# GOVERNMENT OF CANADA RESPONSE TO ALBERTA'S DRAFT LOWER ATHABASCA REGIONAL PLAN

## I. Introduction

Under its *Land Use Framework*, the Government of Alberta's new approach to regional planning brings together many of its responsibilities associated with supporting economic development, healthy communities, and environmental protection. The Government of Canada acknowledges the Government of Alberta's efforts in the development of the draft regional plan for the Lower Athabasca, a region that contains the majority of oil sands development.

The draft *Lower Athabasca Regional Plan* (LARP), released for public comment on April 5, 2011, aims to balance economic, social and environmental objectives and improve the understanding of cumulative environmental effects of development. While only one of the seven regions for which the province is developing plans, the Lower Athabasca is unique in that it is facing national and international scrutiny regarding the local and transboundary environmental impacts of oil sands development. As owner of the resource, Alberta has important management obligations in this regard.

The world's second-largest oil deposit, the oil sands are a resource of national importance. They are a major economic driver, generating about 2% of Canada's GDP, and providing jobs both locally and nationally.

However, recently, the pace and scale of oil sands development have caused concerns domestically and internationally about environmental impacts. These concerns could threaten future development of the oil sands. Effectively managing the social and environmental impacts associated with the growth of the oil sands is essential to their environmentally sustainable development.

Like Alberta, the Government of Canada has responsibilities to monitor, assess and regulate activities in the Lower Athabasca for the purposes of protecting ecosystems and biota in the region. For example, the federal government has responsibilities under the

- *Canadian Environmental Assessment Act* – to assess the impacts of proposed projects
- *Canadian Environmental Protection Act, 1999* – to monitor, assess and regulate pollutants, including toxic substances, air pollutants and greenhouse gases
- *Fisheries Act* – to conserve and protect fish and fish habitat
- *Species at Risk Act* – to protect threatened or endangered species
- *Migratory Birds Convention Act, 1994* – to protect migratory birds, their eggs and nests

- *Canada National Parks Act* – to designate, manage and protect national parks and reserves
- *Navigable Waters Protection Act* – to ensure the public's right to navigate Canada's waters without obstruction

By virtue of these statutes, the federal government has a responsibility to collect information, and develop guidelines and regulations that ensure ecosystems and biota are protected and conserved in the Lower Athabasca and across Canada.

More broadly, the Government of Canada has a number of other related interests stemming from land-use decisions in the Lower Athabasca region. These include the management of federal lands, such as Wood Buffalo National Park and the Cold Lake Air Weapons Range. The federal government also has important legal obligations and commitments to Aboriginal peoples and the fulfillment of responsibilities in the North.

Recently, serious questions have been raised about existing science and monitoring efforts in the region, including their effectiveness in identifying the environmental impacts of oil sands development. These concerns have in turn resulted in questions about the industry's social license to operate and its access to international markets.

The Government of Canada recognizes that the draft LARP is a valuable first step. To ensure environmental sustainability, any management framework – including those found in the LARP – needs solid science and monitoring to underpin it. To this end, Government of Canada scientists will continue to engage their Alberta counterparts so that both governments can provide assurance to Canadians that the oil sands are developed in an environmentally-sustainable manner.

Addressing the environmental monitoring problems in the oil sands will help to secure its future. The Government of Canada is committed to working with the province, industry, and stakeholders to implement a world-class environmental monitoring system.

Within the federal government, Environment Canada has world-recognized expertise in environmental science and monitoring, and it has committed to use its capacity to build the world-class environmental monitoring system needed for the oil sands. In collaboration with Alberta officials, Environment Canada scientists have developed a monitoring plan for water. They are currently developing similar plans for air and biodiversity. The goal is to create a monitoring system that can provide the information necessary for holistic, cumulative effects-based management in the region. The Government of Canada looks forward to continued engagement with Alberta officials on the final design and implementation of the monitoring programs, which will be crucial to achieving

the goals of the LARP, as well as to the discharging of federal environmental responsibilities.

When the monitoring system is implemented the data will be available to all, and will support:

- provincial regulatory decisions and enforcement
- federal regulatory decisions and enforcement
- the assurance of environmentally sustainable production that is key to securing foreign markets, both for sales and investment.

Parks Canada is leading the development of a monitoring program downstream, for the Peace-Athabasca Delta. The system is also being developed in collaboration with Alberta Environment as well as with other federal departments, local Aboriginal groups and non-governmental organizations. Its mandate is to measure, evaluate and communicate the state of the Peace-Athabasca Delta ecosystem. This monitoring system will provide a valuable complement to the one whose design is being led by Environment Canada.

Federal and Alberta officials are collaborating on a number of other regulatory initiatives pertinent to the area. For example, federal government scientists are collaborating with Alberta officials in the development of a water quantity management framework, which will subsequently be incorporated into the LARP. Environment Canada officials are participating in the development of a national Air Quality Management System, which may then inform the Air Quality Management Framework of the LARP.

Natural Resources Canada leads a comprehensive research program on oil sands water and tailings management that works in close collaboration with industry, regulators, and academia. An important part of this program is the effort to move the industry to develop dry tailings technologies that will significantly change the impact of tailings ponds on the local environment. Natural Resources Canada officials are also working in collaboration with other government departments and academia on oil sands carbon capture and storage technologies, and have initiated a research study to improve the reclamation of mined areas to a boreal forest ecosystem. They have also undertaken isotopic fingerprinting research to distinguish between natural and anthropogenic contaminants in groundwater in the vicinity of tailings ponds.

This response primarily focuses on outcomes three and four of the LARP's *Implementation Plan*, which pertain to the management of landscapes, water and air, and the three management plans that have been released to date – surface water quality, groundwater and air quality. It begins with detailed scientific and technical comments on the management frameworks found in the LARP, and ends with a number of federal perspectives moving forward. It is recognized that some of the issues identified below are also acknowledged in the current draft of the LARP.

From an environmental management perspective, there are many positive elements of the LARP:

- It provides a structured, outcomes-based approach to managing environmental issues that could improve transparency and fairness, and support common approaches to achieving environmental goals
- It is intended to take a cumulative effects perspective that uses baselines, triggers and limits based on measurements of what is present in the ecosystem, as opposed to only regulating what is released from individual sites
- It uses science-based limits within the management frameworks
- It incorporates mandatory management responses (as opposed to voluntary measures) to exceedances of those limits
- It uses triggers as early warning signals to prompt a better understanding of a potential problem prior to taking action
- It has an evergreen nature that will allow it to grow and adapt as new knowledge emerges and as circumstances change

While the management frameworks proposed in the LARP identify some of the science and monitoring elements required, key gaps remain. In the following sections, the Government of Canada provides comments on these gaps, in support of the LARP's effective design and implementation.

## II. Comments on the Surface Water Quality Management Framework

The *Surface Water Quality Management Framework* uses science-based guidelines to set water quality limits, and incorporates water quality indices to analyze and interpret monitoring data. The use of triggers and limits as management tools are positive steps forward in protecting the water quality of the Lower Athabasca. The Government of Canada recommends the following to further strengthen the *Water Quality Management Framework*.

### *1. Enhancing the Cumulative Effects Approach*

The Government of Canada supports the principles underpinning the LARP, particularly the focus on promoting a cumulative effects-based approach. However, the regional plan does not define or identify what would actually constitute the measured cumulative effects. Two areas for consideration are described below.

The first is the inclusion of biological parameters, such as changes in the relative abundance of aquatic invertebrates, bioaccumulation of toxic substances in key invertebrate or fish species, or fish health assessments. Because changes in these parameters are affected by all environmental stressors, they are useful tools for determining the full range of cumulative effects.

The inclusion of biological parameters would also take into account interactions between contaminants. Because mixtures of contaminants can interact with each other or the target organism to generate new effects, measuring biological endpoints (e.g. fish health) can reveal effects that might not be predicted from the properties of each of the constituent substances in isolation.

*2. Developing an Understanding of the Mechanisms of Ecosystem Impacts*

Although the *Surface Water Quality Management Framework* includes baselines, triggers and limits regarding acceptable contaminant levels, an enhanced understanding of the mechanisms underlying the spatial and temporal distribution of these contaminants would help to better manage the environmental impacts of the development of the oil sands.

For example, the fluxes of contaminants, especially between surface and groundwater, and the atmosphere and surface water, have important implications for the distribution of contaminant loads throughout the ecosystem. Where the contaminants end up affects which part of the ecosystem they impact. Similarly, the frequency (how often), duration (how long), geographic extent (how broad), and season (fish spawning season) can change the impacts of the same amount of contamination. As an illustrative example, many adsorption processes and ecological consequences of oil sands effluents may be pronounced during the ice-cover period and particularly in the late fall/winter and early spring. By taking into account the considerations mentioned above, monitoring can be fine-tuned to efficiently measure factors that could have the most impact on the health of the ecosystem, including the resident biota.

The surface water quality monitoring system developed by scientists from Environment Canada and Alberta Environment could be a source of data for Alberta to use in an improved *Surface Water Quality Management Framework*.

*3. Augmenting the Management Framework's Scope*

The *Surface Water Quality Management Framework* provides limits for 12 general water quality indicators and 29 metals, taken from a sampling site at Old Fort. Although these are generally-acknowledged key indicators for water quality, and while some of the metals are key constituents of bitumen, the *Framework* could be strengthened through the inclusion of additional indicators that are high profile and important substances specific to the oil sands industry. Two notable groups would be oil sands acids (i.e. naphthenic acids) and polycyclic aromatic hydrocarbons (PAHs). Their addition would allow evaluation of monitoring data that is pertinent to the concerns raised regarding the oil sands' impact on water quality.

The decision criteria used to determine the inclusion of water quality indicators in the *Framework* are clear but conservative. Using the cited criteria, there are

insufficient data available to support the proposed statistical approach (based on an “inverse t-test”) and therefore the inclusion of some important indicators (e.g. PAHs and napthenic acids) in the *Framework*. However, other statistical techniques exist that could be used (e.g. some based on presence/absence observations) for which current data would be sufficient. Alternative statistical methodologies would allow inclusion of key oil sands parameters in the *Framework*.

Additionally, there would be benefits to expanding the proposed geographic scope of the monitoring that supports the *Surface Water Quality Framework*. The risk in the approach proposed in the *Framework* is that evaluating a single monitoring location on the main stem of the Athabasca River could result in the omission of upstream localized exceedances of limits, especially in environmentally important tributaries. An increased spatial coverage would address this challenge and also allow monitoring to identify any problematic locations within the region. If there prove to be any localized points of concern, monitoring could be focussed on these areas, and management or protective actions taken if necessary.

Additionally, the Old Fort monitoring site would not provide an evaluation of ecological consequences, should there be any, of oil sands operations on the downstream receiving waters, including Lake Athabasca, the Peace-Athabasca Delta and the Slave River.

The surface water quality monitoring plan developed by scientists from Environment Canada and Alberta Environment will incorporate a broader geographic scope and provide the additional water quality monitoring data required to apply the Framework across a broader area, rather than to a single monitoring site. Also, if limits are approached or exceeded, the new monitoring plan will provide spatially explicit data that will allow identification of the source of contamination and help facilitate appropriate management actions.

*4. Improving the Science Behind Existing Water Quality Limits*

The Government of Canada supports the establishment of limits for contaminants, based on toxicological studies, as part of a cumulative effects management approach. It is noted that most of Alberta’s proposed water quality limits reference currently accepted standards. However, there are some limits that, in their present form, would not be appropriate for use by the federal government in its assessment and regulatory functions.

For both the groundwater and surface water quality management frameworks, some of the water quality limits cited would benefit from being re-examined and focussed on the most ecologically pertinent endpoint (e.g. the limits for Cr, Fe, Se). For example, the selenium water quality limit could be based on fish tissue

units instead of water concentration, as new scientific evidence shows that the tissue concentration is more informative regarding the effects of contamination.

Another group of limits (e.g. Sb, Ba, Be, B, Ca, Cl, Co, Li, Mn, Mo, $SO_4$) is protective of receptors that are not aquatic organisms (e.g. livestock or drinking water), and therefore does not necessarily provide adequate protection of aquatic ecosystem health. Shifting the values of these limits to those recommended for the protection of aquatic ecosystems would improve the consistency of, and strengthen, the *Framework*.

It would also be important to include limits for the concentrations of the dissolved or bioavailable fractions of many of the metals, for which there are currently only "trigger" concentrations. Because the bioavailable fraction has the most direct impact on living organisms, this measurement is of significance to the ecosystem impacts of the metal contamination.

Some of the water quality limits that were derived from existing national standards are frequently surpassed in water quality readings from the Athabasca River. For example, Alberta Environment measured Canadian Council of Ministers of the Environment (CCME) guideline exceedances for each of iron, aluminum, cadmium and copper at a frequency of greater than 40% of samples taken; other relevant parameters (e.g., phosphorous, nitrogen, dissolved solids) are also consistently exceeded.

Because the river has considerable sediment and flows over bitumen deposits, it is unknown whether these exceedances are due to natural or human causes. Therefore, it is unknown whether they are exceedances that require action to manage, or are natural characteristics of the river, which require site- or region-specific limits.

The development of site-specific guidelines would provide important context for these compounds.

*5. Ensuring Statistical Power*

Although trigger values are identified in the *Surface Water Quality Framework* as long-term mean values, it is also stated that a statistical evaluation of the method to determine triggers is required and that a method is needed to detect if a trigger value has been reached. The natural variation of the data is large and therefore limits the ability to measure increases. Understanding the statistical power to detect change for each water quality parameter is important.

A power analysis of a subset of Athabasca River water quality parameters revealed that the existing monthly sampling is likely insufficient to detect a 20% increase in effect size (an effect size often used) as many water quality indicators

had low power. This was especially true for indicators of particular interest, including nutrients and metals (see Table 1 below). In Table 1, the Sample Size is the necessary number of annual samples to measure a 20% Effect Size Increase. Stated otherwise, it is the number of annual samples necessary to measure a 20% increase or decrease in the mean. Low statistical power because of natural variability is an inherent challenge in water quality monitoring. Biological cumulative effects monitoring, detailed above, is a commonly used technique that complements chemical monitoring and aids in monitoring data interpretation, especially when inherent data variability makes collecting a sufficient number of chemical samples difficult.

Table 1 – Calculation of sample size and power based on a 20% increase in Effect Size from the mean (trigger value)

| | General Indicator (mg/L) | n | Max | Min | Median | Mean | Variance | SD | 20% Effect Size Increase | Sample Size | New Mean based on 20% Effect Size Increase | Power to detect 20% increase with 12 samples |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Calcium (Ca2+) | 237 | 54.8 | 19.1 | 33.5 | 34.7 | 62.8 | 7.9 | 6.94 | 10 | 41.64 | 0.95 |
| | Chloride (C1-) | 237 | 64.2 | 1.2 | 17.3 | 20.2 | 194 | 13.9 | 4.04 | 79 | 24.24 | 0.377 |
| | Magnesium (Mg+) | 237 | 15.7 | 4.6 | 9.5 | 9.5 | 5.7 | 2.4 | 1.9 | 12 | 11.4 | 0.912 |
| | Potassium (K+) | 237 | 8.2 | 0.2 | 1.3 | 1.4 | 0.4 | 0.6 | 0.28 | 32 | 1.68 | 0.608 |
| | Sodium (Na+) | 237 | 51.4 | 4.6 | 19.7 | 21.4 | 137.1 | 11.7 | 4.28 | 50 | 25.68 | 0.475 |
| | Sulphate (SO4-) | 237 | 53.9 | 0.3 | 25.6 | 26.7 | 90.4 | 9.5 | 5.34 | 22 | 32.04 | 0.723 |
| | Total Dissolved Phosphorous (TDP) | 231 | 0.096 | 0.002 | 0.013 | 0.016 | 0.00014 | 0.012 | 0.0032 | 94 | 0.0192 | 0.347 |
| | Total Phosphorous (TP) | 234 | 0.37 | 0.013 | 0.042 | 0.073 | 0.005 | 0.072 | 0.0146 | 161 | 0.0876 | 0.347 |
| | Nitrate (NO3-N) | 118 | 0.63 | 0.002 | 0.052 | 0.092 | 0.011 | 0.105 | 0.0184 | 215 | 0.1104 | 0.243 |
| | Total Ammonia (NH3+4-N) | 231 | 1 | 0.01 | 0.03 | 0.05 | 0.01 | 0.08 | 0.01 | 422 | 0.06 | 0.194 |
| | Total Nitrogen (TN) | 235 | 1.931 | 0.032 | 0.562 | 0.59 | 0.063 | 0.251 | 0.118 | 31 | 0.708 | 0.612 |
| Metals (µg/L) | Arsenic (Total) | 56 | 5 | 0.1 | 0.8 | 1.1 | 0.7 | 0.9 | 0.22 | 111 | 1.32 | 0.320 |
| Metals (µg/L) | Cadmium (Total) | 56 | 2.6 | 0 | 0.1 | 0.3 | 0.2 | 0.5 | 0.06 | 458 | 0.36 | 0.189 |
| Metals (µg/L) | Mercury (Total) | 36 | 0.02 | 0.0003 | 0.003 | 0.005 | 0.0287 | 0.0054 | 0.00104 | 126 | 0.00624 | 0.303 |

Data from Tables A1 and A2 in the Lower Athabasca Regional Plan (draft Surface Water Quality Management Framework).

## III. Comments on the Groundwater Management Framework

These comments are provided acknowledging that the *Groundwater Management Framework* is not as well developed as the *Surface Water Quality Framework*. The multiple science needs identified in the *Framework*, including developing appropriate site-specific and regional triggers and limits, and completion of groundwater models, are acknowledged.

### *1. Taking an Integrated Approach to Ground-Surface Water Interactions*

As noted in the *Framework*, the Lower Athabasca has a very complex hydrogeology. There are environmentally important ground-surface water interactions or exchanges in the oil sands region. Existing surface water contamination (from the natural oil sand deposits) is largely related to the groundwater flow (level and quantity) and groundwater contaminant flux to the rivers. An improved focus on these groundwater-surface water interactions would strengthen the *Groundwater Management Framework*.

Such an undertaking would require a network of monitoring wells and drive points proximal to groundwater discharge points near surface waters. Seepage meters installed in surface waters could also be a useful tool. Finally, integrated modelling of groundwater and surface water could also be helpful in delineating groundwater-surface water relationships.

### *2. Improving Groundwater Quality Indicators*

The justification to divide the groundwater quality parameters into multiple tiers is not clear. There may be good justification and, if so, it is recommended that this justification be included in the *Framework*. To best understand groundwater quality, a broad suite of physical and chemical parameters could initially be consistently measured. Surrogate parameters (e.g. Total Dissolved Solids (TDS)) could replace individual analytes once their reliability has been demonstrated. Alternatively, the sets of indicators within the *Framework's* "primary" and "secondary" tiers could be considered to be of equal importance, and could both be monitored to ensure adequate groundwater quality.

The *Framework* could also be strengthened by providing justification for the differences between the proposed water quality parameters for mining versus in situ operations.

The establishment of indicators, limits and triggers is an effective approach to detect changes to groundwater quality and quantity. However, certain parameters in specific aquifers are highly variable (e.g. TDS in the Basal McMurray aquifer), therefore a single trigger value may not be applicable and spatially explicit limits would likely need to be developed.

Also, as mentioned above, some of the limits cited are protective of receptors that are not aquatic organisms. It is recommended that the use of drinking water guidelines be used in the context of drinking water, and not used to determine the extent of protection of aquatic life.

*3. Using Site-specific Monitoring as an Early Warning Method*

While a regional monitoring and evaluation system is certainly necessary, the use of regional triggers to serve as early warnings of a negative change in condition from natural variability may be hampered by the slow rate of groundwater flow in much of the region. Accordingly, it is possible that effects of site-specific projects may not be observed at the regional scale or at surface water receptors until decades or centuries later.

Examination of the data generated by routine site-specific monitoring, instead of that from regional monitoring, would provide better “early warning” of possible groundwater problems. The proximity of monitoring wells to potential sources of contamination and closer spacing of monitoring locations could make the site-specific locations more effective than the regional system. Again, the establishment of indicators, limits and triggers for these site-specific locations should apply.

*4. Addressing Baseline Challenges*

In order to manage the impacts of development, it is usual practice to determine the natural background levels so that the total anthropogenic releases can be quantified and monitored. The *Groundwater Management Framework* outlines a plan to supplement the existing data set through the collection of additional data for the three regional monitoring networks, either recently established, or still being planned.

The determination of accurate baseline conditions for groundwater quality may prove challenging, as there is already considerable development activities in the region. Additional measures, such as isotopic fingerprinting methods may be the only means to understand pre-development conditions.

*5. Ensuring a Comprehensive Scope*

The *Groundwater Management Framework* identifies the three groundwater management areas. The study area boundary for the North Athabasca Oil Sands (NAOS) could be strengthened by including oil sands projects where there is a reasonable potential for environmental impacts and cumulative effects to groundwater. In particular, all proposed oil sands mines and lease areas immediately south of Wood Buffalo National Park should be completely included within the study area boundary for the NAOS.

*6. Considering Indirect Surface Water Impacts: Fish Habitat and Navigation*

There are some activities specific to oil sands development that may have impacts on fish, fish habitat and navigation that deserve consideration. One impact to surface water that is not well-understood results from activities associated with in situ projects such as Steam Assisted Gravity Drainage developments. With this type of oil extraction, pressurized steam is pumped underground. This can cause heave and subsidence of the landscape overlaying the reservoir, which, in turn, can have an effect on groundwater and surface water flows and potentially impact wetlands, fish habitat, and navigation. Another consideration is the potential for the depressurization of groundwater due to oil sands mine development, which could result in a de-watering of surface water streams and tributaries, with subsequent impacts on fish habitat and navigation.

Further research on these activities, their impacts and their potential management through limits and triggers, would help the LARP to achieve its sustainable development goals.

## IV. Comments on the Air Quality Management Framework

*1. Clarifying the Scope of the Air Quality Management Framework*

Although the *Framework* addresses $SO_2$ and $NO_2$, there are other important air pollutants that are relevant to the oil sands and have negative human and ecosystem health impacts, specifically particulate matter, ozone, volatile organic compounds, metals and toxics.

Describing the relationships between the LARP and other frameworks, such as the *Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework*, and the *Air Quality Management System*, could help demonstrate the extent to which it conveys Alberta's comprehensive approach to air quality management.

The geographic scope of the *Air Quality Management Framework* would not enable it to address transboundary air quality concerns (e.g. acid-sensitive lakes outside the Lower Athabasca region). By definition, this is difficult to do within a regional planning regime such as the LARP. The Air Quality Management System (AQMS), whose development is being co-led by the Governments of Alberta and Canada, is a pan-Canadian initiative with implementation slated for 2013. It will address issues like transboundary air quality issues and could be the means to address this gap.

Further, the AQMS will also establish a Canada-wide approach to air quality management that could affect what the Government of Alberta has proposed in LARP. The Government of Alberta has recognized that there may be a need for adjustments to align to future AQMS. Similarly, the federal government

recognizes that its comments on the *Air Quality Management Framework* may be affected by future developments in the AQMS.

*2. Continuing to Work Collaboratively to Develop Ambient Air Quality Standards, Improve Analytical Methodologies, and Air Quality Limits*

The Government of Alberta's efforts to develop new, more stringent ambient air quality objectives for $NO_2$ are commendable. Governments across Canada are continuing to develop new Canadian Ambient Air Quality Standards for $NO_2$ and $SO_2$ in the near-term.

Although intergovernmental discussions on ambient air quality standards will continue, it is worth noting that there are a variety of potential human and/or ecosystem health endpoints. Two examples are the World Health Organization's health-based guideline for both $NO_2$ and $SO_2$.

Similarly, there are areas in the measurement methodology and analysis aspects of the *Air Quality Management Framework* that could be strengthened to increase its effectiveness at protecting health and the environment. For example, conventional ambient $NO_2$ measurements do not measure $NO_2$ directly, but through a chemical conversion process that can result in artificially inflated values for $NO_2$. This is especially the case in non-urban settings. By taking challenges like these into account, the *Framework* could be better able to manage air quality.

The proposed calculation method for air quality limits uses the 99th percentile value as the metric representative of the upper tail of the concentration frequency distribution. This means that 87 hours (or roughly 3 and a half days) of highest concentration values could be lost when representing the peak data. Further, the proposed method calculates annual ratios of the 99th percentile to the maximum value and then averages the ratio over several sites. This method reduces the influence of the highest concentration values through the use of the 99th percentile, the application of the average ratio from all sites to adjust the trigger criteria, and the combination of urban, industrial and background site data to calculate the average ratio for $NO_2$.

Another possible approach for applying the trigger concept could be to follow the Canada Wide Standards approach for ozone, namely, to use the 4th highest hourly concentration values instead of a percentile value and base the trigger levels on the original AAAQO values (i.e., with no adjustment by the average of the 99th percentile to maximum ratios). This could provide a more direct measure of peak air quality and allow the detection of the presence and impact of high values.

By including "secondary pollutants" (i.e., the reaction products of $SO_2$ and $NO_2$ with other airborne compounds), the scope of the *Framework* would be more comprehensive and protective of human and ecosystem health.

## V. Comments on Biodiversity Protection

In providing these comments, the Government of Canada acknowledges that Alberta's *Biodiversity Management Framework* and land disturbance plan will be released by 2013. However, the LARP does propose new protected areas (parks, recreation areas and conservation areas) that could contribute to biodiversity conservation. The following comments refer mainly to these proposed new protected areas.

### *1. Ensuring Protected Areas Designation Incorporates a Strong Scientific Basis*

It is noted that the Government of Alberta has proposed to increase the proportion of protected areas (including parks, recreation and conservation areas) in the region from about 6.7% to 24.5%. It is understood that these areas have been chosen through a process that seeks to achieve a balance between economic, social and environmental considerations.

From a Government of Canada perspective, protected land designation should ensure the adequate representation of all the ecosystem types in the region, including the boreal plains. Consideration should also be given to ensuring connectivity among protected areas, including National Parks. By so doing, the representative biodiversity of northeastern Alberta is more likely to be conserved.

### 2. *Maintaining a Strong Focus on Species At Risk*

As the Government of Alberta advances with its *Biodiversity Management Framework*, it will be important to ensure a prominent focus on threatened and endangered species whose critical habitat lies within the region. The Lower Athabasca Region contains habitat for a number of endangered and threatened species (e.g. boreal caribou) whose critical habitat will be identified in the near future.

### *3. Using Offsets to Protect Biodiversity*

One strategy for protecting biodiversity, including species at risk, could be the use of land-use offsets for those areas impacted by industrial development, as was proposed by the Lower Athabasca Regional Advisory Council. "Offset" lands would be designated to compensate for ecological values (e.g. old growth forest biodiversity or peat bogs) that are impaired or lost through economic activities.

### *4. Including Aboriginal Perspectives*

The Government of Canada acknowledges the Government of Alberta for highlighting the importance of Aboriginal engagement as one of the key implementation outcomes in the LARP. Accordingly, the Government of Alberta is encouraged to incorporate Aboriginal Traditional Knowledge in the development of the *Biodiversity Management Framework* and in the setting of limits and targets.

## VI. General Federal Perspectives on the LARP

Below are some more perspectives on the draft LARP and its management frameworks from a broader Government of Canada perspective.

When considering water quantity limits under the forthcoming *Surface Water Quantity Management Framework*, it is recommended that the impacts of these limits on navigation, and Aboriginal treaty rights to navigation, be taken into account. Transport Canada is prepared to work with Alberta in setting limits and triggers that protect the navigational use of the waters of the Lower Athabasca Region.

Wood Buffalo National Park, a United Nations Environmental, Scientific and Cultural Organization (UNESCO) World Heritage Site, is located adjacent to the Lower Athabasca Region, forming part of its north-western border. The Peace-Athabasca Delta, a wetland of global significance, is both within the park and downstream of oil sands development. In order to understand and manage downstream environmental impacts due to development within the Lower Athabasca Region, it is suggested that monitoring, especially within the Peace-Athabasca Delta, also be carried out.

It would be useful to clarify two elements of Alberta's biodiversity framework moving forward. The first is regarding whether newly-established provincial recreation areas will include a restriction that prohibits hydroelectric facilities and transmission-related infrastructure on the Slave River, particularly in the Provincial Recreation Area containing Slave River, Cassette, Mountain and Pelican Rapids, as these potential developments could also impact the Delta. Secondly, there is uncertainty on the location of the Athabasca River Corridor adjacent to Wood Buffalo National Park, management intent, and potential intersection with protected land designation.

The Government of Canada recognizes that the Government of Alberta has acknowledged the importance of working with Aboriginal peoples on the implementation of the LARP. It is recommended that the Government of Alberta continue working with parties downstream of the oil sands development, including the Government of the Northwest Territories and affected Aboriginal communities, to ensure they receive adequate supplies of clean fresh water.

Acknowledging the economic importance of the oil sands to Aboriginal companies and communities, continued on-going effective involvement of Aboriginal groups would help to ensure that the LARP's environmental outcomes take into account their perspectives.

The Regional Groundwater Monitoring Network is a critical part of the LARP's *Groundwater Management Framework* and the Network's success is necessary for the achievement of the *Framework*'s groundwater quality and quantity objectives. It will be important to ensure the long-term stability of the Groundwater Working Group, and allow input or participation from a wide variety of participants (e.g. federal, provincial, academic, industry, Aboriginal) in order to successfully address groundwater issues in the region.

The value of all the management frameworks would be optimized if the data collected to support their implementation were archived in a publicly accessible database that automatically identified trigger or limit exceedances. This level of transparency is important to ensure that data and data interpretation are trusted by regulators, stakeholders and the public.

The federal government is a lease holder of provincial crown land at the Cold Lake Air Weapons Range (CLAWR). Continued engagement with the Department of National Defence in the development of the LARP is important to ensure a number of key issues are appropriately and proactively resolved.

These include the possible impacts on land-use in the CLAWR lands due to changed land-use designation on abutting provincial crown lands – for example, there could be pressure for increased access roads in the CLAWR to compensate for reduced access due to the creation of new conservation areas or parks on adjacent provincial crown land.

A second key issue is that of continued use of air space, and associated noise from supersonic and low-altitude flying, above lands outside of the CLAWR that may become sold, or designated as parks or recreation areas. One possible solution for this could be the designation of *Air Range Influence Zones* in the LARP. These would be areas where low level flying is allowed and will be done, which may, from other users' perspectives, create noise nuisances from time to time.

Finally, the proposed LARP land use map indicates that a small segment of the proposed Dillon River Conservation Area crosses the northern boundary of the CLAWR. The boundary data held by the Department of National Defence seems to conflict with the Government of Alberta's interpretation of the CLAWR boundary. This should be clarified prior to the finalization of the LARP.

## VII. Conclusion

The Government of Alberta's LARP is an important step in managing the cumulative effects of development in the region. These comments are offered with the intention of providing science-based advice that could strengthen the LARP's comprehensiveness and effectiveness. Officials from the Government of Canada would be pleased to follow up with their counterparts in the Government of Alberta to provide more detail or clarification.