

Expansion. The Pierre River Mine does not directly overlap with Fort McKay's Traplines. The incremental effect of the proposed Jackpine Mine Expansion on Fort McKay community member's Traplines is as follows: #1714 (5358 ha), #1716 (3168 ha) and #2137(1163 ha); resulting in cumulative losses of 42 to 60% as well as possible impacts on access to the remaining portion of the Trapline.

While there are processes in place to provide individual trapper compensation for adverse effects on Traplines, this does not address the cumulative effects of development on Fort McKay's access to traditional resources, way of life and culture. Any amount of land disturbance and any impediments to access are considered significant adverse effects on Fort McKay's traditional land use opportunities and ability to exercise their Treaty and aboriginal rights. Hence, these effects are not rated using a numeric rating system and instead are rated qualitatively. Because the Current Scenario was given a rating of "significant adverse effect" (gauge in the red zone) and the Application Case increases the disturbance, the gauge stays in the red zone. Application Case impacts are expected to further contribute to a situation that is already significantly adversely affecting Traplines and associated traditional land use.

For details see: *Section 9 – Disturbance and Access Implications for Traditional Use*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.3 Wetlands (Muskeg)

Wetlands are integral to Fort McKay's culture and support many key traditional resources, including traditional plants.

Wetlands covered 171,493 ha (45%) of the FTSA at Pre-development. In the Base Case, wetland cover is reduced to 126,789 ha (33%) of the FTSA. This represents a 26% reduction in the areas covered by wetland vegetation between the 1960s and 2007.

Land occupied by wetlands (muskeg) will decline in the FTSA during the construction and operation phases of the projects (*Application Case*). The incremental effects of the Projects are scored as high (significant) for the direct loss of total wetland, peatland areas associated with wetlands, and the high rare plant potential class for wetlands. The incremental consequences of the Projects are negligible for old growth associated with wetlands and low for productive forest associated with wetlands. The effects of the wetland loss will be experienced into the far future for both the resource and the Community of Fort McKay. These significant losses will negatively affect the Community's ability to carry traditional activities that support its values and culture.

A significant adverse effect is demonstrated for all wetland indicators when the cumulative changes predicted in the Application Case are compared to conditions in

the late 1990s. Cumulative losses of 26 to 37% have occurred in all wetland indicators since the later part of the 1990s. Confidence in wetland reclamation, especially of peatlands, is very low, further emphasizing the long-term effects of wetland disturbance. Losses of wetlands and wetland indicators above 20% are classified as significant adverse effects of high environmental consequence; hence the gauge stays in the red zone (meaning significant adverse effect) in the Application Case.

For details see: [Section 7 – Vegetation](#) Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.4 Upland Forest

Upland forests support many of the key traditional resources important to Fort McKay.

Uplands covered approximately 158,166 ha (42%) of the land area in the FTSA at Pre-Development. In the Base Case, upland land cover is reduced to 138,907 ha (37%) of the land area in the FTSA. This represents a 12.2% reduction in the areas covered by upland vegetation between the 1960s and 2007.

In the [Application Case](#), upland cover is reduced to 134,440 ha (35%) of the land area in the FTSA. This represents a 15% reduction in the areas covered by upland vegetation since the 1960s.

Land occupied by upland forest will decline in the FTSA during the construction and operation phases of the projects (Application Case). The incremental effects of the Projects from Base to Application Case are scored as negligible to low significance for the direct loss of total upland forest, rare plant potential class, old growth associated, and productive forests associated with uplands. Though limited in nature, these losses will negatively contribute to the Community's ability to continue traditional activities that support its values and culture during operations (i.e., the Application Case).

A moderate to high adverse effect is demonstrated for all upland indicators when the cumulative changes predicted in the Application Case are compared to conditions in the late 1990s. Losses of uplands and upland indicators are close to or above 20% (meaning significant and adverse with high environmental consequence). Because of the concern that all indicators will move toward the high magnitude change (currently only riparian and low rare plant potential sites are high) the gauge stays in the yellow zone in the Application Case.

For details see: [Section 7 – Vegetation](#), Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.5 Biodiversity

Biodiversity is important to Fort McKay because it reflects the integrity of the landscape and ecosystems that support Fort McKay's traditional activities. The biodiversity assessment evaluated changes in biodiversity at the ecosystem level (biodiversity potential) and at the landscape level (distribution and make-up of landscape "types").

At the ecosystem level, lands ranked with high biodiversity potential have decreased in the FTSA by 26% between 1960 and 2007 (Base Case). Moderate biodiversity potential areas have decreased by about 20% since 1960, while low biodiversity potential areas have decreased by 10%. When the *Application Case* is considered, high biodiversity potential decreases 35% since the 1960s. Moderate biodiversity potential areas in the Application case decrease by about 25% since 1960, while low biodiversity potential areas in the Application Case increase by 56% since 1960.

At the landscape level, upland (15% since the 1960s) and wetland cover (35% since the 1960s) has decreased. As well, the landscape has been fragmented; the number of "patches" (areas surrounded by disturbance) in the FTSA has increased. The patch size has decreased which indicates that there are more areas experiencing disturbance.

Changes in biodiversity greater than 20% are considered to be significant and adverse, hence the gauge is determined to be in the red zone for the Application Case when compared to the late 1990s—this includes ecosystem level biodiversity and landscape level effects on wetlands and uplands.

For details see: *Section 8 – Biodiversity*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.6 Traditional Plants

The harvesting of traditional plants is a key traditional use activity of Fort McKay. The traditional plant assessment looked at areas of "traditional plant potential" as well as at some specific Fort McKay berry harvesting sites.

5.1.6.1 Traditional Plant Potential

Prior to oil sands development (1960s) the traditional plant potential in the FTSA was as follows: high (30%), moderate (46%), and low (23%). In the *Application Case* the proportion of high plant potential areas decreased from 30% to 26% and moderate potential areas decreased from 46% to 25%. In contrast, areas ranked with low potential to contain traditional use plants increased from 23% at Pre-Development to 49% in the Application Case, due to the increase in area of disturbed land (which are ranked as having low plant potential). When Application

Case is compared to the late 1990s, the changes are considered significant and adverse; as such they are each given a ranking of red for the Application Case.

5.1.6.2 Berry Sites

One hundred and fourteen (114) traditional use berry sites were documented within the FTSA (FMFN 1994). Fifty-three (53) of these berry sites (46%) have been lost as of 2007. The Application Case disturbed an additional four traditional use berry sites (7%). While Fort McKay acknowledges that berry producing sites may be created with reclamation these historical traditional use sites cannot be re-created to pre-development conditions, and therefore considers these losses to be permanent. The cumulative loss of 54% of the traditional use berry sites since development began including the Application Case is considered highly significant and adverse to the Community; hence the gauge is in the red zone.

For details see: [Section 7 – Vegetation](#), Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.7 Moose Habitat and Populations

Moose is a Cultural Keystone Species for Fort McKay and secure moose populations are very important for hunting and the on-going sustainability of Fort McKay's culture. The best moose habitat is concentrated near the Athabasca River Valley, and within the Muskeg and Firebag river drainages.

Currently, a substantial amount of moose habitat is disturbed; 20% of the high and moderate quality moose habitat in Fort McKay's intense use Culturally Significant Ecosystem (CSE) traditional land use areas. When the [Application Case](#) is considered, 23% of habitat is disturbed. An assessment of moose habitat within the FTSA indicates there is currently a 25% loss of moose habitat, which increases to 32% in the Application Case. Although Fort McKay uses all their Traditional Lands, the adverse effects on moose habitat and populations are felt even more intensely because the disturbances are disproportionately experienced within the Intense Use CSE and the FTSA, which are the most used and most easily accessible areas.

Recent surveys carried out by Alberta Sustainable Resource Development as part of the Fort McKay Country Food Availability Study show that moose populations have declined within Wildlife Management Area 531, which overlaps the Fort McKay's Traditional Lands west of the Athabasca River.

The Base Case for disturbance to moose habitat and populations within the FTSA was given a rating of "significant adverse effect" (gauge in the red zone). The Application Case increases the disturbance and there is a population study that demonstrates a decline in moose populations within Fort McKay's Traditional Lands, so the gauge stays in the red zone. Since habitat losses 20% or greater are considered significant and could potentially lead to declines in population levels, the

rating for habitat within the intense use CSE is in the red zone for the Application Case.

For details see [Section 6 – Wildlife](#), Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.8 Canada Lynx Habitat

Canada lynx is an important trapping species for Fort McKay. The best Canada lynx habitat is concentrated near the Athabasca River Valley and in the northeast portion (including the Muskeg and Firebag drainage basins) and the northwest corner of the Fur Bearer CSE.

Currently, disturbance to high and moderate Canada lynx habitat is as follows: Low Use CSE (0%), Moderate Use CSE (9%), Intense Use CSE (14%), and FTSA (26%). When the [Application Case](#) is considered, the Low Use CSE disturbance remains the same (0%), Moderate Use CSE disturbance increases from 9% to 10%, Intense Use CSE disturbance increases from 14% to 17% and FTSA disturbance increases from 26% to 33%.

Evidence suggests that habitat loss from oil sands development is adversely affecting moose populations (SRD 2009). In the FMSA, sufficient population data for other wildlife species were not available and hence were not analyzed. However, if moose populations are being adversely affected by oil sand development, it is likely that other wildlife species populations are also being adversely affected. Both Canada lynx and fisher/marten have lost large amounts of high quality habitat. As a precautionary approach, it should be assumed that other wildlife species populations are being adversely affected until shown otherwise.

Since habitat losses 20% or greater are considered significant and could potentially lead to declines in population levels, the gauge is in the red zone for lynx habitat impacts in the FTSA and in the yellow zone (indicating a situation that is of concern and requires monitoring) for impacts within the intense and moderate use CSEs.

For details see [Section 6 – Wildlife](#), Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.9 Beaver Habitat

Beaver is a Cultural Keystone Species for Fort McKay and secure beaver populations are very important for trapping and the on-going sustainability of Fort McKay's culture.

Currently, beaver habitat has been lost within the intense (23% loss), moderate (17% loss) and low (9% loss) traditional use Fur Bearers CSEs. Within the FTSA about 20% of the high quality beaver habitat has been lost. When the [Application](#)

Case is considered, the habitat loss is as follows: intense use CSE increases from 23% to 24%, moderate use CSE remains the same (17%), the low use CSE remains the same (9%) and the FTSA increases from 20% to 26%.

Since habitat losses 20% or greater are considered significant and could potentially lead to declines in population levels, the gauge is in the red zone (meaning significant adverse effects) for impacts to beaver habitat in the intense use CSE and the FTSA and in the yellow zone (indicating a situation that is of concern and requires monitoring) for impacts within the moderate use CSE.

For details see [Section 6 – Wildlife](#), Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.10 Fisher/Marten Habitat

Fisher and marten are important trapping species for Fort McKay. The best fisher and marten habitat is concentrated near the Athabasca River Valley and in the northeast portion and northwest corner of the Fur Bearer CSE.

Currently, fisher and marten habitat has been lost within the intense (10% loss), moderate (9%), and low (4%) traditional use Fur Bearers CSEs of the Fort McKay's Fur Bearers CSE. Within the FTSA, 22% of high quality fisher/marten habitat has been lost. When the **Application Case** is considered, the habitat loss is as follows: intense use CSE increases from 10% to 13%, moderate use CSE increases from 10% to 12%, the low use CSE remains the same (4%), and the FTSA increases from 22% to 30%.

Since habitat losses 20% or greater are considered significant and could potentially lead to declines in population levels, the gauge is in the red zone for fisher and marten habitat impacts in the FTSA and in the yellow zone for impacts within the intense and moderate use CSEs.

For details see [Section 6 – Wildlife](#), Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.11 Protected Areas

Fort McKay has set a Healing the Earth Strategy target of protecting 40% of its Traditional Lands for traditional use. Currently there are only five provincially protected areas within Fort McKay's Traditional Lands, which comprise about 6.4% of Fort McKay's Traditional Lands:

- Birch Mountains Wildland Provincial Park
- Marguerite River Wildland Provincial Park
- Richardson River Dunes Wildland Provincial Park

- Whitemud Falls Wildland Provincial Park and Ecoreserve
- Quarry of the Ancestors (candidate Provincial Historic Site)

As well, Creeburn Lake, which was transferred to Fort McKay under Treaty Land Entitlement in 2006, has been identified through the Community land use planning process as an area to protect for preservation of culture.

Fort McKay has identified a large area within which specific protected areas could be selected. Within this large area there are currently several constraints to the development of new protected areas; about 30% is already existing or approved projects and if currently tenured leases are developed about 78% of the land could be lost. The remaining land is already fragmented by linear development and more linear development is likely.

In contrast to other indicators, protected areas is a positive indicator; as the amount of protected areas increases, the potential for offsetting losses to traditional use from disturbances is increased and the gauge moves toward green. Since the current level of protected areas is so much below Fort McKay's target and there are many pressures on the land that Fort McKay has identified for potential protection, the gauge is in the red for the Base Case and remains in the red for the *Application Case*.

For details see *Section 9 – Disturbance and Access Implications for Traditional Use*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.1.12 Reclamation

Reclamation is the main proposed mitigation for oil sands operations; Fort McKay has serious concerns about its ability to provide suitable landscapes for traditional activities (Healing the Earth Strategy, Fort McKay IRC 2010b):

Put it back the way it was—when the land is mined it should be reclaimed to the way it was; however, current reclamation plans are for landscapes with more uplands, few wetlands and many large pit lakes instead of the extensive networks of wetlands, rivers and streams that exist now.

Reclamation is too slow—reclamation starts about 10 years after a project begins, and then even if re-vegetation is successful, it takes an additional 20 to 25 years for these sites to mature into forests. Land reclaimed in the region is currently less than 200 ha of the over 133,000 ha of disturbance. If the land is unavailable for traditional uses for more than a generation, much of the traditional knowledge will be lost.

You can't put the spirit back into the land—when the landscape is reclaimed the land will lose “spirit” and medicines and other plants grown on the reclaimed sites will not be as effective.

Reclaimed land will not be safe for animals or people—decades of living with oil sands mining on their Traditional Lands has provided the Community with examples of air, land and water impacts due to uncontrolled events. There is a concern regarding the health and safety of animals and people who use the reclaimed land.

Muskeg is important, water is important—there are concerns about water quality, both on and off the reclaimed mine sites and the lack of ability to reclaim muskeg.

Who will be responsible for the land (environmental issues) when mining is finished?—Fort McKay will remain after mining is completed and is concerned about long-term environmental issues.

Due to these concerns and the lack of successful reclamation to date (only 104 ha have received reclamation certification), the gauge remains in the red from the Base Case to the Application Case.

For details see [Section 10 – Reclamation](#), Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.2 Pollution

Community members worry about the effect industrial pollution is having on the land, and thus the quality (and quantity) of wild meat, fish and plants. People are concerned not only for the land and the plants and animals it supports, but for their own health as well. This deters some individuals from harvesting activities near the Community where much of the industrial activity is taking place. The perceived need to travel further distances and the related cost also further discourages some individuals from harvesting activities all together. As shared by Community members,

You have to go way out into the mountains to hunt. I don't eat anything from around here.

(Fort McKay Workshop 2008)

Haze and smoke and yellow stuff gets deposited on vehicles after it rains. You can see them stacks. Sometimes you can see just the green haze drifting in the wind. It's not clean air.

(FMA 2008: 35)

It doesn't go away...no matter where the wind blows you're gonna get it. You leave your clothes outside and if you bring them inside, oh, it doesn't smell good.

(FMA 2008: 35)

Through changes in land use patterns, perception of risk when consuming wild foods, and changes in food availability, pollution has the ability to strongly impact harvesting activity, and in turn Fort McKay’s cultural heritage.

See Table 5-2 for a summary of indicator gauges related to Pollution. As summary of all gauges discussed in the Project-specific CHA is located in [Appendix A](#).

See Section 8.3.1, [CHA Baseline](#) for additional discussion of Fort McKay’s concerns related to Pollution.

Table 5-2: Pollution Indicator Table

Measuring Change In Stressors	Green-Yellow-Red Gauge Rating ¹				
	Pre-Development Scenario	Current Scenario	Base Case	Application Case	Planned Development Case
Air quality parameters – Sulphur dioxide (SO ₂)					
Air quality parameters – Nitrogen Oxides (NO _x)					
Air Quality – Particulate Matter (PM _{2.5})					
Odours					
Air emission effects on vegetation		 (SO ₂ , Ozone, and PAI - minimal issues, effects very local in nature)	 (SO ₂ & PAI)	 (SO ₂ & PAI)	 (SO ₂ & PAI)
		 (ozone)	 (ozone)	 (ozone)	 (ozone)
		 (NO _x)	 (NO _x)	 (NO _x)	 (NO _x)
		 (nitrogen deposition)	 (nitrogen deposition)	 (nitrogen deposition)	 (nitrogen deposition)
		 (NH ₃)	 (NH ₃)	 (NH ₃)	 (NH ₃)
		 (NH ₃)	 (NH ₃)	 (NH ₃)	 (NH ₃)

5.2.1 Air Quality Parameters: Sulphur Dioxide (SO₂)

Sulphur dioxide (SO₂) emissions are principally associated with the combustion (burning) of sulphur-containing fuels such as coke and some diesel fuels, but are also associated with sulphur recovery processes. 1960s SO₂ levels in Fort McKay were predicted by modeling to be very low. SO₂ levels have increased substantially since pre-development. However, current levels are generally below Fort McKay's Human Health and Keeping Clean Areas Clean criteria/targets. However there are some periodic high levels, where Fort McKay's 24-hour Healing the Earth Strategy criteria have been exceeded.

Regional SO₂ emissions have generally been decreasing and will decrease further as sulphur emission controls are applied to large sulphur emission sources. However, this trend could reverse if alternate fuels with high sulphur content, such as coke, bitumen, asphaltenes, produced gas and refinery fuel gas, replace natural gas.

Fort McKay's does have a concern with upset or operational conditions that result in periodic high SO₂ levels in the Community. The gauge remains in the yellow zone in the *Application Case* to indicate that although regional levels of SO₂ are decreasing that there is an issue that needs to be addressed.

For details see *Section 2.3*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.2.2 Air Quality Parameters: Nitrogen Oxides (NO_X)

There are a large number of Nitrogen Oxides (NO_X) sources in the region including mine fleets (major source), boilers, heaters, gas turbines, traffic and to a lesser extent household heating. Potential effects of NO_X emissions include human health effects associated with NO₂ in the air; ozone (O₃), which is formed from NO₂; and fine particles (PM_{2.5}), which NO and NO₂ can contribute to.

Pre-development NO₂ levels in Fort McKay were predicted by modeling to be relatively low and associated with community activities such as wood burning as well as some background level from upwind sources.

NO₂ levels have increased substantially above 1960s levels as a result of regional developments. Current Case NO₂ levels in Fort McKay are below Fort McKay's Air Quality Health Criteria and Keeping Clean Areas Clean air quality targets. However statistical analyses show a trend of increasing NO₂ levels over the past 10 years.

Fort McKay maintains this indicator in the yellow zone for the *Application Case* since there is a trend of increasing levels that needs to be addressed.

For details see *Section 2 – Air Quality* and *Appendix 2-1*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.2.3 Odours

Currently, the Community is subject to hydrocarbon and sulphur-based odourous compounds from oil sands operations. The experience of Fort McKay community members is that odours occur in the Community on a regular basis (i.e., several times a week). Higher Total Hydrocarbon and Total Reduced Sulfur levels in the Community of Fort McKay occur when the wind is from the direction of existing industrial operations. As industrial growth in the region continues, and gradually fully surrounds Fort McKay, the concern is that odour levels may not only intensify, but that they will occur more frequently as well, since there will be no wind direction that doesn't transport some odourous oil sands facility emissions.

Fort McKay's assessment clearly indicates that, under the Base Case, odour threshold levels will likely be exceeded within the Community of Fort McKay, as well as in areas of its traditional lands. The predicted levels will at times be at unpleasant, odourous levels. These predictions are not surprising since odours are already an issue in Fort McKay under the Current Scenario. The situation can only be expected to worsen as approved but not yet operating projects are commissioned. Examples of projects that are expected to commence operation in the area include: Horizon, Jackpine, Muskeg River Mine expansion and Kearl.

Fort McKay's odour assessment ([Section 2.4](#), Fort McKay Specific Environmental Assessment) indicates that the **Application Case** could have a significant adverse impact on odour levels within Fort McKay—an approximately 10% increase is expected in the number of hours and peak periods above odour threshold levels, and also on odour levels in parts of the high and moderate use traditional land use areas north and east of Fort McKay along the Athabasca river valley.

Since odours are currently significantly adversely impacting the Community of Fort McKay and the use and enjoyment of Fort McKay's traditional lands by Fort McKay residents, and Base and Application Cases result in predicted increases in odours in Fort McKay and on Fort McKay's Traditional Lands, the rating in the Application Case remain red, meaning a significant adverse effect. Immediate actions to address existing and projected odour issues are therefore being recommended.

For details see [Section 2.4](#), Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.2.4 Air Quality Parameters: Particulate Matter PM_{2.5}

Particulate matter (PM_{2.5}) emissions are associated with the combustion of some fuels in vehicles, boilers, heaters, turbines and process units and dust from construction and mining operations (primary PM_{2.5}). PM_{2.5} is also formed in the atmosphere from water vapour and various sulphur, nitrogen and hydrocarbon compounds (secondary PM_{2.5}).

In the absence of industrial development, ambient PM_{2.5} levels in Fort McKay would be expected to be relatively low and primarily associated with community or residential activities such as wood burning, forest fires as well as some background level from upwind sources. In general, PM_{2.5} levels in the Community have increased from 1960s levels. Interpretation of PM_{2.5} data is complicated by natural sources that can result in high levels for significant periods of time (e.g. days or even weeks in the case of forest fires). Increased levels are associated with industrial activity and levels in the Community are generally higher when the wind is blowing from the southeast to southwest. In the *Application Case* the indicator rating changes from green in the Base Case to yellow, meaning there are possible adverse effects and/or substantial uncertainty regarding effects.

For details see *Section 2 – Air Quality*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.2.5 Air Emission Effects on Vegetation

Fort McKay values the health and vitality of vegetation communities within their Traditional Lands. Since air emissions were minimal in the 1960s, it is assumed that the pre-development air quality did not have any adverse effects on natural vegetation. Current regional air emissions, mainly from oil sands developments, that can cause effects on vegetation are as follows:

SO₂, Ozone, and Potential Acid Inputs—Currently, average annual SO₂ levels within Fort McKay's Traditional Lands are below Fort McKay's Average Annual Criteria for lichens, forests and natural vegetation. SO₂ levels in the Application Case do not appear to represent a significant threat to regional vegetation through fumigation (direct) exposure. Potential Acid Input (PAI) or acid deposition modeling indicates that current PAI levels are below effects levels, except if very close proximity to emission sources. *Application Case* PAI levels are not expected to have significant adverse effects. Both SO₂ and PAI are rated as green in the Application Case.

Though Ozone was rated as green in the Current Scenario, increased future VOC emissions may contribute to ozone formation, which could lead to subsequent ozone-related vegetation effects. Due to this concern, the indicator for ozone in the Application Case is rated as yellow.

NO_x and Nitrogen Deposition—An evaluation of nitrogen deposition information for the region indicates that current levels on Fort McKay's Traditional Lands in the vicinity of existing mining projects may be at effect levels. Similarly, data indicate that at certain locations, NO_x may exceed direct effects thresholds. In the Current Case, regional nitrogen deposition as well as levels of NO_x are rated in the yellow zone and need to be addressed.

In the *Application Case* the proposed projects would increase the area with a nitrogen loading of greater than 8 kg N/ha/yr by approximately 5,000 ha. This increase occurs in the areas adjacent to the two proposed mines and approximately 2000 ha of this land is outside current or approved project development areas and Shell's proposed project areas. Shell's proposed combined project development area (Jackpine Mine Expansion and Pierre River Mine) is 21,339 ha and therefore the potentially affected undeveloped area represents approximately 9% of the proposed development which is higher than the 5% impact criteria being used by Fort McKay to indicate a significant effect. In the *Application Case* these criteria are rated in the red zone because there is an expected significant adverse effect.

NH_3 —Regional ammonia monitoring indicates that ammonia values may currently be at levels that could adversely affect sensitive vegetation receptors such as lichens, and therefore regional ammonia levels are a concern to Fort McKay. In the *Application Case* NH_3 is rated in the yellow zone, further work needs to be done monitor and more fully evaluate potential sources and effects of ammonia.

For details see *Section 2 – Air Quality* and *Appendix 2-1*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.3 Reduced Access to Land

For maintenance of Fort McKay's cultural heritage it is critical to have access to land upon which to conduct traditional activities. There are a number of ways in which industrial development may impact access:

- Direct land disturbance (as discussed above)
- Direct and indirect effects on traditional trails
- Direct and indirect effects on Traplines
- Regional population increases

As Fort McKay Community members have shared:

Access...is a big issue for everybody in the community. Where you used to go [you] can't anymore.

(FMA 2008: 31)

Very hard for us to get around on the Trapline now because there are so many new roads. You could get lost. Everybody is scared to go out in the bush because cutlines are confusing.

(FMA 2008: 31)

Can't go moose hunting anymore because of the security gates.

(FMA 2008: 31)

With reduced access to land there is a reduced ability to hunt, trap, gather and fish. In turn, this impacts Fort McKay’s cultural heritage.

See Table 5-3 for a summary of indicator gauges related to Reduced Access to Land. As summary of all gauges discussed in the Project-specific CHA is located in [Appendix A](#).

See the Section 8.3.1, [CHA Baseline](#) for additional discussion of Fort McKay’s concerns related to Access to Land.

Table 5-3: Access to Land Indicator Table

Measuring Change In Stressors	Green-Yellow-Red Gauge Rating ¹				
	Pre-Development Scenario	Current Scenario	Base Case	Application Case	Planned Development Case
Traditional Trails		Note: no Current Scenario – see Base Case			
Linear disturbance					

5.3.1 Linear Disturbance

Prior to oil sands development linear developments were limited to Highway 63 and a few forestry roads and cut lines. Currently, most areas of Fort McKay’s Traditional Lands being are influenced by linear developments. The effects of linear development have not been fully assessed within Fort McKay’s Traditional Lands. However, scenario modeling done for the Regional Municipality of Wood Buffalo indicates that several ecological indicators are sensitive to the influence of linear developments, in particular moose, black bear and fish (SEWG 2008). This is mainly due to increase in access and associated hunting and fishing pressure (SEWG 2008).

Linear developments also influence the integrity of the landscape, for example, roads can alter wetland flow patterns, and biodiversity is affected by fragmentation of the landscape. The volume of seismic lines and changing road patterns associated with industrial development can result in confusion, frustration and impediments to Fort McKay’s access of the resources that are remaining.

Due the impacts of linear development on Fort McKay’s access, on key resources of interest to Fort McKay (i.e., fish, moose, bear, wetlands), the lack of comprehensive regional information on the effects of linear development, the lack of comprehensive access management plans, and feedback from Community members during the development of the CHA Baseline report Fort McKay considers the effects of linear development to be a significant issue; hence, the gauge remains in the red zone from the Current Case to the [Application Case](#).

For details see *Section 9 – Disturbance and Access Implications for Traditional Use*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.3.2 Traditional Trails

Fort McKay documented a number of its traditional trails in *There is Still Survival Out There* (FMFN 1994). Prior to oil sands development there were about 1,343 km of traditional trails within the FTSA. Currently, about 320 km of these trails in the FTSA have been disturbed due to development, a 24% loss. In the *Application Case* 409 km of the trails in the FTSA will have been disturbed, a 30% total loss (and increase of 89 km since the Base Case).

Not only is the area of directly disturbed trail unusable, but if trails are missing large sections it may render the rest of the trail unusable. So the loss estimate of 30%, in terms of opportunity for use of the traditional trail system, is conservative. Fort McKay considers this loss to be significant; hence the gauge remains in the red zone in the *Application Case*.

For details see *Section 9 – Disturbance and Access Implications for Traditional Use*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.4 Industrial Water Use

The streams and rivers are the basis for the much of the wildlife habitat that made these lands productive and provided a sustainable way of life for thousands of years. The impacts on groundwater are also important for hunting, trapping, fishing and gathering. The Community has always made direct and indirect use of the groundwater resources during traditional pursuits. Direct use of groundwater occurs at places where Community members spend time, including on Traplines, at cabins or simply spending time on the land. Groundwater may be obtained from muskegs, springs and, during the winter, from groundwater that has been discharged as surface water body base flow. Indirect use of groundwater occurs where traditional activities such as gathering take place and the vegetation at the gathering sites (e.g., fens) is dependent on groundwater for survival. Changes to water are of high concern to Fort McKay,

There's no water in the river anymore. Pathetic little stream compared to how it used to be.

(FMA 2008: 38)

[regarding the Jackpine Mine Expansion river diversion] Who is going to want to fish after that? They're not going to trust the river system. Muskeg river is the only clean river that we have.

(FMA 2008: 25)

Maintaining water quality and quantity are critical to support land resources within Fort McKay’s traditional lands, which in turn sustains the retention of Fort McKay’s cultural heritage.

See Table 5-4 for a summary of indicator gauges related to Industrial Water Use. A summary of all gauges discussed in the Project-specific CHA is located in [Appendix A](#).

See the Section 8.3.1, [CHA Baseline](#) for additional discussion of Fort McKay’s concerns related to Industrial Water Use.

Table 5-4: Industrial Water Use Indicator Table

Measuring Change In Stressors	Green-Yellow-Red Gauge Rating ¹				
	Pre-Development Scenario	Current Scenario	Base Case	Application Case	Planned Development Case
Athabasca River					
Watershed Disturbance		 (Muskeg River)	 (Muskeg River)	 (Muskeg River)	 (Muskeg River)
		 (Pierre River)	 (Pierre River)	 (Pierre River)	 (Pierre River)
		 (McLean Creek Beaver, Tar and Calumet River watersheds)	 (McLean Creek Beaver, Tar and Calumet River watersheds)	 (McLean Creek Beaver, Tar and Calumet River watersheds)	 (McLean Creek Beaver, Tar and Calumet River watersheds)
Groundwater					

5.4.1 Watershed Disturbance

Fort McKay assessed the current state of Athabasca River watersheds that are used for fishing, hunting, trapping and gathering. Development in watersheds not only influences specific traditional land use areas and resources, and groundwater and surface water systems, in some cases it threatens the very sustainability of the watershed.

Watershed disturbance due to development in the 1960s is essentially zero in all lower Athabasca River subwatersheds within Fort McKay’s Traditional Lands.

For the Muskeg River watershed, the gauge is rated as red (“**endangered**”) in the *Application Case* due to an approximate 44% disturbance within the watershed and a 148% change in stream flow. Watershed state is rated as red (“**endangered**”) when there is more than 25% change in stream flow in any given season and/or more than 40% of the watershed area affected by development and related land-use changes. The need for water management planning is clearly evident in the Muskeg River watershed. The state of the Muskeg River watershed is rated as red for the Base Case and Application Case. It is critical that a water management plan be created for this watershed to establish impact limits and provide direction to development. The opportunity to establish such a plan has not been lost as the state of the Muskeg River in the Current Scenario is still “**sustainable**” (yellow in the gauge).

For the Pierre River watershed, the gauge is rated as yellow (“**threatened**”) in the Application Case due to an approximate 10% disturbance in the watershed (“**threatened**”) and a 23% maximum change in streamflow. Watershed state is rated as yellow when there is more than 10% change but less than 25% change in stream flow in any season and/or between 20% and 40% of the watershed area affected by development and related land-use changes.

Threatened watersheds include the McLean Creek, Beaver, Tar and Calumet River Watersheds hence the gauge is rated as yellow for these watersheds as well.

For details see *Section 4 – Surface Water Hydrology*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.4.2 Watershed Index for Athabasca Watershed

The 1960s flows in the Athabasca River were essentially natural, with very small net withdrawals from Fort McMurray and upstream.

Currently, water withdrawals from the Athabasca River for oil sands use are, on average, 3.63 m³/s. The influence of water withdrawals is most noticeable in the winter when water withdrawals comprise up to about 8% of the winter low flow.

Fort McKay’s surface water assessment criteria set the state of the lower Athabasca River watershed for the *Application Case* remains the same as in the Base Case—“**threatened**” (yellow in the gauge). This is due to the proposed stream flow changes are greater than 10% but less than 25% in any given season and the change in the watershed area is less than 20%. Though the Phase 1 Water Management Framework does restrict water withdrawals, change to surface water is significant. It is important for work on the Phase 2 Water Management Framework for the lower Athabasca River be completed so total impact limits can be set and future development can be directed.

For details see *Section 4 – Surface Water Hydrology*, Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.4.3 Groundwater

5.4.3.1 Groundwater Quantity

For the *Application Case* direct and/or indirect use of groundwater on Fort McKay's Traditional Lands that occur within Shell's proposed project disturbances will be unavailable to the Community for the duration of active mining, closure and reclamation.

Direct use of groundwater at two cabins located on traditional lands within the proposed active mining area of the Jackpine Mine Expansion will be adversely affect as the cabin sites are located in the mining area and will have to be relocated. If the cabins a re-installed after mining is finished, the quality of groundwater available is likely to be unsuitable due to process-affected seepage from tailings ponds.

Direct use of groundwater at two cabins located on traditional lands outside Jackpine Mine Expansion Project the active mining area could be impacted as the cabin sites are located at a distance where 1 m of groundwater drawdown is predicted.

Groundwater drawdown associated with mine dewatering will affect fens: 425 ha (Jackpine Mine Expansion) and 1548 ha (Pierre River Mine). A portion of these drawdown areas (about 25% and 33% respectively) are expected to be 1 m drawdown or greater, which is associated with adverse effects on fens.

Since there is a loss of groundwater resources associated with the mine footprint as well as significant adverse drawdown effects on groundwater use at two cabins and on fens, groundwater quantity issues are rated as red on the gauge.

5.4.3.2 Groundwater Quality

For the *Application Case* Groundwater discharge to Muskeg River downstream from the Jackpine North Pit Lake and Muskeg Creek will decrease about 100 L/s compared to the current scenario.

The Pleistocene Channel Aquifer is a preferential groundwater flow unit and may result in process-affected seepage from the ETDA moving northeast. Dewatering at Kearl and Aurora South mines may further promote the process-affected groundwater flow in the aquifer.

A plume of process-affected seepage from the in-pit tailings pond will move slowly towards the Athabasca River. Seepage to the Athabasca River will be negligible compared to flow volume.

Since there is the potential for seepage to affect groundwater and surface water the gauged is rated as yellow, which means that potential effects on may occur and monitoring is needed.

For details see [Section 3 – Groundwater](#), Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a).

5.5 Wage Economy

No indicators were developed to assess implications for changes in the wage economy to impact the Community’s Cultural Heritage. However, Fort McKay would like to realize economic development opportunities that help the Community grow while maintain their cultural heritage (guiding, tourism, etc.). See the strategies outlined in Section 9.7.1***??**

5.6 Increased Population

Increased regional populations lead to increases pressures on local resources and reported conflicts between Aboriginal and non-Aboriginal people, increased cost of living, increased access to drugs and alcohol, decreased feelings of security, and decreased Community cohesion. As access increases to an area where there previously was none, there is an increase in hunting and angling pressures, as well as noise disturbance resulting in reductions in wildlife and fish populations. As ground disturbance increases with more vehicular traffic (both road and off-road), sensitive landscapes are affected, successful reclamation of clearings becomes more difficult, and opportunities for introduction and establishment of invasive species occur. In addition, improved access often results in land uses that can create issues related to littering, vandalism of property, and forest fire.

Fort McKay Community members share their concerns related to the increasing regional population,

There are too many white people. We can’t even go berry picking: women are scared to go by themselves.

(HEG 2009: 47)

If I get an animal now, somebody else is going to come around and pick it up

(FMA 2008:25)

Recreational users take their quads and ... Motorbikes there during summer, resulting in a lot of traffic

(FMA 2008: 42)

See Table 5-5 for a summary of indicator gauges related to Increased Population. As summary of all gauges discussed in the Project-specific CHA is located in [Appendix A](#).

See the Section 8.3.1, [CHA Baseline](#) for additional discussion of Fort McKay’s concerns related to Increased Population.

Table 5-5: Increased Population Indicator Table

Measuring Change In Stressors	Green-Yellow-Red Gauge Rating ¹				
	Pre-Development Scenario	Current Scenario	Base Case	Application Case	Planned Development Case
Regional Population Trends					

5.6.1 Regional Population Trends

In the 1960s the population of Fort McMurray was about 2,000 people. This increased to about 35,000 in the 1980s to about 36,000 in the late-1990s. Since the late-1990s the population in Fort McMurray and Regional Municipality of Wood Buffalo has grown exponentially. The current population of Fort McMurray is just over 72,000 and the RMWB is now over 100,000 (RMWB Municipal Census 1999 and 2008). Shell predicts that by 2015 the urban population would be about 90,000 under the Base Case and 98,000 with the population affects of the Shell projects included. Shell’s population models predict a leveling off of population growth due structural shifts in the oil sands industry.

Also within the region a large number of work camps, many of them located near Fort McKay. Population in work camps was about 3,500 in the late-1990s and has risen to over 26,000 in 2008. This is a 2600% increase from Pre-development to current. During construction, Shell’s project would add an estimated 3000 workers in 2015 associated with the construction of the Jackpine Mine Expansion. Later, in about 2021, Shell predicts a similar increase in workers during construction of the Pierre River Mine.

The indicator gauge remains is in the red in the Application Case due to continued strain the growing population puts on the opportunity for the Community of Fort McKay to utilize their Traditional Lands.

See [Section 9 – Disturbance and Access Implications for Traditional Use](#) of the Fort McKay Specific Environmental Assessment (Fort McKay IRC 2010a) for further discussion.

6.0 Assessment of Indicators: Planned Development Case

The Planned Development Case (PDC) further exacerbates the criteria considered in each of the above indicators. The PDC increases loss of land, generates additional emissions, brings more people into the region during development and operations, requires more water for processing, and necessitates additional large-scale reclamation. Each indicator described above shows that in the PDC, Fort McKay's cultural heritage, which has already been deemed significant and adverse, is further strained.

7.0 Conclusions and Recommendations

As evidenced through the above indicators, both the Application Case and the Planned Development Case further exacerbate an already strained situation (i.e., Fort McKay's Cultural Heritage). Below Fort McKay recommends measures to mitigate and accommodate the Community as a result of development on their Traditional Lands.

7.1 Cultural Heritage Assessment Baseline

As detailed in Section 12.0 of the *CHA Baseline*, Fort McKay has outlined numerous strategies to re-capture and maintain the cultural heritage of the Community. These are briefly summarized below.

7.1.1 Cultural Resilience

The Community's ability to adapt to environmental change while simultaneously supporting their cultural heritage and values is linked with maintaining or regaining sovereignty over how associated issues are addressed. As such, Fort McKay would like to develop systems and programs aimed at replacing the individual and Community health and well-being that is no longer achieved to the same extent through traditional pursuits and way of life.

7.1.2 Reclamation

Mine related land disturbance, even when accounting for reclamation, will result in a minimum of two to three generations⁵ of Fort McKay Community members without access to significant portions of their Traditional Lands. Reclamation is sometimes referenced as a mitigation measure for impacts on traditional land use resulting from project development (e.g., Suncor Energy 2007). However, oil sands projects typically have a lifespan of 25–50 years (sometimes longer) from pre-construction to closure during which time little to no land access is possible for the Community. Even at closure, reclamation activities will not result in a landscape that resembles pre-disturbance conditions. According to Shell Canada Limited (2007b), a site is "considered to be restored if natural succession processes are restored" and does not require the establishment of a site to a mature stage. While these areas may be on a trajectory towards recovering biological diversity and function at the time reclamation certification is granted, they will likely not be suitable for a pre-disturbance range of traditional activities. This further extends the duration of impact beyond the estimate 25–50 years (two the three generations). Ultimately, this disturbance impact reaches into the far future with regards to cultural heritage.

⁵ The length of a generation is defined as 20 years (Ohno 1996).

Fort McKay has developed the Healing the Earth Strategy, to guide the Community's engagement in environmental activities (Fort McKay IRC 2010b). Structured under four strategic areas—*retention*, *reclamation*, *improvement* and *offset*—the Community seeks to ensure that their Traditional Lands are managed in a way that addresses Community environmental concerns and respects Community values. Reclamation, which focuses on providing habitat that supports pre-development land use, helps guide Community input into the reclamation process on their Traditional Lands.

7.1.3 Language Retention

Establishing programs and practices to support ongoing usage of Cree and Dene is of high importance to Fort McKay. Communication of cultural knowledge using their Aboriginal languages is no longer a common practice in the Community. Continued knowledge of such things as traditional place names, names and uses of traditional resources, and a sophisticated awareness of rich meaning of cultural practices are at high risk of being lost without utilization of Aboriginal languages. As such, the Community is currently identifying steps to bolster Aboriginal language retention and practice.

7.1.4 Land-Based Employment

Community employment, particularly for young people, tends to be selected based on the current opportunities that people see available to them. This has resulted in many youth indicating that they may want to drive a heavy hauler truck, for example, because this is a job they continuously see and hear about. However, Fort McKay would like to realize more land-based employment such as tourism and guiding. The Community recognizes there are significant potential economic development opportunities that can be created within their Traditional Lands that connect with Community cultural values.

7.1.5 Further Development and Documentation of the Cultural Heritage Baseline

The process of preparing the CHA Baseline revealed the complexity of the undertaking as well as the need for detailed and appropriate integration of social, economic, and health indicators. Further data and documentation will provide a richer, and more comprehensive, meaningful assessment for the Community of Fort McKay. Fort McKay looks forward to the opportunity to further develop the CHA Baseline and, in turn, future project-specific cultural heritage assessments.

During workshops and focus group conversations related to this report, Community members discussed the development of additional indicators that could be applied to particular cultural attributes as a way to further monitor changes to cultural heritage. Potential indicators may include measures such as the amount of time

spent hunting or distance travelled from Fort McKay to reach hunting locations. Development of these qualitative and quantitative indicators requires planning meetings and additional workshops with Community members. Fort McKay would like the opportunity to establish and monitor these indicators in the future.

7.1.6 Cumulative Effects and Regional Initiatives

Fort McKay has been an active participant in a great number of regional initiatives that were and are intended to support the Community's interests, including maintenance of their cultural heritage. However, whether the Lower Athabasca Regional Plan (LARP) the Moose Lake Access Management Plan (AMP) and other initiatives aimed at addressing regional cumulative impacts will alleviate the negative impacts of industry and other cultural stressors is not yet known. Although the work of these groups is helpful for governments and industry to understand environmental effects, this understanding in itself does not mitigate these effects. To that end, Fort McKay has provided recommendations in the Fort McKay Environmental Specific Assessment with regard to specific environmental effects (e.g., land disturbance, wildlife, odours, etc.). It has yet to be determined if these recommendations will be implemented.

7.1.6.1 Cultural Heritage Strategy

Further work is necessary to comprehensively address the significant adverse effects of industrial development on Fort McKay's cultural heritage. For example, establishment of a Community-developed Cultural Heritage Strategy is required to provide a clear approach to support and retain the Community's cultural heritage related needs.

Development of such a strategy requires further Community member input and discussion under the guidance of Fort McKay leadership. To best address cultural heritage, governments must consult with Fort McKay on how best to mitigate, compensate and accommodate adverse effects that the Community is currently experiencing on cultural heritage and opportunities for traditional land use.

7.2 Project-Specific Recommendations

Regulators ensure that Shell contribute to:

- Further development of Fort McKay's Cultural Heritage Strategy
- Other systems and programs aimed at strengthening individual and Community health and well-being that is no longer currently achieved to the same extent through traditional pursuits and way of life

7.3 Cumulative Effects Recommendations

The measures discussed above will only partially moderate or offset the loss to Fort McKay of traditional land use opportunities and ability to exercise their Treaty and aboriginal rights. The governments need to develop further mitigation and accommodation measures with Fort McKay to address the cumulative effects of industrial development on their cultural heritage.

8.0 References

- Ducks Unlimited. 2008. *Enhanced Wetland Classification for the Al-Pac Boreal Conservation Project*. ArcInfo grid files provided by Ducks Unlimited Canada, Western Boreal Office, Edmonton, Alberta.
- FMA Heritage Consultants Inc. 2008. Fort McKay First Nation Traditional Knowledge Report. In Pierre River Mine Supplemental information, Part 2 Supplements, Appendix A. Prepared for the Shell Canada Jackpine Mine Expansion and Pierre River Mine EIA. Prepared at request of Fort McKay Industry Relations Corporation.
- Fort McKay First Nation (FMFN). 1994. *There is Still Survival Out There*. Fort McKay First Nation, Fort McKay, Alberta.
- Fort McKay Industry Relations Corporation (Fort McKay IRC). 2010a. *Fort McKay Specific Environmental Assessment*.
- Fort McKay Industry Relations Corporation (Fort McKay IRC). 2010b. *Healing the Earth Strategy*. Working Draft.
- Golder Associates. 2007. *Traditional Land Use Environmental Setting for the Jackpine Mine Expansion & Pierre River Mine Project*. Shell Canada Jackpine Mine Expansion and Pierre River Mine EIA.
- Human Environment Group (HEG). 2009. *Indicators of Cultural Change (1960 to 2009): A Framework for Selecting Indicators Based on Cultural Values in Fort McKay*. Prepared for the Fort McKay Industry Relations Corporation, August 2009.
- McKillop, J. 2002. *Toward Culturally Appropriate Consultation: an Approach for Fort McKay First Nation*. Unpublished Master's Thesis. University of Calgary.
- Ohno, S. 1996. The Malthusian parameter of ascents: What prevents the exponential increase of one's ancestors? *Proc. Natl. Acad. Sci. USA* Vol. 93, pp. 15276-15278, December 1996.
- Regional Municipality of Wood Buffalo (RMWB) 1999. Municipal Census 1999. Available at: <http://www.woodbuffalo.ab.ca/business/demographics/pdf/1999%20Census%20Report.pdf>
- Regional Municipality of Wood Buffalo (RMWB) Municipal Census 2008. Available at: <http://www.woodbuffalo.ab.ca/business/demographics/pdf/1999%20Census%20Report.pdf>

Shell Canada Ltd (Shell) 2007. Shell Canada Limited, Jackpine Mine Expansion and Pierre River Mine EIA Application

Suncor Energy Inc. 2007. *Traditional Knowledge and Land Use Assessment*. Voyageur South Project Environmental Impact Assessment, July 2007. Volume 4, Section 8.0.

Sustainable Ecosystems Working Group (SEWG). 2008. Terrestrial Ecosystem Management Framework for the Regional Municipality of Wood Buffalo. Prepared by the Sustainable Ecosystems Working Group of the Cumulative Environmental Management Association.

Sustainable Resource Development (SRD). 2009. Fort McKay Country Food Availability Study. Sustainable Resource Development, Fish and Wildlife Division, Fort McMurray Field Office. Unpublished Report.