

# Update on the action plan on the responsible development of oil and gas resources

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## Introduction

On January 19, 2015, following 21 months of information-gathering, the Select Committee on the Risks and Benefits of Hydraulic Fracturing tabled a report on oil and gas development and its potential impacts and benefits in the Yukon Legislative Assembly. The report contained 21 recommendations regarding the need for public dialogue, economic impact analysis, the collection of baseline data and an evaluation of potential human health and social impacts. On April 9, 2015, the Yukon government responded to the report, accepting all 21 recommendations and committing to develop a work plan to address them.

The government's response also committed to taking a "go-slow" approach, and to consider opportunities for shale resource development in the Liard basin (southeastern Yukon) pending First Nation support. The rationale for keeping the Liard basin open to shale resource development is that there is currently shale gas development activity in British Columbia's portion of the Liard basin (and therefore a strong likelihood for successful development in Yukon), and a natural gas gathering system and associated infrastructure already existing in the area.

Since then, the Yukon government recognized that a broader strategy supporting all types of oil and gas development in Yukon is required. The strategy, called the Action plan on the responsible development of oil and gas (Action Plan), runs from 2015 to 2019, and aims to fulfil the Yukon government's responsibility to manage and support the sustainable development of oil and gas resources.

The Yukon government continues to work government-to-government with First Nations to discuss their concerns as well as community opportunities around oil and gas development projects. We continue to work in partnership with First Nations in the development of this industry.

The path to Yukon's self-reliance includes safe and responsible natural resource development, and shale oil and gas resources are but one part of that mix.

Past history, current conditions and future projections demonstrate that the pace and scale of future development of oil and gas resources will be limited and gradual. Key factors influencing the pace and scale of oil and gas activity in Yukon are limited [land availability](#) within accessible oil and gas basins and remoteness from services and market.

To date, Yukon has seen limited oil and gas exploration, little conventional natural gas production, and no development of our shale-based resources. With this in mind, the Yukon government is taking the time necessary to gather important baseline information, conduct research, and have an informed public dialogue before making further decisions related to shale oil and gas resources.

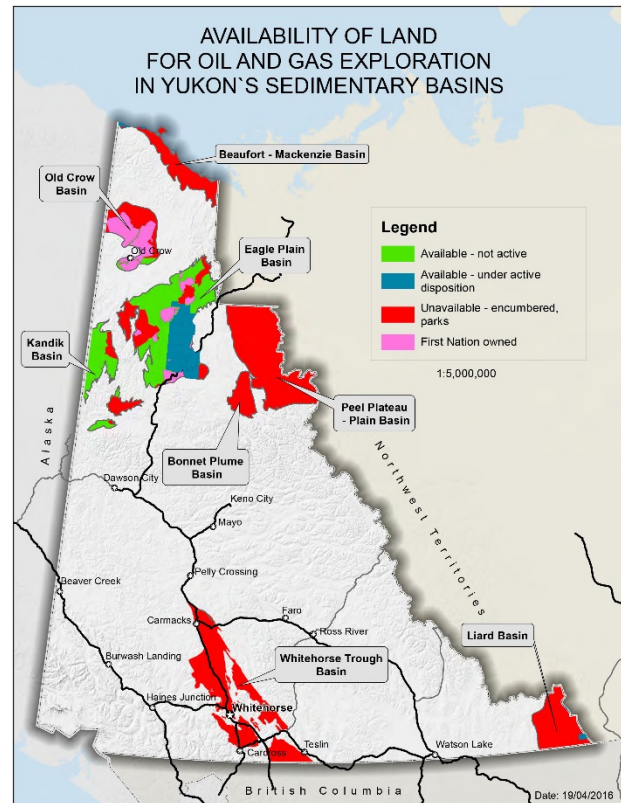
As a steward, the Yukon government is committed to responsible resource development. Key components of any responsible resource management decisions are to be well informed and to understand the risks and benefits of a development project.

The Action Plan is divided into four categories: Engagement, First Nation Relations, Technical and Research and Effective Regulatory Regime.

## Engagement

The Yukon government recognizes that many Yukoners have questions about oil and gas resource development. We are working to build awareness of government's role in regulating oil and gas activities and foster an understanding of how oil and gas resources can be responsibly developed in Yukon.

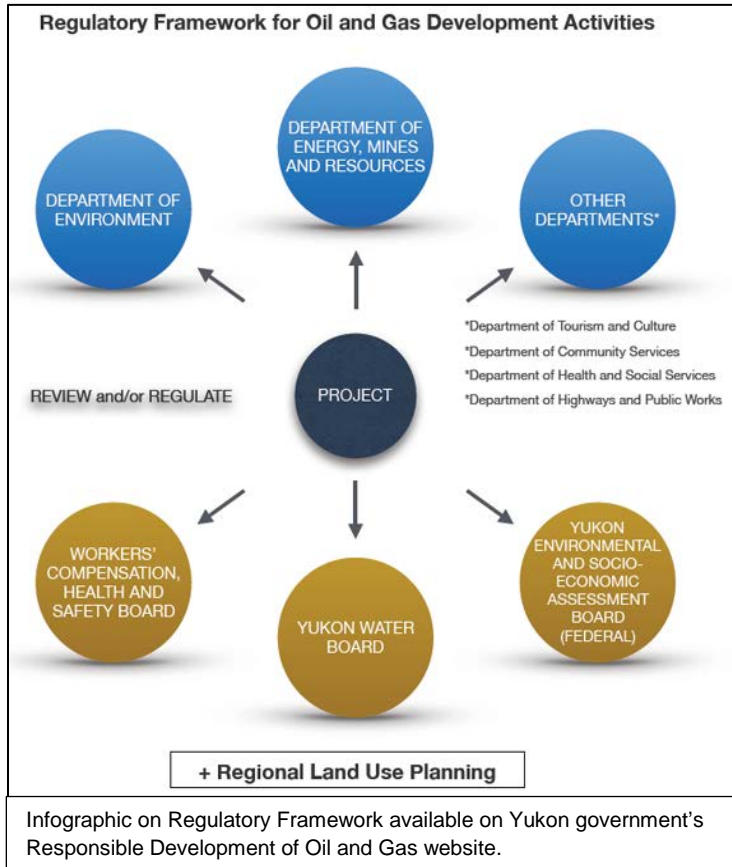
Public discussion has broadened to include the challenges of climate change and how each jurisdiction may reduce greenhouse gas emissions, protect economic growth and social well-being while developing an oil and gas resource sector. Recent energy policy analysis clearly demonstrates that solutions are complex and will likely require compromise.



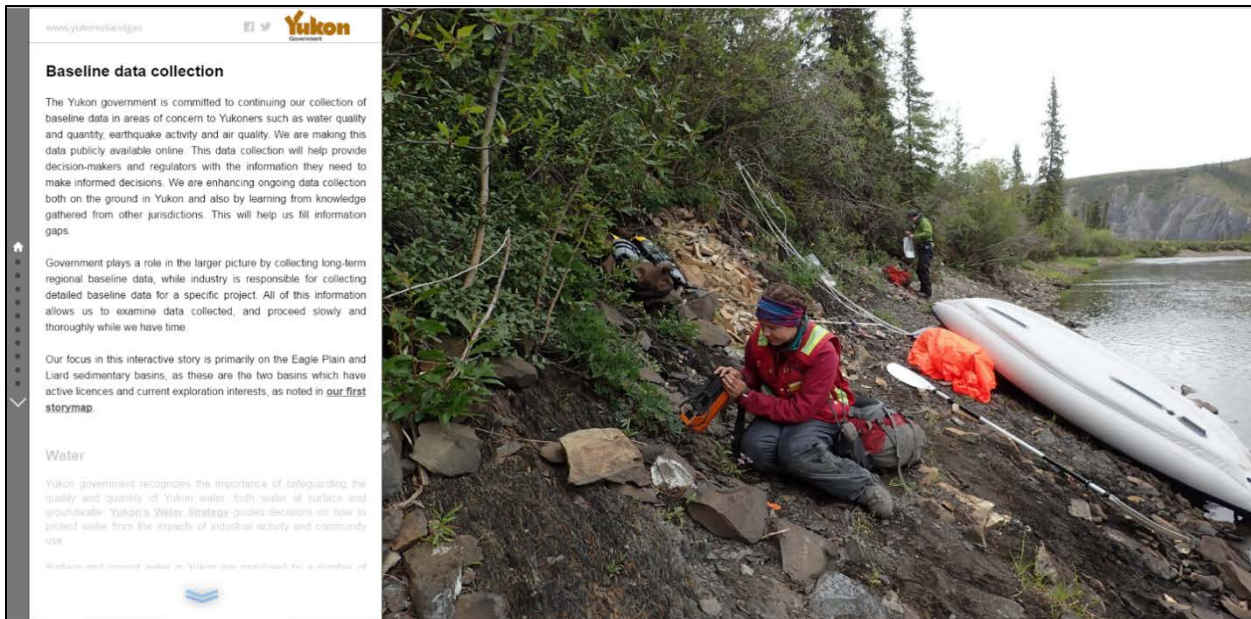
From April to July 2016, the Yukon government released new material on its oil and gas website exploring information and topics of interest related to the government's role in the responsible development of oil and gas resources in Yukon. The material can be found at [yukonoilandgas.com](http://yukonoilandgas.com).

Over a 13-week period from April to July 2016, there were over 1,900 visits to the site exploring articles, infographics, and story maps.

This infographic on Regulatory Framework impacting oil and gas activities is one example of the infographics available on the website.



Two story maps were also created which provide [background](#) on Yukon's hydrocarbon resources and describe the [baseline data collection](#) and research occurring in Liard and Eagle Plain sedimentary basins. (See screen shot below.)



Baseline data collection story map outlines Yukon's continuing efforts to collect new scientific data.

In June 2016, the Yukon government hosted a public discussion on energy issues led by speaker Colleen Mitchell, President from the Atlantica Centre for Energy based in Saint John, New Brunswick. Mitchell discussed Atlantic Canada's experiences in an energy world. One of Mitchell's key messages was that "By stalling responsible resource development, we are also stalling our path towards a sustainable energy future and allowing other nations to determine our economic and energy future. The Yukon government needs to look at what advances are being made elsewhere, what are their lessons learned and cherry pick the best applications for our own communities."

These engagement initiatives reflect the Yukon government's vision and values around responsible oil and gas development and include the Yukon public, Yukon First Nations, government regulators, and the private sector.

### **First Nation Relations**

The Yukon government continues to work government-to-government with Yukon First Nations to address their concerns around oil and gas resource development and to meet Yukon government legal obligations to consult affected First Nations.

The goal is to build First Nations support for the development of oil and gas resources which could provide benefits to Yukon communities and the economy while ensuring a strong level of environmental protection.

The Yukon government is committed to involve and support affected First Nations prior to proceeding with any potential oil and gas development project. The Yukon government sent letters to initiate dialogue with affected First Nations on engagement models, respectful partnerships and future agreements.

Discussions with affected First Nations will focus on the development of business opportunities and negotiation of agreements and partnerships related to oil and gas development activities.

Yukon government also continues to work with Yukon First Nations on the Memorandum of Agreement Working Group toward the development of a common regulatory regime.

### **Technical Research**

The path to Yukon's self-reliance includes safe and responsible natural resource development. The Yukon government is committed to continuing collecting baseline data in areas of concern to Yukoners.

To date, the territory has experienced limited oil and gas exploration, and no development of our shale-based resources. With this in mind, the Yukon government is taking the time to set the stage for responsible development by providing decision-

makers and regulators with the valuable information needed to make informed decisions.

The Yukon government is enhancing ongoing data collection to ensure any gaps in data are filled. This investment provides a knowledge base on which to make sound resource management decisions in the future, not just for oil and gas development but for all activity in the region.

The Yukon government is collaborating with other interested researchers and experts from outside Yukon. We are involved in scientific partnerships with various academic institutions and neighbouring governments, and continue to participate on a number of national working groups.

The collection of baseline data is occurring in Liard and Eagle Plain sedimentary basins, as these are the two basins which have active oil and gas dispositions. The increased baseline data will provide a regional picture of the current state of the environment.

While government has a major role to play in collecting long-term, regional baseline data which characterizes an area, industry is responsible for collecting detailed baseline data for a specific project.

Yukon is the only jurisdiction in Canada to invest in such multi-disciplinary baseline data collection and research in advance of shale oil and gas development. This investment will provide a knowledge base from which to make regulatory and investment decisions on many types of future development.

The technical and research component covers baseline data collection, economic development studies and a desktop review of human health impact assessments. The goal is to identify gaps in information and expand on existing information to allow for safe development of oil and gas resources.

The Yukon government is collaborating and partnering with universities and neighbouring governments to increase its understanding and receive more value for the money invested. All of these information gathering projects are being closely coordinated with the over-arching Action Plan to ensure critical topics or knowledge areas are addressed.

The Yukon government is also committed to learning what has worked in other jurisdictions and filling information gaps while there is the time and ability to proceed slowly. Lessons learned will be applied on a project-by-project basis. Baseline data collection will provide a regional picture of the current state of the environment.

The parameters being investigated are:

- surface water quality and quantity;
- groundwater quality and quantity;
- weather;
- air quality;
- seismic activity;
- landscape changes and permafrost;
- shale gas resource potential assessment;
- fish and wildlife;
- human health impacts; and
- economic assessment.

[A baseline data collection interactive map](#) explains the Yukon government's data collection process.

### **Surface water quality and quantity**

This year, the Yukon government increased the number of surface water quality monitoring stations in the Laird sedimentary basin from three to six.

There are two surface water quantity sites, on the Beaver and La Biche rivers.

The Yukon government is currently seasonally monitoring six surface water quality sites in the Eagle Plain basin. There are two surface water quantity sites on McParlon and Dalglish creeks. Concurrently, a three-year expanded water monitoring program in the Eagle Plain area wound down this season.



Water Resources Branch staff prepare to collect surface/ground water quality samples at the Beaver River in the Laird Basin in November 2015.

A report on the baseline characterization of the areas sampled will be completed this fiscal year. The detailed results will give government more confidence in characterizing the surface water characteristics of the area.

Weather and water quantity data will be used to model the amount of water available throughout the year.

## Groundwater quality and quantity

There are currently eight shallow groundwater wells in the Eagle Plain sedimentary basin area and a deeper groundwater well at the Northern Cross Yukon work camp. Four more will be installed in 2016.



An Environment Yukon hydrogeologist undertakes shallow groundwater sampling near the LaBiche River in August 2015.

There are six shallow groundwater wells located upstream and downstream of the Kotaneelee site in the Liard sedimentary basin.

The Yukon government plans to drill two new deep groundwater multi-level wells in southeast Yukon in fall 2016. Each multi-level location will have four monitoring levels, so it will be like having eight wells rather than two. These wells will provide valuable information on groundwater flow and the chemical character of groundwater in this region.

The Yukon government is also working on water quality research studies in partnership with the University of Calgary, and University of Guelph. These studies will give us a better understanding of existing water components such as dissolved gases, Naturally Occurring Radioactive Materials (NORMs), and isotope 'fingerprinting' in the area. The results from these studies will provide a baseline characterization of groundwater quality

and quantity in the Eagle Plain and Kotaneelee basins, which will allow for long-term monitoring of any development project's potential impacts on water resources.

The Yukon government continues to participate with the Canadian Water Network's Hydraulic Fracturing Consortium to advance knowledge and decisions on hydraulic fracturing and water.

## Weather

Two mini-weather stations are to be installed to measure temperature, wind direction, wind speed, rainfall/snowfall and humidity in the Liard sedimentary basin area as there is currently very little weather data for that area of southeast Yukon.

In the Eagle Plain sedimentary basin area, two Yukon government weather stations are in operation and are monitored on a regular basis.

Precipitation data collected, when integrated with surface and groundwater data, contributes to a better understanding of the hydrological cycles in the area.

## Air quality

The Yukon government generally monitors and gathers air quality data in populated areas. Baseline air quality data is therefore limited for the unpopulated Liard and Eagle Plain sedimentary basins areas.

Air Emission Permits are required for any oil and gas resource development projects. These permits track air emissions from a project.

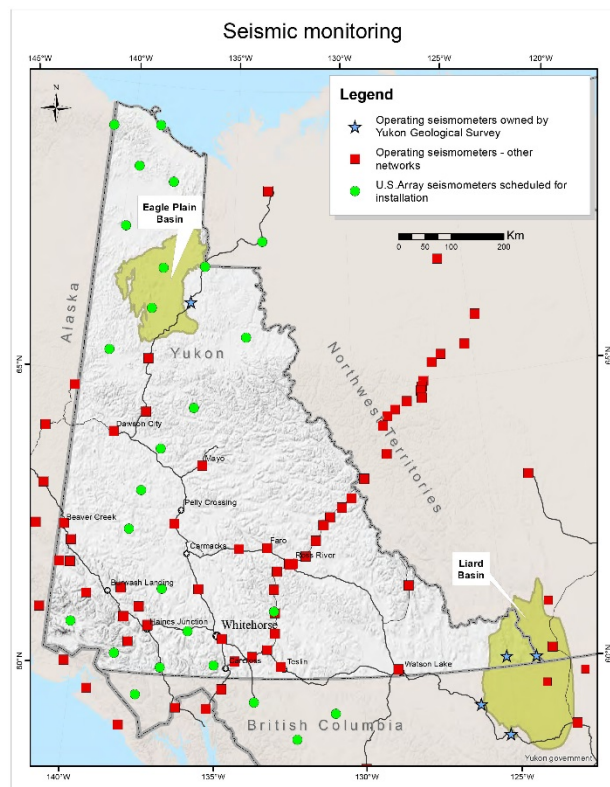
The Yukon government is involved in the national Canadian Flaring and Venting Regulators Forum which researches air emissions, and is part of the Pan-Canadian Framework on Clean Growth and Climate Change which works on meeting greenhouse gas emissions targets.

### Seismic activity

The Yukon government installed five seismic instruments around the Liard sedimentary basin area, an area with very limited detailed seismic data. This was done in partnership with Natural Resources Canada, other regulators and universities.

The western portion of the Eagle Plain sedimentary basin will be monitored by the USArray network, which is to be installed in 2017. The basin coverage will include data from one existing Yukon-owned seismometer installed near Eagle Plains Lodge in 2015.

The seismic monitoring will gather baseline data on the frequency and magnitude of naturally occurring seismic activity (earthquakes) in these areas, and data generated from earthquake movements will be used to map faults in the subsurface. The success in mapping subsurface faults depends on if there is enough natural earthquake activity of sufficient magnitude to identify any faults in the study areas.





## **Landscape changes and permafrost**

Yukon government geologists are assessing the terrain in the Eagle Plain sedimentary basin area for landslide hazards and are continuing to collect permafrost data using new instruments installed last year. A baseline permafrost monitoring study underway in the area will help identify areas prone to permafrost degradation and assess hydrological connectivity.

As there is limited permafrost in the Liard sedimentary basin area and landslides are common, the Yukon Geological Survey will be initiating a long-term study in the fall 2016 to assess the surface stability of known landslides in the area.

The permafrost and landscape studies will characterize landslide types and determine landscape vulnerabilities (e.g. melting permafrost) to ensure that any future resource development activity or infrastructure planning avoids high risk areas or takes actions to reduce the risk. Ongoing monitoring of ground temperature data will also contribute to climate change studies.

## **Shale gas resource potential assessment**

The Yukon Geological Survey participated in a multi-jurisdictional study of unconventional shale gas resources of the Liard basin. The study, published in March 2016 by the National Energy Board, indicated the Liard basin is one of the largest sources of shale gas resources in the world.

Yukon's share of the unconventional gas potential of the Liard basin is eight trillion cubic feet of marketable gas, enough gas to fuel all of Canada's needs for two and a half years. The studied portion of the Yukon basin covers an area of only 657 square kilometres. The study is available at [yukonoilandgas.com](http://yukonoilandgas.com).

The resource assessment is an important step in understanding Yukon's shale gas potential. With a limited land base available for oil and gas development, this assessment demonstrates the enormous energy potential in southeast Yukon.

The results of the study are being used in an assessment of the economic benefits and impacts of developing shale oil and gas resources in the Liard basin.

## **Fish and wildlife**

The Yukon government is reviewing existing fish and wildlife studies in the Eagle Plain and Liard basins. The historic data and current research will be compared to work in other jurisdictions to see what additional information may be of value and provide new insights. This will help government prioritize where additional data collection is required.

## **Human health impacts**

The Yukon government's Department of Health & Social Services is reviewing human health impact studies from other jurisdictions such as British Columbia and New Brunswick. The British Columbia study was conducted over three years in northeast BC where most of the shale gas activity occurs.

## **Economic assessment**

An economic assessment of the potential economic impacts of shale gas development in Liard sedimentary basin is currently underway. Work to date includes developing cost estimates for development in the Liard sedimentary basin, creating several development scenarios and completion of a functional cash flow model.

A major component of the economic assessment is an economic impact analysis. This analysis provides a method to identify the potential economic impacts associated with a particular project or industry.

This analysis can inform decision-makers and stakeholders of the potential economic impacts, and can help guide actions and policies in relation to the particular project activity in question.

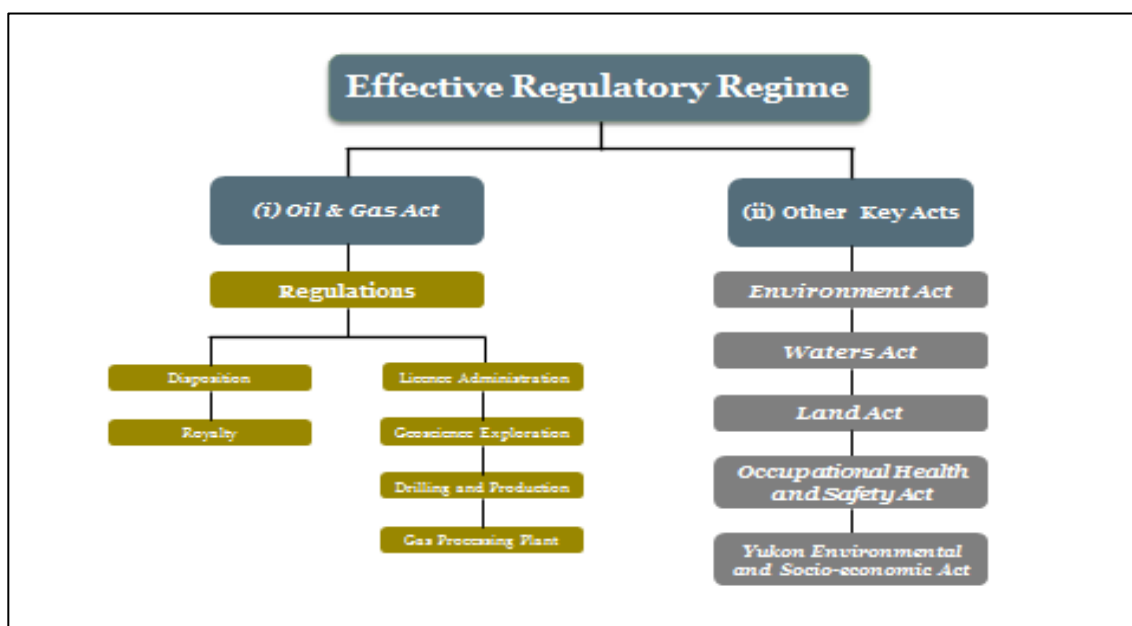
A contract was awarded to Nichols Applied Management and Economic Consultants to develop a comprehensive financial model of the full development of the Yukon portion of the Liard basin and generate estimates of key measures of economic activity, such as Gross Domestic Product, labour income, employment, and government revenue under various development scenarios. The study is expected to be completed in fall 2016.

## **Effective Regulatory Regime**

Yukon has over 70-years of history of oil and gas activities such as the Canol oil pipeline from Norman Wells, NWT to a Whitehorse refinery, seismic exploration, exploration drilling and natural gas production. The Yukon government has been responsible for the management and regulation of oil and gas activity in the territory since 1998.

The regulatory framework has evolved with the sector. The development of Yukon's oil and gas resources are subject to strong regulatory requirements and safeguards to protect human health, wildlife, water, land and air. Safety is a cornerstone in regulatory oversight. Through technical research and data collection, the Yukon government can improve its oil and gas regulations to reflect the latest knowledge and ensure the protection of people, air, water, land, wildlife and the overall environment.

The Yukon government continues to review its oil and gas regulations to ensure it is capable of safely regulating oil and gas activities in an economic, resource conserving way.



Consultations on proposed amendments to the *Oil and Gas Act* and *Oil and Gas Disposition Regulations* occurred in the summer of 2015. The *Oil and Gas Act* was subsequently amended in December 2015. Changes to the *Oil and Gas Disposition Regulations* are under consideration following further consultation with Yukon First Nations in the summer of 2016.

## Conclusion

Discussions around natural resource development are often challenging with much of the focus revolving around environmental concerns.

While environmental stewardship is a primary consideration, the Yukon government is also responsible for considering the social and economic benefits of any proposed development project.

Sustainable development requires a balance between environmental, social and economic considerations. Governments must represent the broad public interest in seeking the best sustainable path for developing publicly owned resources.

The Yukon government's role is to ensure that benefits are maximized while carefully mitigating and managing any potential effects on people and the environment. There are many laws, regulations and policies to guide the government's decision making process.

In the end, the Yukon government is committed to responsible resource development. To ensure responsible resource management decisions, we are focussing on being well informed about the risks and benefits of a development project. The Yukon government's Action Plan on Responsible Oil and Gas Development will assist in guiding our path forward as stewards of this natural resource.

## **Partnerships and Collaborative Efforts**

This list summarizes all partnerships, research studies, and project teams that were formally established to fulfill the Action Plan's objectives. This list includes pre-existing partnerships and collaborations that bring value to implementing the Action Plan.

### **University Affiliates**

Canadian Water Network  
University of Calgary  
University of Guelph

### **Industry**

Canadian Association of Petroleum Producers (CAPP)  
EFLO Energy Yukon Ltd.  
Northern Cross (Yukon) Ltd.  
Yukon Chamber of Commerce  
Yukon Oil and Gas Advisory Committee

### **Other Governments**

Government of British Columbia (British Columbia Oil and Gas Commission, Geoscience BC)  
Government of Canada (National Energy Board, Geological Survey of Canada, Natural Resources Canada, Yukon Environmental and Socioeconomic Assessment Board, Canadian High Arctic Research Station, Natural Sciences and Engineering Research Council)  
Government of Northwest Territories (Northwest Territories Geological Survey)

### **Yukon government departments**

Community Services (Wildland Fire Management)  
Economic Development (Business & Economic Research)  
Energy, Mines and Resources (Oil and Gas Resources and Yukon Geological Survey)  
Environment (Animal Health Unit, Fish and Wildlife, Environmental Programs, Water Resources)  
Executive Council Office (Aboriginal Relations)  
Health and Social Services (Health Services)