

# Area-based Analysis: Overview

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About the

## BC Oil and Gas Commission

The BC Oil and Gas Commission (Commission) is the provincial regulatory agency with responsibilities for regulating oil and gas activities in British Columbia, including exploration, development, pipeline transportation and reclamation.

The Commission's core services include reviewing and assessing applications for industry activity, consulting with First Nations, cooperating with partner agencies, and ensuring industry complies with provincial legislation and all regulatory requirements. The public interest is protected by ensuring public safety, respecting those affected by oil and gas activities, conserving the environment, and ensuring equitable participation in production.

For general information about the Commission, please visit [www.bcogc.ca](http://www.bcogc.ca) or phone 250-794-5200.



### Commission Mission

We regulate oil and gas activities for the benefit of British Columbians.

We achieve this by:

- Protecting public safety,
- Respecting those affected by oil and gas activities,
- Conserving the environment, and
- Supporting resource development.

Through the active engagement of our stakeholders and partners, we provide fair and timely decisions within our regulatory framework.

We support opportunities for employee growth, recognize individual and group contributions, demonstrate accountability at all levels, and instill pride and confidence in our organization.

We serve with a passion for excellence.

### Vision

To be the leading oil and gas regulator in Canada.

### Values

Respectful

Accountable

Effective

Efficient

Responsive

Transparent

## Area-based Analysis: Overview

In the past 10 years, the province of British Columbia has seen a shift to shale and tight gas resource, or “unconventional” oil and gas development. The provincial government and the Commission are managing this change in a manner that minimizes environmental impact while maximizing public benefits. The Oil and Gas Activities Act (OGAA) was brought into force on October 4, 2010. It advanced the regulatory framework in British Columbia by strengthening regulations aimed at protecting the environment and enhancing government’s ability to respond to the future regulatory needs of industry and stakeholders.

The Commission continues to make improvements that promote positive environmental outcomes through more effective and efficient oversight. One such initiative - Area-based Analysis – evaluates oil and gas development opportunities by analyzing existing land-use, regulatory requirements, government policy and direction. The analysis then builds a landscape-level picture of the impact that oil and gas activity and other activities have on a particular region and the management tools available to the Commission.

The Area-based Analysis approach gathers and analyzes existing information and data on development activities in identified areas to better inform regulatory decisions. It evaluates the overall landscape to facilitate appropriate management of surface and subsurface impact. This approach increases transparency allowing for greater communication of what is happening at the landscape level. It complements continued oversight of localized, site-specific values at the individual permit level.

This report explains in detail the benefits, process and plans for the Area-based Analysis approach.





## Executive Summary

The oil and gas industry is a large resource revenue generator for British Columbia, with \$1.3 billion in direct government revenue for fiscal year 2011/12. Currently, British Columbia yields about one trillion cubic feet (Tcf) of marketable natural gas per year. Production growth in the province over the past 10 years is largely from the development of shale and tight gas in northeast British Columbia. This has meant a shift to a new type of natural gas development that provides opportunities for enhanced resource stewardship.

The Commission and the provincial government are working to enhance their ability to manage the environmental impact from oil and gas activity. Government sets strategic land and resource objectives through legislation, policy, and land-use planning. The Commission serves the public interest by following a single-window model for permitting oil and gas exploration and development and for ensuring operators' compliance with government's strategic direction, applicable laws, regulations and permits. This model gives British Columbia a competitive advantage over other jurisdictions and has supported effectiveness and efficiency in the regulatory process.

The Area-based Analysis approach was developed by the Commission to identify the environmental and social values associated with British Columbia's unconventional

gas basins. It is a comprehensive, tactical approach to characterizing the landscape in a way that informs decisions on oil and gas applications. It is a coherent framework for managing the environmental and social impacts of oil and gas development. Area-based Analysis may also be used to evaluate trends in resource development and the effectiveness of policy regimes and standard operating practices in conserving environmental and social values.

An analysis of each unconventional gas basin area will be summarized in area-specific reports produced by the Commission. These reports will be updated periodically to reflect new information including updates to relevant government policy and legislation and recent development activities, and to report on outcomes. These area-specific reports will provide guidance during operational planning and permitting to avoid or minimize conflicts with identified values. Other government agencies, First Nations and stakeholders may also use the information provided by the Commission's analysis to understand and monitor the impact of oil and gas development for each identified area. Area-based analyses will:

- Provide a consistent rationale and process for identifying environmental and social values.
- Clarify objectives as set out in government policy and statutes.

- Provide an analysis of existing development and the opportunity for future oil and gas activity.
- Provide a simplified and transparent framework to assess and manage oil and gas development impacts on environmental and social values.

The Area-based Analysis approach uses the expertise and knowledge of Commission and government staff, stakeholders and experts to build on the current regulatory and policy framework, resulting in better protection of environmental and social values while supporting responsible resource development. The benefits of the Area-based Analysis approach are:

- Facilitates and promotes up-front development planning and collaboration.
- Clarifies regulatory requirements and environmental objectives, leading to increased certainty.
- Increases flexibility and transparency for both the Commission and the industry.
- Provides comprehensive understanding of where specific environmental and social values exist.
- Encourages more efficient use of planned and existing infrastructure - reducing costs and environmental impacts.



## Unconventional Oil and Gas Activity in British Columbia

British Columbia has experienced oil and gas activity since the 1920s. The majority of this activity is associated with the exploration and production of conventional natural gas, whereby a single well is drilled on a well pad. Conventional gas pools are well-defined and each pool is generally limited in size.

In recent years the industry has focused on transitioning to unconventional development with innovative drilling techniques such as horizontal drilling and multi-stage hydraulic fracturing. As shown in Table 1, unconventional development targets vast resources of natural gas that are contained in broad formations covering large areas, known as basins.

Conventional oil and gas exploration relies on exploration and development of porous and permeable zones in the subsurface. These types of reservoirs are typically less than 20 metres in thickness and have limited areal extent. By comparison, unconventional reservoirs such as fine grained sandstones, siltstones and shales are widespread. They occur over large areas and individual formations can reach thicknesses in excess of 300 metres. This combination means that unconventional reservoirs have the ability to hold immense volumes of natural gas. By some estimates, B.C.'s unconventional reservoirs may contain up to 10 times the resources attributed to conventional oil and gas.

Extracting natural gas from unconventional formations is fundamentally different in method, size, and scale than conventional formations, as highlighted in Table 1. The emerging pattern of surface development associated with subsurface unconventional gas development has different environmental outcomes than conventional developments - unconventional development patterns tend to be more predictable, which presents the opportunity to achieve better environmental and social outcomes through more comprehensive, area-based analysis and planning.

The Commission has identified the following unconventional basins in northeast B.C. as key areas for area-based analyses: Liard, Horn River, Montney, and Cordova (Figure 1).

Figure 1: Commission-defined Basins in British Columbia

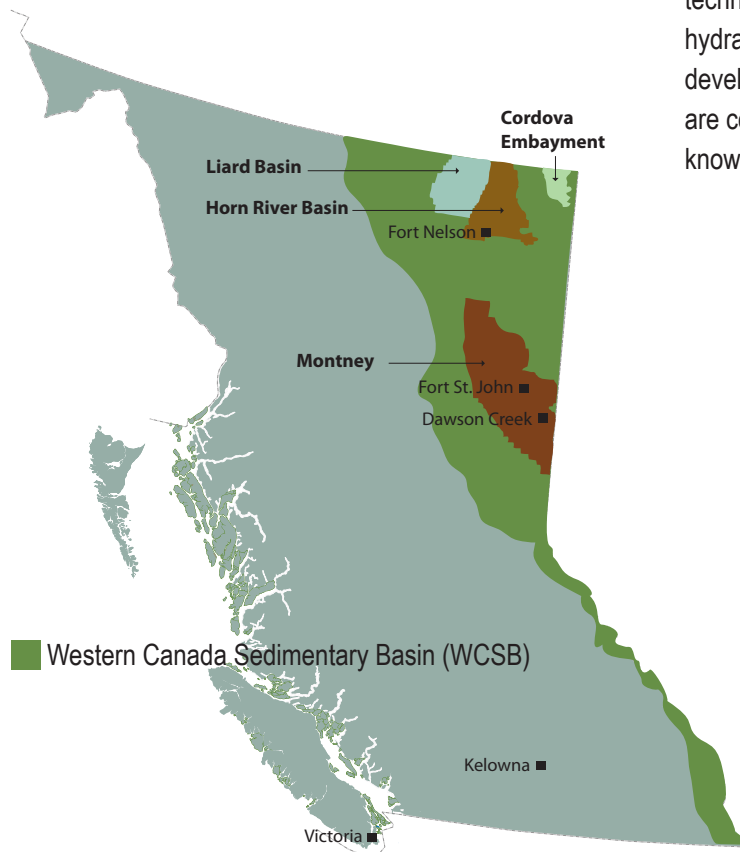


Table 1: Comparison Between Conventional and Unconventional Development

	Conventional	Unconventional	Implications of Unconventional Development <sup>1</sup>
Pool Size	Small and irregular	Large and continuous	Somewhat more flexibility in well pad placement <sup>2</sup>
Drainage	One vertical well drains a gas spacing unit (GSU*)	Limited, as one vertical well drains < ¼ GSU	Less subsurface competition between wells
Well Type	Vertical wells access and exploit sufficient pool reserves per GSU	Horizontal wells required to develop large resource potential per GSU	Different well spacing and target areas required
Reserve Life	Five to 20 + years	20+ years	Long development time frames
Tenure Size	Varied – related to target pool size	Generally much larger	More opportunity to plan operations on land base
Wells	Individual surface disturbance for each well with minimal location flexibility	Individual surface disturbance accommodates multiple wells with flexibility	Reduced surface disturbance per well that can adjust to various development scenarios
Development Predictability	Very low/Random	High/Focused	Ability to plan development for better environmental and social outcomes
Access	Difficult to predict need and location	Potential to plan future access road location	With long-term development planning, coordinate arterial access and main pipeline corridors
Facilities	Difficult to predict size and location	Growth and location can be modeled	Ability to select repeatable design and optimal location
H <sub>2</sub> S (Sour) Gas	Significant in many plays	Limited or not present	Decreased public safety risk

\* GSU: Gas spacing unit is typically one square mile or 2.6 km<sup>2</sup>.

1. Assumes that sufficient reservoir and well engineering data have been collected and analyzed, allowing optimized resource extraction.

2. Flexibility of pad locations is a function of understanding all landscape constraints and how best to space and place pad to ensure optimized reservoir contact



## Strategic Direction

# Regulatory and Policy Framework

## Legislation

OGAA consolidated and modernized the province's oil and gas regulatory framework and provides statutory authority to the Commission to permit oil and gas activities and regulate surface and subsurface land use by oil and gas operators.

The Environmental Protection and Management Regulation (EPMR) of the OGAA stipulates actions a permit holder carrying out an oil and gas activity must take, or refrain from taking, to protect or effectively manage the environment. It contains government's objectives pertaining to:

- Surface and subsurface water.
- Wildlife and wildlife habitat.
- Riparian values (such as the interface area between rivers, lakes and wetlands and upland areas).
- Resource features (such as recreational trails or livestock range improvements).
- Cultural heritage resources (such as First Nations areas of interest).

The EPMR requires oil and gas operators to avoid or minimize operations in areas where resource values exist that are associated with the environmental objectives. It also requires timely reclamation by permit holders of sites no longer required for oil and gas activities.

The Commission's regulatory authority has been established under OGAA and includes specified enactments under the Forest Act, Heritage Conservation Act, Land Act, Environmental Management Act, and Water Act. In addition, there are laws of general application that apply to operators conducting oil and gas activities, including but not limited to, the Migratory Game Birds Convention Act, BC Environmental Assessment Act, BC Wildlife Act, Federal Fisheries and Navigable Waters Protection Acts, among others.

## Government of British Columbia

The Crown holds the rights to the majority of petroleum and natural gas resources in British Columbia. Companies acquire these subsurface rights as tenures through a competitive bidding process. The Ministry of Energy, Mines and Natural Gas administers petroleum and natural gas tenures through the Petroleum and Natural Gas Act and its regulations on behalf of the Crown. Tenure holders are granted the exclusive right to explore for and produce oil and gas from their tenures for a limited time under specific conditions. Before any oil and gas activity can occur, tenure holders must apply for and receive a permit from the Commission.



### BC Oil and Gas Commission

The oil and gas industry in British Columbia is regulated by the Commission as an agent of the Crown. The Commission is responsible for permitting and overseeing oil and gas activities in British Columbia, including exploration, development, pipeline transportation and reclamation. It is mandated with balancing a broad range of environmental and social considerations.

The Commission's core roles include:

- Assessing applications for oil and gas activities, and issuing permits when appropriate.
- Ensuring industry compliance with legislative, regulatory and permit-specific requirements, in part through inspections and other monitoring and enforcement activities.
- Consulting with First Nations on applications and operations.

As a regulator, the Commission serves, considers and adjudicates diverse and sometimes conflicting interests of multiple stakeholder and First Nations groups.

### Consultation and Notification

OGAA clearly defines requirements for consultation with, and notification of, affected parties that companies must follow prior to submitting an application for any oil and gas activity permitted through OGAA.

### Consultation with First Nations

The Commission holds the legal responsibility to consult with, and where required, accommodate First Nations where a proposed oil and gas activity could adversely affect treaty or aboriginal rights (including title).

The Commission has an established process to engage and consult with First Nations with treaty or aboriginal rights in northeast British Columbia. This includes concepts drawn from both the provincial government's New Relationship, which states "new processes and structures for working together on decisions regarding the use of land and resources"<sup>1</sup>, and OGAA, which states that it is a purpose of the Commission "to encourage the participation of First Nations and aboriginal peoples in processes affecting them"<sup>2</sup> and "to respect aboriginal and treaty rights in a manner consistent with section 35 of the Constitution Act, 1982."<sup>3</sup>

In conjunction with the applicable First Nation(s) and the Commission, the provincial government has, or is currently negotiating:

- Economic Benefits Agreements.
- Long Term Oil and Gas Agreements.
- Consultation Process Agreements.
- Oil and Gas Consultation Agreements.
- Strategic Land-use Planning Agreements.

These agreements document the procedures and expectations of consultation.

Beyond the individual application review and referral process with First Nations, the Commission recognizes the importance of encouraging First Nations' participation in oil and gas related economic opportunities and land and resource management initiatives. The Commission encourages proponents to discuss their projects with the relevant First Nation(s), in whose traditional area the project is located, prior to submitting their applications to the Commission. This provides the opportunity for proactive relationship building and mitigation of any potential land-use conflicts prior to the application being submitted to the Commission.

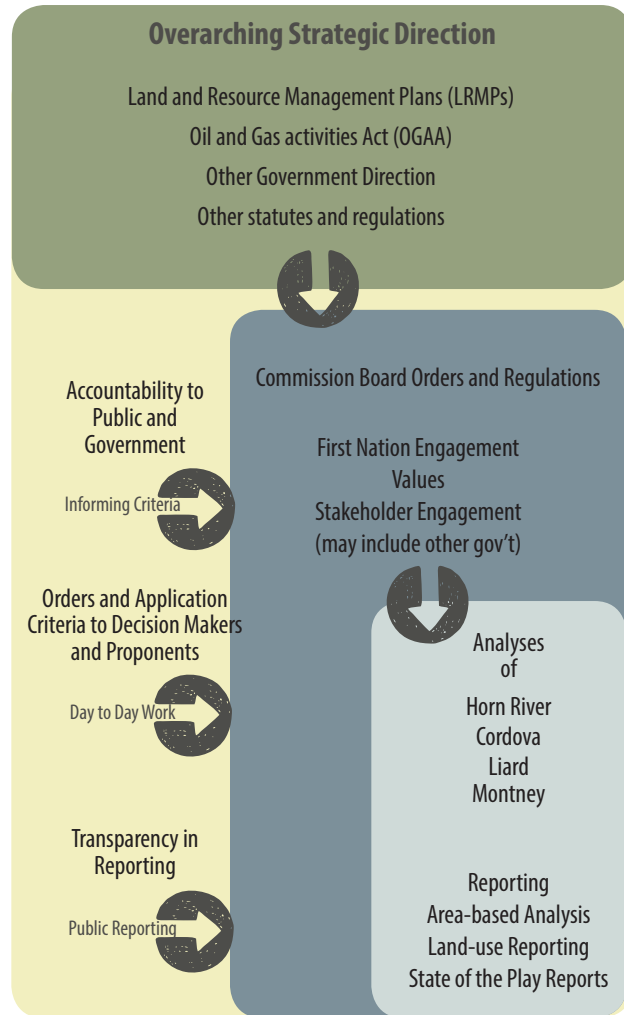


1. Province of British Columbia. 2008. ([www.newrelationship.gov.bc.ca/agreements\\_and\\_leg/new\\_relationship\\_agreement.html](http://www.newrelationship.gov.bc.ca/agreements_and_leg/new_relationship_agreement.html)).

2. Oil and Gas Activities Act. Part 2. Division 1.49(c).

3. Oil and Gas Activities Act. Part 7. 84.

Figure 2 – Area-based Analysis Framework



## Area-based Analysis

Area-based analyses (Figure 2) integrate direction from statutes and regulations, relevant elements of land-use planning, and environmental and social values into a coherent and clarified framework for managing oil and gas development. Area-based analyses will:

- Provide a consistent rationale and process for identifying environmental and social values.
- Clarify objectives as set out in government policy and statutes.
- Provide an analysis of existing development and the opportunity for future oil and gas activity.
- Provide a simplified and transparent framework to assess and manage oil and gas development impacts on environmental and social values.

Commission statutory decision makers then use the Analysis during their evaluation of applications to gauge the potential impact of applications on defined environmental and social values.

Compiling all known data and information into area-specific analyses gives industry, First Nations, government and other stakeholders the same information used by the Commission, thus augmenting the transparency of statutory decisions. As a result, other government agencies, First Nations and stakeholders may use the information provided in the analyses to understand and consider the impact of oil and gas development at the landscape level.

Area-based Analyses may also be used to evaluate trends in resource development and the effectiveness of policy regimes and standard practices in protecting environmental and social values.

The Area-based Analysis approach enhances knowledge and consideration of environmental and social values, streamlines the Commission’s single-window review process, increases transparency and continues to build the knowledge and expertise of statutory decision makers.

### First Nations Engagement

Through consultation with the Commission, First Nations have identified a desire to address issues regarding impacts to their treaty and aboriginal rights beyond the operational level. Broad landscape values brought forward by First Nations, including land, air, water, wildlife and cultural settlement areas, often lead to extended consultation. Area-based Analysis creates an opportunity to proactively consult on, and consider these values and concerns at the landscape level. How this information is provided and incorporated will depend on the outcome of First Nations engagement related to each area analysis.

The analyses may be used during consultation on applications to provide a higher-level and longer-term view of landscape conditions and dynamics, compared to individual permits, which are necessarily small scale and relatively short-term. Additionally, First Nations may use area-specific analyses to engage with industry to identify cultural, heritage and other important values.

## Elements of Area-based Analysis

### Values

Values identify environmental and social objectives and are intended to capture current legislative and policy objectives at the landscape level in a clarified management structure. Most values are defined spatially by the Commission, in collaboration with the Ministry of Environment and other agencies, based on stakeholder and First Nations input and interpretation of strategic government direction and policy using a broad-scale, ecosystem delineated approach. Finer-scale values are “nested” under broader values where they co-occur on the landscape, share common ecological processes and/or threats, and can be expected to respond similarly to development pressures and management actions. Nested values are generally priority species requiring habitat protection, as identified by MOE’s Conservation Framework (BC Ministry of Environment, 2009), as well as red-listed ecological communities. As a result, management of a value is expected to address the needs of the finer-scale values nested under it.

Using values aligns with the provincial Cumulative Effects Assessment and Management Framework. Values are designed to provide specific guidance for material adverse effect tests under the Environmental Protection and Management Regulation (EPMR) of the Oil and Gas Activities Act.

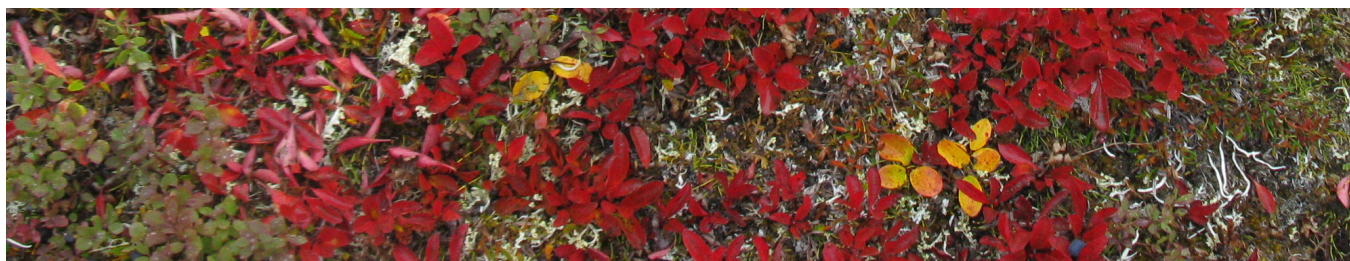
For each value, the following have been identified:

- A definition and Rationale.
- Desired Outcomes - high-level, qualitative statements about the preferred future condition of the value.
- Components - characteristics that, if degraded, would compromise the integrity of the value.
- Indicators - specific metrics to assess and report on the condition and trend of a component.
- Enhanced management triggers - the values of indicators that result in a change in management requirements to address an escalating impact.
- Regulatory/Policy triggers - the estimated values of the indicator that meet statutory, regulatory and policy requirements.
- Nested Values - other important values that co-occur on the landscape, share common ecological processes and/or threats, and can be expected to respond similarly to development pressures and management.

### Opportunity and Constraint Mapping

Opportunity and constraint mapping spatially identifies where oil and gas surface activity can and cannot occur on the land base, and under what conditions. Zones are based on Commission interpretation of federal and provincial land-use statutes and regulations, as well as values. Current conditions are assessed by examining the industrial activity and infrastructure development in the area and determining its net effect on values with respect to regulatory/policy triggers.

The opportunity for oil and gas exploration and development is the impact tolerance defined spatially by the zones and their associated practices, and non-spatially by the incremental allowable impact on values, which is the net of the regulatory/policy triggers minus the current condition. The Commission may use the information to model future development scenarios to understand potential impacts of oil and gas activities on values.



## Operational Implementation

The Area-based Analysis approach enables enhanced management of environmental and social values and creates new opportunities for streamlined permitting of oil and gas activities. Currently, each new application is evaluated individually by the Commission. Identifying objectives and requirements at a landscape scale is a more appropriate scale to assess potential impact on values and makes multi-activity permitting more feasible, which creates a more effective and efficient regulatory environment. Proponents will use area-specific analyses as guidance during operational planning and development to avoid or minimize conflicts with identified values, and will submit applications that outline appropriate practices and strategies to ensure that all activities associated with a project meet the Area-based Analysis objectives. This generates a number of benefits:

- Facilitates and promotes up-front development planning and collaboration through opportunity and constraint mapping.
- Informs proponents of potential operational constraints prior to purchase of subsurface tenure.
- Clarifies regulatory requirements, environmental objectives and acceptable impacts – leading to increased certainty.
- Increases flexibility and transparency for both the Commission and the industry.
- Provides comprehensive understanding of where specific environmental and social values exist.

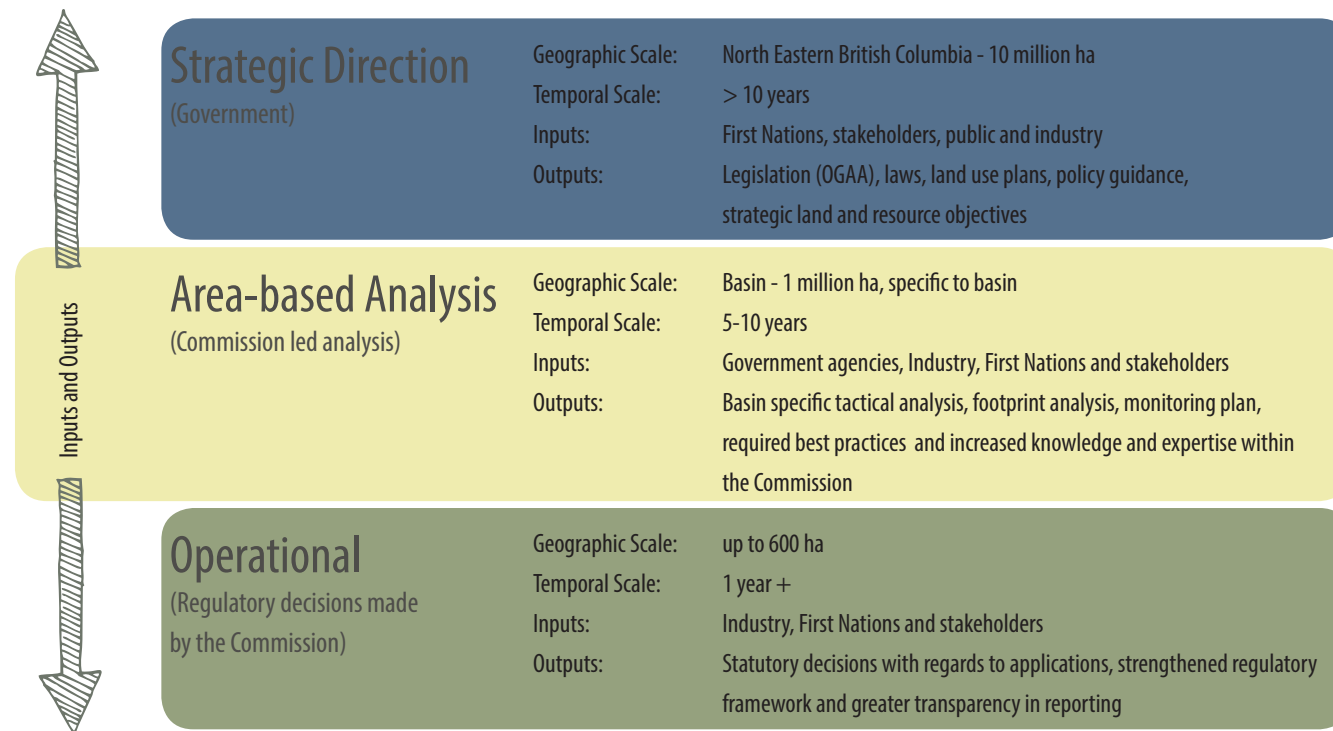
- Encourages improved development planning and more efficient use of existing infrastructure - reducing costs and environmental impacts.

The output of area-based analysis provides direction to companies submitting permit applications for oil and gas activities and a tool for the Commission to ensure that operational permitting decisions are aligned with the goals of the strategic direction. It is also used to provide

feedback to government on the outcomes of strategic direction and to inform strategic policy discussions (Figure 3).

As shown in Figure 4, the goal of the area-based management framework is to maintain conditions in the bottom bar where permitting is subject to routine reviews and standard operating procedures. Annual reports and trends are reviewed with local and regional

Figure 3: Creating an Area-based Analysis to Link Strategic Direction to Operational Implementation for Oil and Gas Activities



management staff. In the event enhanced management triggers have been reached and the current condition of the value is determined to be in the middle bar, options will be discussed with local and regional managers with a goal of restoring and subsequently maintaining conditions below the enhanced management trigger. To do this, additional operating procedures and additional permit restrictions may be required. Senior and regional provincial government staff will be asked to confirm policy direction when regulatory/policy triggers are reached and the current condition of the value is within the top bar. The objective will be to restore conditions below the regulatory/policy trigger and ideally below the enhanced management trigger. This could be achieved by suspending permitting, confirming policy direction and implementing innovative approaches to mitigate/offset the impact.

Statutory decision makers will use enhanced management triggers and regulatory/policy triggers to inform decisions. The status of values relative to either enhanced management triggers or regulatory/policy triggers influences the complexity of the review, whether a permit is approved and the associated permit requirements. The Commission recognizes the need to consider evolving technologies and practices that may achieve desired outcomes in innovative ways.

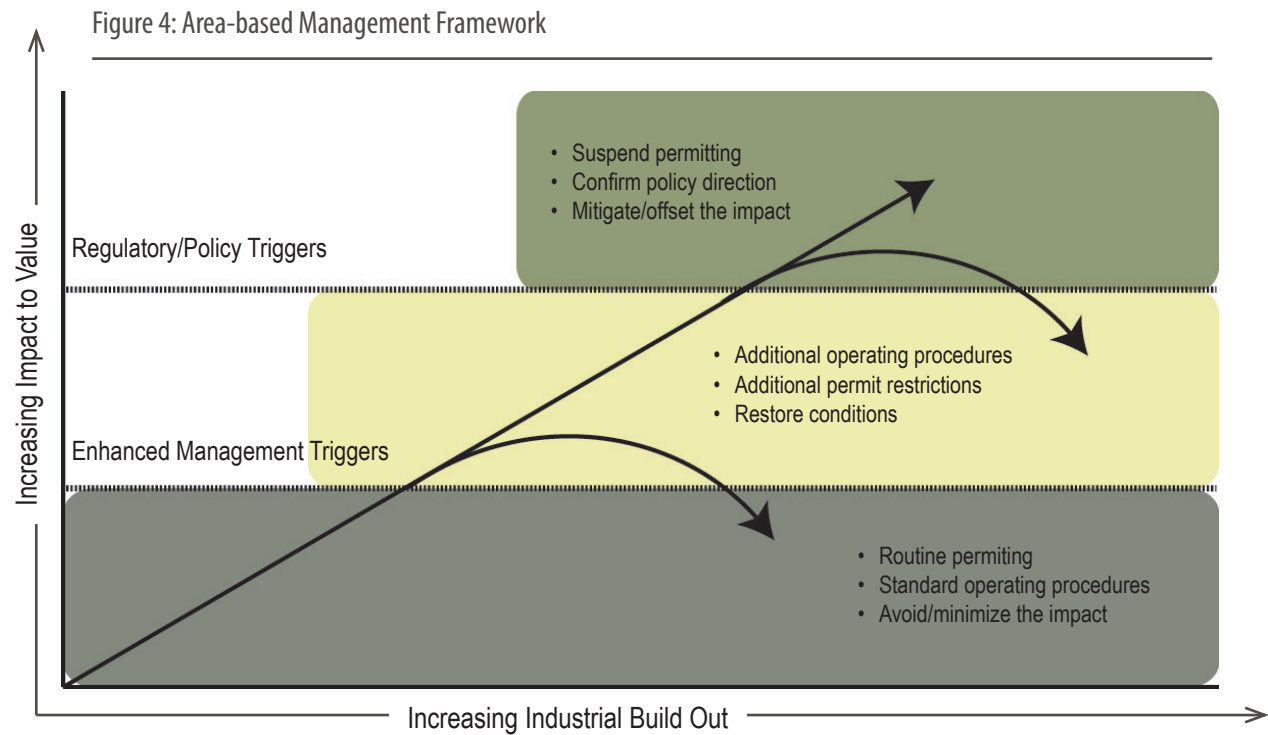
**Optimizing Development Opportunities and Improving Outcomes**  
The Area-based Analysis approach uses monitoring and adaptive management to build on the current strong regulatory and policy framework, including the protection of environmental and social values while supporting

responsible resource development. Area-based Analysis encourages the development of strategies to manage and protect values and to maintain and create development opportunities. There are three classes of strategies that can be employed:

1. Avoid - adjust the location, means or timing of oil and gas activities.
2. Minimize - where adjustment cannot avoid impacts, implement actions that minimize adverse effects on values (e.g., encouraging companies to share infrastructure such as roads, pipeline corridors and facilities).

3. Restore - ease constraints by restoring ecological function.
4. Offset - tangible, measurable, on-the-ground conservation, that are additional to what would be achieved in existing programs or activities.

The Commission has an interest in implementing strategies developed in the area analyses to ensure effective management of values and to continue to generate benefits to British Columbians. Work will be done to determine how to develop these strategies and implement them in identified areas with input from First Nations, stakeholders, and partners.





## Moving Forward

The Commission is committed to an Area-based Analysis approach for regulating oil and gas activities. The initial natural gas basin undergoing area-based analysis is the Liard. The Montney, Cordova and Horn River basins will follow and potentially the rest of northeast B.C.

A series of reports including Land-use Reports, Area-based Analyses and State of the Play Reports will be produced for each identified area. These will complement additional Commission reporting on other topics related to oil and gas activities such as water, flaring and venting, and compliance and enforcement. Area-specific reports will serve as guidance during operational planning and permitting to avoid or minimize conflicts with identified values. All reports will be public documents that will be shared with other government agencies, First Nations, industry and stakeholders to bring greater transparency to the regulatory decisions made at the Commission.

To advance Area-based Analysis, the Commission will:

- Monitor area-specific objectives and regularly report on outcomes.
- Revise components, enhanced management triggers and regulatory/policy triggers as new information or government direction becomes available.
- Periodically update area-specific analyses

based on land-use reports that reflect new activities and reclamation.

- Address knowledge gaps and refine assumptions to improve and expand the data that supports analyses.
- Continually update processes and procedures to improve the regulation of oil and gas activities.
- Work with government, industry, First Nations and stakeholders to monitor and revise values as required and incorporate new ideas and direction as they emerge.

The Commission encourages feedback on this report and on the regulation of oil and gas activities in general. The Commission is continually updating its processes and procedures in response to public input gained through the consultation and notification process required during the permitting process, and in response to feedback from stakeholders, First Nations and industry.

