.⁶⁷

The *Community Charter* distinguishes between powers to regulate (e.g., limiting or restricting the way an activity is carried out), the power to prohibit (e.g., prohibiting coalbed methane or some related activity such as fracturing of coal seams) and the imposition of requirements (e.g., imposing a positive requirement to do something, e.g., payment of security).⁶⁸ Municipal powers in relation to business are limited to a power to regulate.

The business regulation power is thus fairly limited, but might be used, for instance, to put restrictions on a particular activity, e.g., regulating hours in which disturbing activities could be carried out or limiting fracking fluid use to non-toxic fracking fluids. It can't be used to impose requirements such as payment of bonds or acquisition of liability insurance – issues that were raised by the Western Governors' Association.

The *Charter* also allows municipalities to adopt business licensing schemes and use licenses to establish terms and conditions for operating businesses. Relevant terms and conditions of interest might be to restrict hours of operation, provide for inspection and penalties, and to require security from non-residents.

4.4 Conflicts between Provincial Law and Local Government Bylaws

4.5 Provincial Power of Oversight

A combination of recent court cases and statutory amendments indicate that local governments may use their powers to regulate operations such as mines and coalbed methane development, so long as compliance with a local bylaw does not mean defying provincial laws. For instance, a 2003 BC Court of Appeal case ruled that zoning bylaws applied to provincially regulated mine processing and storage facilities.⁶⁹ Courts will not imply a conflict between local and provincial or federal laws simply because a local government imposes more stringent standards than the province or federal government.⁷⁰ In relation to municipalities, this approach is codified in section 10 of the *Community Charter*, but given the case law, it applies equally to regional districts.

Nonetheless, there are a number of limits of which local governments need to be aware when regulating coalbed methane operations. In particular:

- **Restrictions on the use or development of land do not bind government.**⁷¹ Generally, this will have limited impact on local governments' powers regarding coalbed methane as local governments can still regulate holders of leases from the government⁷² – i.e., coalbed methane producers.
- **Some powers require provincial approval.** Zoning bylaws and Official Community Plans passed by regional districts will often require ministerial approval,⁷³ and bylaws in areas of concurrent provincial authority require either general or explicit authorization or approval (see Section 4.3.2 – Sometimes Provincial Approval is Required: Concurrent Powers).
- **Potential for government override.** The Minister of Community Services has a power to require changes to local government land use bylaws, and the provincial Cabinet can also override all local bylaws that impact on projects deemed to be provincially significant.⁷⁴

Furthermore, with respect to bylaws, zonings or land use contracts that would impose a stricter regime than would otherwise be permitted under the *Environmental Management Act*, while a conflict will not be presumed simply because the bylaw imposes further restrictions or conditions, that Act provides that:

Bylaws to manage increased truck traffic on local roads are a tool local governments can use to control the impacts associated with coalbed methane development.



4.6 Local Government Request for establishment of a Buffer Zone

- (i) a Minister may by order declare that a conflict exists between a local bylaw and the Act and its regulations (thus suspending the bylaw);⁷⁵ and
- (ii) Cabinet may by order suspend the operation of a zoning or land use contract that would preclude a use for a purpose allowed under a permit, approval or order issued in respect of the land or a waste management plan, to the extent Cabinet deems necessary.⁷⁶

These are significant powers that are as yet untested.

As described in section 1.1 – Overview of Coalbed Methane Development, when a company is interested in acquiring the oil and gas rights to a certain area, it will make a request to the provincial government to include that area in the monthly auctions of oil and gas tenures.

Once the ministry determines that tenure to a specific parcel should be posted for auction, current government practice is to circulate such requests for tenure postings to provincial agencies, local governments and First Nations for comment. These notices are often sent to the local planning officer. Receipt of this notice is an opportunity for the local government to engage the community on how to respond to the proposed tenure, perhaps by organizing a community meeting, adding it as an agenda item at a council meeting, or sharing the notice publicly in the local newspaper.

In addition, at this point, local governments have the opportunity to contact the Titles Division of the Ministry of Energy, Mines and Petroleum Resources to request that a buffer zone be established around the municipality – i.e. to request the exclusion of a certain area from coalbed methane development. The minister has the power to by order withdraw certain areas from disposition, further to powers accorded under *Petroleum and Natural Gas Act*.⁷⁷ Those areas remain withdrawn from disposition until such time as the order is cancelled by the minister.

While there is no guarantee that such requests will receive an order for a buffer zone, the comment process is an important opportunity for local governments to communicate with the province and to seek support for their local land use priorities. Given the potentially significant outcome this process may have, local governments are encouraged to engage in public consultation on this issue, as mentioned above.

Finally, it is worth noting that good communication in the early stages of development between the coalbed methane developer, the Ministry and the local government may mean that the local government does not need to request a buffer zone at all.

4.7 Fair Share Agreements

Other than property taxes, local governments in British Columbia do not have any powers to tax coalbed methane operators. Therefore, tax revenues from coalbed methane development will not necessarily flow back to the communities from which the gas is derived. There are some exceptions to this. The Province has negotiated a 10-year Fair Share Agreement with the Peace River Regional District, whereby a portion of provincial tax revenues from oil and gas development in the region is returned to the Regional District and its Municipalities in recognition of the fact that these areas are service centres for the industry and provide the necessary infrastructure to service the industry and its workers. Similar agreements may be possible for other local governments facing significant impacts from oil and gas development.

Conclusion: Recommendations for Local Governments

As BC seeks to develop coalbed methane in its communities, local governments may be able to avoid some of the negative impacts, conflict and difficulties through proper study, planning and regulation, by building on the experience of US communities and by using the tools available to BC local governments under the *Local Government Act* and the *Community Charter*.

For local governments that are faced with the prospect of coalbed methane development, we recommend that they research the issues and associated impacts, and consider implementing the following measures:

1. Establish consultation protocols with the Oil and Gas Commission regarding coalbed methane development in the community. Ask the BC government to pass a regulation to make it mandatory for local governments to be notified and consulted about coalbed methane applications in their community.
2. Review/revise Regional Growth Strategies and the local government's Official Community Plan to establish clear objectives in relation to coalbed methane development. Appropriately designed development permit areas can ensure site specific noise mitigation, protection of viewscapes, minimization of surface disturbances, and protection of aquifers, sensitive riparian areas and wildlife. Development approval information areas can ensure information is provided that will allow communities to assess and respond to anticipated impacts on the natural or human environment.
3. Review zoning and development bylaws. Issues to be considered include the need for bylaws restricting activities associated with coalbed methane development, guiding residential use away from areas that are or will be developed for coalbed methane, and identifying appropriate setbacks to avoid safety concerns. Bylaws can also stipulate provisions regarding location, siting and density of coalbed methane structures, setbacks from residences, noise sensitive users, streams and sensitive ecosystems, and may impose screening and landscaping requirements.
4. Protect water resources. As well as designation of sensitive riparian and wetland systems, or aquifer recharge areas as development permit areas, and setbacks between coalbed methane wells and water wells, local governments can use health related powers to restrict use of diesel based fracking fluids in proximity to water wells, and can regulate the dumping of produced water into streams where this might cause pollution or affect drinking water sources.
5. Avoid conflicts over noise. Local governments can reduce conflicts over noise from coalbed methane development by imposing zoning restrictions on noisy activities such as gas compressors in sensitive residential, commercial or institutional areas; using industrial form development permit areas to deal with siting; and establishing noise bylaws to place restrictions on noisy activities and noise levels. Local governments may wish to consider imposing variable standards that take into account sensitivities to noise in different areas.

6. Recover costs. Local governments should consider changes to building bylaws and development cost charge bylaws with a view to ensuring that coalbed methane developers assume their share of financial responsibility for any new capital costs for roads necessitated by coalbed methane development.
7. Consider road and traffic needs. Local governments should consider whether road bylaws need to be amended to place parking, load or route restrictions for truck traffic using local roads.
8. Review business regulation and licensing requirements. Municipalities might want to place restrictions on certain coalbed methane activities, such as regulating hours during which disturbing activities might be carried out, or limiting fracking fluids to non-toxic fluids. Licensing conditions may include a power to inspect or to impose penalties, or to demand financial security from non-resident businesses.

West Coast Environmental Law

Related Publications

Oil and Gas in British Columbia: 10 Steps to Responsible Development

<http://www.wcel.org/wcelpub/2004/14100.pdf>

Coalbed Methane: A Citizen's Guide

<http://www.wcel.org/wcelpub/2003/14027.pdf>

Checklist for BC Code of Practice for Discharge of Produced Water from Coalbed Gas Operations

<http://www.wcel.org/wcelpub/2004/14173.pdf>

When the Landman Comes Knocking: A Guide for BC Landowners Living with Oil and Gas (*a joint publication of West Coast Environmental Law and Sierra Legal Defence Fund*) <http://www.wcel.org/wcelpub/2004/14174.pdf>

Pump it Out: The Environmental Costs of BC's Upstream Oil and Gas Industry

<http://www.wcel.org/wcelpub/2003/14028.pdf>

For More Information

The following websites provide different perspectives on the issue of coalbed methane development in Canada and the United States.

The Pembina Institute for Appropriate Development is a research institute based in Alberta. See especially its June 2003 report entitled, *The environmental challenges of coalbed methane development in Alberta* by Mary Griffiths and Chris Severson-Baker: http://www.pembina.org/pdf/publications/coalbed_methane_Summary.pdf.

Oil & Gas Accountability Project, based in Colorado, is a citizen-led group advocating for "greater accountability, responsibility and respect for people and places in the course of oil and gas development": <http://www.ogap.org>.

The Powder River Basin Resources Council, based in Wyoming, arose in response to unplanned rapid energy development; its website has many resources on coalbed methane development and especially related concerns for ranchers and landowners: <http://www.powderriverbasin.org/>.

Northern Plains Resource Council, based in Montana, is a citizen-based organization, also working on coalbed methane development issues and concerns:

<http://www.nprcmt.org/>.

The BC Ministry of Energy and Mines has an information section devoted to coalbed methane: <http://www.em.gov.bc.ca/subwebs/oilandgas/resource/cbg/cbg.htm>.

The BC Oil and Gas Commission also has coalbed methane resources:

<http://www.ogc.gov.bc.ca/>. See also their Guidelines for Coalbed Methane Projects in British Columbia, released in draft by the OGC in 2002.

The Canadian Society for Unconventional Gas (CSUG) is a society registered in the Province of Alberta that supports the exploration and development of Canadian unconventional gas resources including coalbed methane. <http://www.csug.ca/>.

Table 1: Planning for Coalbed Methane with Development Permit Areas.

The second column of Table 1 lists the main types of requirements that can be imposed in development permits depending on the purpose of the permit listed in column 1. Examples of special conditions or objectives that justify the designation, and the types of guidelines that might be imposed to meet them, are listed in the third column.

Act allows development permit areas to be created for the purposes of	Allowable requirements	Examples of <i>objectives</i>, types of guidelines, development approval information relevant to the coalbed methane context
<p>Establishing objectives related to form and character of industrial development.</p>	<p>Requirements regarding the character of the development, including landscaping, and the siting, form, exterior design and finish of buildings and structures.</p> <p>Varying bylaw requirements related to the siting of uses and structures.</p>	<p>1) <i>Minimize surface disturbance and visual impacts:</i></p> <ul style="list-style-type: none"> a) Taking into account well siting requirements imposed by the province, and other guidelines, locate structures in a manner that minimizes surface disturbances through techniques such as directional drilling, drilling multiple wells from the same pad, and use of existing well pads. b) Use existing disturbance corridors for roads, pipelines and power lines. c) Avoid locating wells and other structures on highly visible ridgelines. d) Use vegetative screens to screen operations from residences, roads and highways. e) Use natural coloured finishes for buildings and structures. <p>2) <i>Minimize noise disturbances</i></p> <ul style="list-style-type: none"> a) Taking into account well siting requirements imposed by the province, and other guidelines, locate compression equipment and well sites as far as possible from residences, churches, schools, wildlife areas, and other noise sensitive locations. b) Require industrial users to use noise mitigation techniques including engineered noise barriers, enclosures and noise abatement equipment that in combination with siting requirements can reasonably be assured to ensure that noise will not exceed a threshold level (e.g., 40 decibels) at a property line or established noise sensitive receptor.

Act allows development permit areas to be created for the purposes of	Allowable requirements	Examples of <i>objectives</i> , types of guidelines, development approval information relevant to the coalbed methane context
Protection of the natural environment, its ecosystems and biological diversity	<p>Specify areas that must be free of development except on condition.</p> <p>Require specified natural features or areas to be preserved, protected, restored or enhanced.</p> <p>Require natural watercourses to be dedicated.</p> <p>Require works to be constructed to preserve, restore or enhance natural watercourses or other specified features of the environment.</p> <p>Require protection measures including that vegetation or trees be planted or retained in order to preserve fish habitat or riparian areas.</p> <p>Varying bylaw requirements related to the siting of uses and structures.</p> <p>Sequencing of construction.</p>	<p>3) <i>Avoid contamination of water wells from methane seepage, fracking fluids, and groundwater contamination:</i></p> <ul style="list-style-type: none"> a) Require coalbed methane developers to include reports by hydrological professionals regarding local hydrology. b) Disallow use of diesel fracking fluids in formations that contain sources of drinking water. c) Ensure appropriate distances between coalbed methane wells and water wells to avoid contamination of water wells. d) Protect groundwater or surface water from contamination: require lining of channels and pits used for produced water. <p>Note: requirement for development permit could be limited to activities like coalbed methane development that pose threats to aquifers.</p> <p>4) <i>Protect biological and hydrological features of riparian areas, wetlands, and floodplains:</i></p> <ul style="list-style-type: none"> a) Prohibit location of well pads, compressors, drilling mud pits and other facilities in wetlands or in specified buffer zones (boundaries of buffer zone may be set based on information provided by developer). b) To extent possible using technologies such as diagonal drilling and to the extent compatible with other objectives, locate well pads , compressors and other facilities to the maximum extent away from riparian/wetland areas. c) Require specified setbacks. d) Construct crossings perpendicular to wetlands.

Act allows development permit areas to be created for the purposes of	Allowable requirements	Examples of <i>objectives</i> , types of guidelines, development approval information relevant to the coalbed methane context
		<p>e) Implement mitigation measures recommended by registered professional biologist for any development within specified distance of wetland.</p> <p>f) For any construction within specified distances of wetlands, schedule construction during times which avoid impacts on fish (requiring appropriate information from registered biologists).</p> <p>5) <i>Avoid habitat fragmentation in areas with high levels of biodiversity:</i></p> <p>a) See 4a) and b).</p> <p>b) Use two-track roads into well locations to the extent feasible.</p> <p>c) Locate wells in proximity to existing roads.</p> <p>d) Use existing disturbance corridors.</p> <p>6) <i>Maintain biodiversity and habitat in sensitive areas:</i></p> <p>a) Reclaim disturbed sensitive areas to proper functioning condition.⁷⁸</p> <p>b) Use of native species in reclamation.</p> <p>c) Interim reclamation of drill sites after drilling and pipelines after construction, to the minimum area required for operation. Reclamation to include recontouring, replacement of topsoil, planting of native species.</p> <p>d) Reclaim all disturbed areas as close as possible to a natural state.</p> <p>7) <i>Protect wildlife:</i></p> <p>a) Require fencing and netting around produced water pits.</p> <p>b) Impose conditions respecting sequence and timing of construction so that construction avoids wildlife breeding seasons.</p>

Notes

- ¹ For a good overview, see in particular: West Coast Environmental Law, *Pump it Out: The Environmental Costs of BC's Upstream Oil and Gas Industry*, May 2003, at <http://www.wcel.org/wcelpub/2003/14028.pdf>.
- ² *Petroleum and Natural Gas Act*, R.S.B.C. 1996, c. 361, ss. 9, 12, 16, 19, and 21. See also *When the Landman Comes Knocking: A Guide for BC Landowners Living with Oil and Gas* (a joint publication of West Coast Environmental Law and Sierra Legal Defence Fund), at <http://www.wcel.org/wcelpub/2004/14174.pdf>.
- ³ Oil and Gas Commission, *DRAFT Guidelines for Coalbed Methane Project in British Columbia* (Ft. St. John: The Commission, October 21, 2002) at p. 1.
- ⁴ Province of BC, *Coalbed Methane in British Columbia*, (Victoria: Ministry of Energy and Mines, May 2001).
- ⁵ *Ibid.*
- ⁶ *Guidelines for Coalbed Methane Projects in British Columbia* (Oil and Gas Commission, October 21, 2002) at page 10, available online at <http://www.ogc.gov.bc.ca/documents/guidelines/Coalbed%20Methane%20Guidelines.pdf>.
- ⁷ *Northern Plains Resources Council v. Fidelity Exploration and Development Company*, United States Court of Appeals for the 9th Circuit, No. 02-35836, D.C. No. CV-00-00105-SHE, April 10, 2003.
- ⁸ See www.wcel.org/wcelpub/2004/14173.pdf and www.wcel.org/wcelpub/2005/14179.pdf.
- ⁹ See report prepared by Summit Environmental Consultants for the BC Ministry of Energy and Mines in relation to the Crowsnest and Bowron River Coalfields, dated March 31, 2004. The report concluded that given the gap in information, "...baseline water quality monitoring will very likely be needed for at least three years before CBG (coalbed gas) development."
- ¹⁰ See e.g., *Our Drinking Water at Risk: What EPA and the Oil and Gas Industry Don't Want Us to Know About Hydraulic Fracturing* (Durango, Colorado: Oil and Gas Accountability Project, April 2005) at <http://www.ogap.org>.
- ¹¹ Authority to delegate is provided under *Agricultural Land Commission Act*, S.B.C. 2002, c. 36, s. 26; *Agricultural Land Reserve Use, Subdivision and Procedure Regulation*, B.C. Reg. 171/2002, section 39.
- ¹² La Plata County, *La Plata County Impact Report*, October 2002 http://co.laplata.co.us/pdf/planning_documents/final_impactrpt/final_ir1.pdf.
- ¹³ County revenues increased over the 30-year period, due to property tax revenues from coalbed methane well production sales. La Plata County Impact Report, October 2002.
- ¹⁴ The study found a less than 1 percent increase in either the total basic employment or total population of the county, meaning there would be little impact to employment, per capita income, population, or housing. La Plata County Impact Report, October 2002.
- ¹⁵ The study found that whereas on average properties near one or more wells may have a sales value less than 1 percent lower than properties that are not near wells, on the other hand those properties that have a coalbed methane well located on them experienced a net reduction in sales value of 22 percent. La Plata County Impact Report, October 2002.
- ¹⁶ Western Governors' Association, April 2004 available at <http://www.westgov.org/wga/initiatives/coalbed/index.htm>.
- ¹⁷ See *Oil and Gas in British Columbia: 10 Steps to Responsible Development*, April, 2004, <http://www.wcel.org/wcelpub/2004/14100.pdf>. See also Larry Pynn, "Oil, gas industry violating rules—audit", *Vancouver Sun*, May 12, 2005 (reporting on a 2005 compliance and enforcement audit by the Oil and Gas Commission). See also "Watchdogs over the oil and gas industry need more clout", *Vancouver Sun* Editorial, May 16, 2005 at p. A10.
- ¹⁸ *Local Government Act*, section 849.
- ¹⁹ *Local Government Act*, sections 849-850.
- ²⁰ *Local Government Act*, Part 26, Division 2, sections 875-885.
- ²¹ See section 884(2) of the *Local Government Act*. Note, however, that courts in BC have generally only been willing to intervene in cases where there is an "absolute and direct collision" between a bylaw and an OCP.
- ²² Section 919.1 of the *Local Government Act*.
- ²³ See e.g. *Denman Island Local Trust Committee v. Ellis*, 2005 BCSC 1238 and *Bignell Enterprises Ltd. v. Campbell River (District)* (1996), 34 M.P.L.R. (2d) 193 (B.C.S.C.).
- ²⁴ *Local Government Act*, section 928(2).
- ²⁵ *Local Government Act*, section 925.
- ²⁶ *Local Government Act*, section 920.01. A local government must also establish procedures and policies on the process for requiring such information, and the substance of the information that may be required: section 920.1(2).
- ²⁷ Western Governors' Association, April 2004 available at <http://www.westgov.org/wga/initiatives/coalbed/index.htm>.

- 28 *Local Government Act*, section 920.2.
- 29 *Local Government Act*, section 903.
- 30 *Local Government Act*, section 909.
- 31 *Local Government Act*, section 907.
- 32 “Minerals” are not defined in the *Local Government Act*, and different pieces of legislation define minerals differently. While the *Mineral Tenure Act*, R.S.B.C. 1979, c. 292, s. 1, defines minerals as excluding oil and gas, the *Coalbed Gas Act*, S.B.C. 2003, c. 18, specifically state that coalbed methane is, and always has been, a natural gas, and that natural gas is, and has always been, a mineral.
- 33 See *Squamish (District) v. Great Pacific Pumice Inc.* (2003), 38 M.P.L.R. (3d) 163, 229 D.L.R. (4th) 93, (B.C.C.A.).
- 34 *Maple Ridge (District) v. Thornhill Aggregates Ltd.* (1993), 14 M.P.L.R. (2d) 288 (B.C.S.C.).
- 35 *Pitt River Quarries Ltd. v. Dewdney-Alouette (Regional District)* (1995), 27 M.P.L.R. (2d) 257 (B.C.S.C.).
- 36 See *Cowichan Valley (Regional District) v. Norton*, (July 14, 2005) Victoria Registry: Docket 05/3148 (B.C.S.C.).
- 37 Zaz Hollander, “Mat-Su drafts drilling regulations. Coalbed Methane: The ordinance would impose restrictions on operations”, Anchorage Daily News (March 19, 2004), <http://www.adn.com/alaska/story/4865806p-4801774c.html>.
- 38 *Ibid.*
- 39 *Ibid.*
- 40 This principle is found in *Roger’s Law of Canadian Municipal Corporations*, 2nd ed. (Toronto: Carswell), cumulative supplement) at 695. It seems to be behind the unelaborated 1998 BC Supreme Court statement that “a municipality has no jurisdiction to pass a zoning bylaw that directly or indirectly prohibits mining or mining activity”: *Falkoski v. Osoyoos (Town)*, [1998] B.C.J. No. 719.
- 41 See *La Plata County Impact Report* (October 2002) for discussion of best practices regarding land use and methane seepage.
- 42 “Comprehensive development zones” are not a defined term within the *Local Government Act*, but refer to use, density and siting requirements that are not set out in a conventional zoning but are as indicated in a landowner’s development plan, usually appended as a schedule to a zoning bylaw (Section 903(2) of the *Local Government Act* allows local governments to exercise zoning powers by incorporating in a bylaw maps, plans, etc.) This approach enables site-specific land use regulations to be developed to accommodate a landowner whose plans otherwise could not be accommodated by an existing zoning category (see Buholzer, *British Columbia Planning Law and Practice*, paras. 7.93 to 7.95). Local governments may wish to consider the use of this zoning tool, but practically speaking, its potential may be rather limited, given that coalbed methane operators are not like conventional land developers who own and plan developments for large pieces of land, but rather, are merely exercising rights of entry to the surface that arise under the *Petroleum and Natural Gas Act*.
- 43 Section 8(6)(c) of the *Community Charter*.
- 44 *Local Government Act*, section 799.
- 45 *Community Charter*, section 9(3).
- 46 Western Governors’ Association, page 10.
- 47 *Public Health Bylaws Regulation* (BC Reg. 42/2004).
- 48 We based this conclusion on several factors: (a) courts have interpreted municipal health powers broadly, allowing them to regulate pesticide use: *114957 Canada Ltée. (Spraytech, Societe d’arrosage) v. Hudson (Town)*, [2001] 2 S.C.R. 241; (b) the terms in the *Community Charter* and *Local Government Act* both refer to public health; (c) protection of public health – i.e., avoiding public exposure to disease causing germs or contaminants – is ultimately about keeping individuals healthy.
- 49 *Community Charter*, section 8(3)(i) and *Local Government Act*, section 523. The *Local Government Act* provides that powers to regulate for public health are subject to the concurrent power restrictions in the *Charter*.
- 50 *Community Charter*, section 8(3)(j).
- 51 *Spheres of Concurrent Jurisdiction - Environment and Wildlife Regulation*, B.C. Reg. 144/2004.
- 52 *Local Government Act*, section 725.1.
- 53 Western Governors’ Association, page 19.
- 54 *Spheres of Concurrent Jurisdiction – Environment and Wildlife Regulation*, B.C. Reg. 144/2004.
- 55 Powers in relation to soil deposit and removal bylaws are given by section 723 of the *Local Government Act*, and section 8(3)(m) of the *Community Charter*. *Community Charter*, section 9(1)(e) applies concurrent power provisions to bylaws that prohibit deposit of contaminated soil or prohibit soil removal. The power to regulate contaminated soil deposit or removal of soils is not concurrent.

- 56 *Community Charter*, section 8(3)(a).
- 57 *Community Charter*, section 8(3)(h) and section 64; *Local Government Act*, sections 724 and 725.
- 58 See e.g., *Osoyoos (Town) v. Rattlesnake Canyon Family Entertainment Park Inc.* (2005), 6 M.P.L.R. (4th) 148 (B.C.S.C.).
- 59 Some activities or operations that people might commonly call “a nuisance” will not be a legal nuisance. Interference with views, or unpopular activities are not normally considered nuisances, but high levels of noise, pollution of groundwater, vibrations may constitute a nuisance if they are unreasonable: *Christensen v. Highlands (District)* (2000), Victoria Docket: 0196, January 6, 2000 (B.C. S.C.).
- 60 *Community Charter*, section 74(1).
- 61 Waste drilling muds or tailings are usually stored in watery pits known as “sump pits”, which can become a hazard if accessible to people, wildlife and livestock. See next footnote.
- 62 Photo credit: Saulteau First Nations. Also see Claudia Houwers, *Petroleum Contaminants Community Research Project Final Report* (Fort St. John: Wildland Resources, April 2004), a study which investigated the effects of oil and gas activity on wildlife in the Del Rio area near Moberly Lake, BC. The study surveyed 78 out of 135 well sites, and 16 (6 sumps and 10 flare pits) were sampled for contaminants. It was determined that 12 out of 16, or 75% of the sites sampled were contaminated, i.e., exceeded the maximum levels. Track surveys were also conducted and it was concluded that 74 out of 78 (95%) of the well sites showed signs of moderate to high animal use. Remote cameras installed at certain locations confirmed animals were ingesting the water and soil from sumps and flare pits. (Abstract, and at p. 25 of the Final Report).
- 63 *Motor Vehicle Act*, R.S.B.C. 1979, c. 318; section 124, and *Community Charter*.
- 64 *Community Charter*, section 35.
- 65 *Community Charter*, section 194(5).
- 66 *Community Charter*, sections 8(5) and 15.
- 67 Authorized by section 799 of the *Local Government Act*.
- 68 *Community Charter*, sections 8(6) and (7). See also definition of “regulate” in the Schedule to the *Charter*.
- 69 *Squamish (District) v. Great Pacific Pumice Inc.*, [2003] BCJ No. 1567(C.A.) [*Squamish #2*].
- 70 114957 *Canada v. Hudson (Ville)*, [2001] 2 S.C.R. 241.
- 71 See section 14(2) of the *Interpretation Act*, R.S.B.C. 1996, c. 238.
- 72 *Squamish (District) v. Great Pacific Pumice Inc.*, [2000] BCJ No. 1027 (C.A.).
- 73 Regional districts are required to have zoning bylaws approved by the Minister unless they are consistent with Official Community Plans: section 913 of the *Local Government Act*. Regional districts must also receive ministerial approval of official community plans, unless specifically exempted: section 882 of the *Local Government Act*.
- 74 Section 874 of the *Local Government Act* allows the Minister of Community Services to order changes to an Official Community Plan, zoning or development permit bylaw. The *Significant Projects Streamlining Act*, S.B.C. 2003, c. 100, allows Cabinet to waive most legal requirements (“constraints”), including most environmental requirements, for projects designated as “provincially significant”. The latter powers have never been used, and the former have apparently not been used during the last decade or more.
- 75 *Environmental Management Act*, section 37(5).
- 76 *Environmental Management Act*, section 37(6).
- 77 *Petroleum and Natural Gas Act*, section 72.
- 78 Proper functioning condition is a concept used in regulation of water impacts. Initially developed by the US Bureau of Land Management, it has also been used by the BC Ministry of Forests. See: British Columbia, Ministry of Forests (2002) “Assessing upland and riparian areas” Rangeland Health Brochure 1, available at <http://www.for.gov.bc.ca/hfd/pubs/Docs/Bro/Bro68.pdf>. See also United States Bureau of Land Management (undated) “PFC (Proper Functioning Condition): what it is and what it isn’t” available at <http://www.mtnvisions.com/Aurora/pfc.html>.



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