INTRODUCTION

Fort McKay
Specific Assessment

Fort McKay

Industry Relations Corporation

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1.0 INTRODUCTION

1.1 Overview

1.1.1 Background

> *Now everything is gone and it's hard to accept, but what can you do? You are forced to walk away. The Land will never be the same.*
>
> (Fort McKay Workshop 2008, HEG 2009)

Fort McKay is a Cree, Dene and Métis community, located in the midst of the Athabasca Oil Sands surface mineable area in northeastern Alberta. Fort McKay, already the community most directly affected by oil sands development, is about to see a third wave of major oil sands development within their Traditional Lands. The first wave of development included the Suncor Tar Island Project and the Syncrude Mildred Lake Project, which were constructed in the late-1960s and the 1970s, respectively. A second wave of development began in the mid-1990s, and included expansion of the original Suncor and Syncrude projects. The second wave also included development of new projects including: the Albian (Shell) Muskeg River Mine, the Syncrude Aurora Mine, the CNRL Horizon Mine and Upgrader, the Shell Jackpine Mine, and some insitu oil sands projects (e.g., Suncor MacKay River and Firebag Projects). The third wave of development, which is about to begin, includes proposals for more oil sands mines (such as Shell's current application) as well as many insitu project proposals to the west of Fort McKay.

Fort McKay has been actively engaged in regulatory processes associated with oil sands applications and approvals for the past two decades. The Community has a long-standing concern that the Terms of Reference (ToR) for major previous oil sands environmental impact assessments (EIAs) do not adequately address Fort McKay's specific needs and requests (as documented in its comments on past project ToRs and EIAs). Consequently the resulting EIAs do not provide sufficient and appropriate information to determine the effects of the project on Fort McKay's cultural heritage as well as the environmental, traditional and cultural resources of importance to the Community.

Upon examination of the final ToR for the Shell Canada Limited (Shell) Jackpine Mine Expansion and Pierre River Mine Projects, Fort McKay determined that the ToR did not meet Fort McKay's need to understand the project-specific and cumulative impacts of the Projects. At this time, Fort McKay requested from the Governments of Canada and Alberta more meaningful consultation and accommodation to address the inadequacy of resource development project Terms of Reference in general. Rather than requesting that the Terms of Reference for the Shell projects be revised following meaningful consultation, which would necessitate Shell preparing a revised environmental impact assessment, Fort McKay

proposed conducting its own assessment, which Shell would submit to the regulators as supplemental information to its December 2007 EIA (Shell 2007).

1.1.2 Fort McKay Specific Assessment Pilot Project Objective

Fort McKay, Shell, Alberta Environment (AENV) and the Canadian Environmental Assessment Agency agreed to conduct a Fort McKay Specific Assessment, as a pilot project. Shell agreed to provide the resources for this project. This is an innovative approach that is intended to fit within the established regulatory process. The objective of this assessment is to provide, from Fort McKay's perspective, appropriate and sufficient information that:

- Fort McKay can use to more fully understand and assess the effects of the Shell projects and cumulative oil sands developments on environmental, cultural and traditional resources of concern and interest to Fort McKay as well as on Fort McKay's cultural heritage;
- is specific to Fort McKay and that the regulators must consider when making public-interest decisions regarding the Projects;
- provides information and recommendations to assist Alberta, Canada, Shell and Fort McKay to develop mitigation and accommodation strategies to address any potential adverse effects; and
- informs consultation.

This Fort McKay Specific Assessment is being submitted by Shell as formal supplemental information to its Application and EIA for the Jackpine Mine Expansion and Pierre River Mine Project (Shell 2007a).

1.1.3 Fort McKay Specific Assessment Scope and Constraints

The scope of the assessment was developed within the following constraints:

- Fort McKay, Shell and AENV agreed that assessment needed to be completed within the regulatory assessment timeline and prior to any scheduled hearing for the Application. This meant that the assessment needed to be completed in approximately one year.
- No new field studies or data collection or development of additional indicators would be undertaken.
- Limited additional modeling – this varied by component (e.g., Habitat Suitability Modeling for four wildlife species was done to develop a pre-development baseline. However, no new additional air quality modeling was done).
- The following components were considered to be outside of the scope of the assessment due to time-constraints and were therefore not included:

- human and community health effects,
- socio-economics effect, and
- a soils assessment.

The scope of the environmental portion of the assessment was developed by Fort McKay, in cooperation with Shell, who provided most of the environmental data for this assessment (See Section 1.5). The scope of the Cultural Heritage Assessment was developed by Fort McKay.

With regard to Traditional Land Use (TLU) and Traditional Environmental Knowledge (TEK), at Fort McKay's request Shell completed a separate Fort McKay Traditional Knowledge Report [FMA 2008; this report is included in Shell's Pierre River Mine Supplemental Information Update (Shell 2009)].

Both the Environmental and Cultural Heritage Assessments were developed in the context of Fort McKay's key concerns and existing TLU and TEK studies, including those produced for the Shell EIA as well as previous EIAs and Community studies.

1.1.4 Key Features of the Assessment

Key features of this assessment include:

- ***Assessment cases:*** Assessment cases are relevant to Fort McKay including a pre-development (1960's) baseline and a current scenario (2008).
- ***Components:*** The assessment includes both an environmental and a cultural heritage assessment, which are closely linked. The assessments focus on issues and indicators of concern to Fort McKay community members with respect to the health of the environment, viability and abundance of specific traditionally used resources, opportunities for traditional land use and cultural heritage.
- ***Study areas:*** Study areas are relevant to Fort McKay's traditional land use and cultural heritage and the specific component being assessed.
- ***Indicators:*** Indicators are of specific interest and concern to Fort McKay and were selected with guidance/input from the Community (Fort McKay IRC 2010a, 2010b).
- ***Assessment Criteria:*** Assessment criteria are consistent with Fort McKay's Healing the Earth Strategy (Fort McKay IRC 2010), are protective of the environment and people, and in line with the Precautionary Principle.
- ***Healing the Earth Strategy – Context for the Fort McKay Specific Assessment:*** Fort McKay has developed an environmental strategy document called the Healing the Earth Strategy (HTES; Fort McKay IRC 2010a). The Healing the Earth Strategy outlines four main tenets that the Community supports with respect to addressing environmental issues: retain, improve, reclaim and offset, The HTES provides guidance and context for Fort McKay's assessment approach, criteria and recommendations.

The scope of the Fort McKay Specific Assessment is further described below and in the individual component sections.

1.1.5 Future Use

It is Fort McKay's hope that the Fort McKay Specific Assessment would be applied to and built upon in future assessments. For example, the pre-development baselines from the environmental and cultural heritage components could be used by future proponents in their EIAs. Fort McKay, upon evaluation of the success of the Fort McKay Specific Assessment, will work with AENV to determine how these assessments can be built into the ToRs for future EIAs and regulatory applications. Fort McKay will also evaluate how the information assembled in the assessments can be used for Community and regional initiatives.

As an innovative pilot project completed in a short timeframe relative to the scope of the project, it is anticipated that the learnings from this project will be used to improve methodology and data sets for future use by regulators, project proponents and Fort McKay. The Cultural Heritage Assessment was particularly challenging to complete within the scope of this pilot project and Fort McKay hopes to build upon and fully develop it in the future.

1.2 Documents that Comprise this Assessment

This assessment is comprised of three main documents:

- An Environmental Assessment (the Environmental Specific Assessment) – this document
- A Cultural Heritage Assessment (CHA) Baseline: Pre-development (1964) to Current (2008) – the Cultural Heritage Assessment Baseline
- An assessment of the effects of the Shell projects on cultural heritage (the Project-Specific Cultural Heritage Assessment), which is presented as an attachment to the CHA Baseline.

The documents, their main sections, and key appendices are shown in Figure 1-1.

1.3 Assessment Scenarios and Cases

Impacts to the various environmental and cultural heritage components are assessed in the context of the following development scenarios:

- ***Pre-Development Scenario*** – this is prior to oil sands development. Depending on data availability the actual date of the Pre-Development Scenario varies from 1954 to 1965.

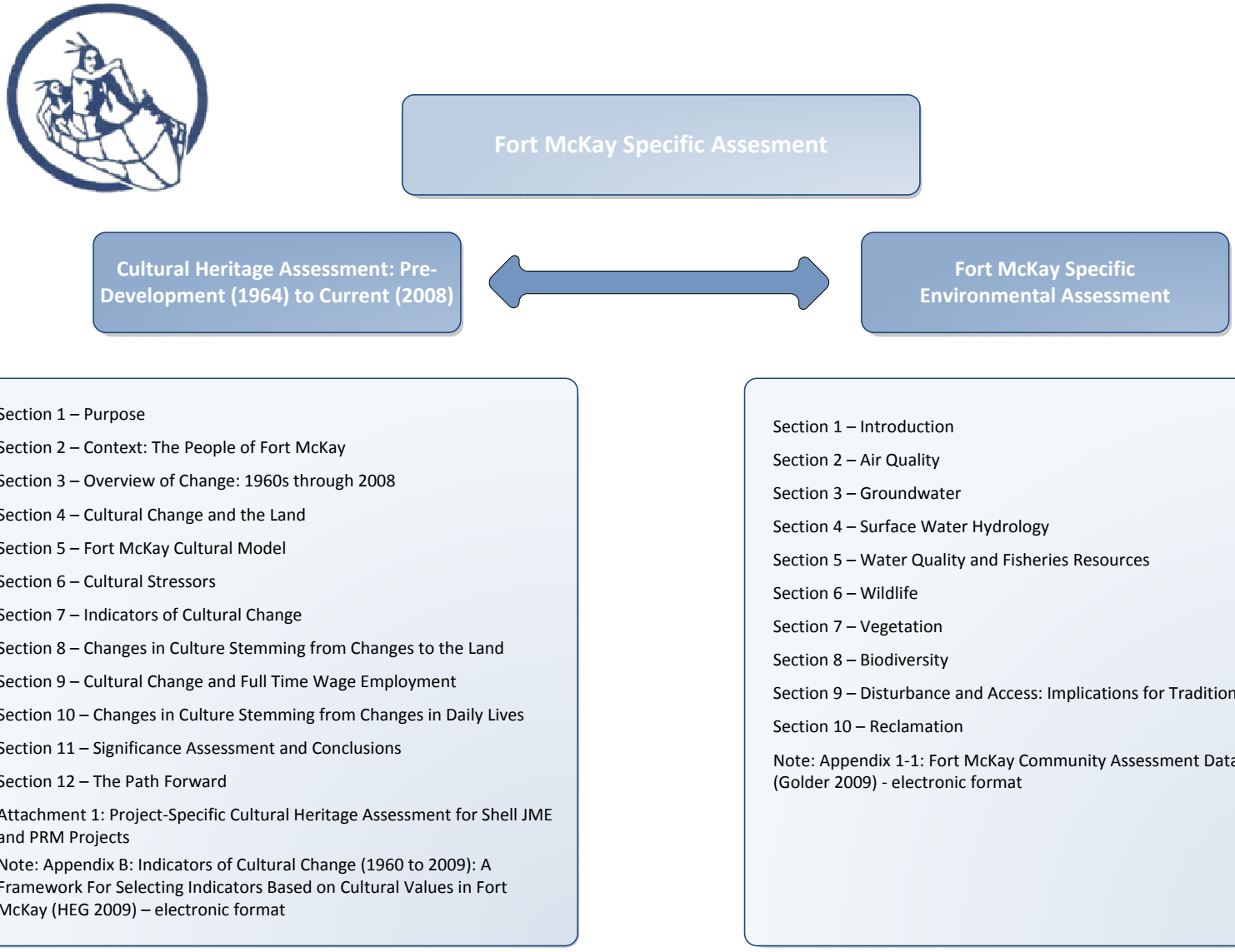


Figure 1-1: Fort McKay Specific Assessment Document Road Map

- ***Current Scenario*** (i.e., what you would see if you looked at the ground, water, air right now) – depending on data availability the actual date of the Current Scenario varies from 2003 to 2008.
- ***Base Case*** – this is existing and approved (but not yet developed) projects.
- ***Application Case*** – this is the Shell's Pierre River Mine and Jackpine Mine Expansion project(s) plus the Base Case.
- ***Planned Development Case*** – this scenario includes additional planned developments.

1.3.1 Pre-Development Scenario

Fort McKay has seen large tracts of their Traditional Lands developed by oil sands operators, beginning in the late-1960s. The Community considers the condition of the land prior to any development as an important and relevant baseline to which all effects of development should be compared in order to understand and potentially mitigate and accommodate the changes that are occurring to their lands and their ability to exercise their rights.

In terms of opportunities to use the land for traditional and other purposes, and to protect the health and abundance of resources (e.g., plants, animals, wetlands) and Fort McKay's cultural heritage, the only relevant baseline, from the Community's perspective, is the time period prior to oil sands development. A pre-development baseline allows for both project-specific and cumulative effects of oil sands development to be more fully assessed, understood and documented.

The exact date of the pre-development baseline varies slightly depending on the component being assessed and the data availability and generally ranges from 1954 (e.g., air photo availability) to 1965. For the Cultural Heritage Assessment, the Pre-Development baseline was framed as 1960's, which is more relevant to people's experience than a specific date.

There is one situation where it was not possible to develop a pre-development baseline. For the vegetation component, Alberta Vegetation Inventory (AVI) mapping (ecosite phase and wetland classes) was not available for the 1960's since this system of classification was not used then and development of a pre-development classification using the AVI system was beyond the scope of this assessment. However, it was important to Fort McKay to use this detailed mapping classification system since it provides an appropriate level of detail to assess impacts on traditional resources of value to Fort McKay (e.g., ecosite phase-level upland vegetation, wetlands, peatlands, rare plants, berry harvesting sites). Therefore, a Late-1990's Scenario, development of which was within the scope of this assessment, was used as a surrogate for pre-development. The vegetation assessment also has a Pre-Development Scenario using the Landsat classification system.

1.3.2 Current Scenario

The Community experiences the effects of oil sands development on a daily basis and there is a need to understand and document for Fort McKay and the Regulators, the impacts that the Community is currently experiencing and the current state of resources within their Traditional Lands. Hence, Fort McKay also included a Current Scenario in this assessment. The Current Scenario varies slightly depending on data availability for specific components (2003 to 2008). One exception is the terrestrial resources components (wildlife, vegetation and biodiversity), where a Current Case was not available; for these components Base Case (i.e., existing and approved developments) was used instead since it is the closest to the current situation.

The Pre-Development and Current Scenarios were not included in the Shell EIA and are specific to this Fort McKay assessment. Therefore, the term "Scenarios" is used for the Fort McKay-specific assessment "Scenarios" to clearly distinguish between the assessment "Cases" used in the EIA (i.e., Base Case, Application Case, and Planned Development [PDC] Case).

1.3.3 Base, Application and Planned Development Cases

Fort McKay also used assessment cases presented in the EIA:

- Base Case (existing and approved developments),
- Application Case (Base Case plus the proposed Shell projects [Pierre River Mine and Jackpine Mine Expansion]), and
- Planned Development Case (PDC; existing and approved developments plus the proposed Shell projects plus planned developments).

The disturbances, projects and information used for each of these cases are the same are those used by Shell in the EIA (Shell 2007a, Volume 3, Section 1.4).

1.3.4 Assessment Approach - Baseline

The Pre-Development Scenarios for the various components were used as a baseline for the assessment. That is, Current Scenario, Base Case, Application Case and Planned Development Case were compared against the Pre-Development Scenario, rather than Base Case, as was done in Shell's EIA.

1.4 Information Sources and Data Limitations

1.4.1 Fort McKay Specific Environmental Assessment

The primary source of information for this Fort McKay Specific Assessment was data and modeling requested by Fort McKay and provided by Shell and its consultants. The information is provided in a data report, which contains only figures and tables: ***Fort McKay Community Assessment*** (Golder 2009; the "Data Report"). Information

provided in Golder (2009) along with other sources of information is used in the assessment. Specific tables and figures from the Data Report are presented and interpreted in this Fort McKay Specific Assessment. Not all the figures and tables are presented in this assessment. For easy cross-referencing, when tables or figures from the Data Report (Golder 2009) or from the EIA (Shell 2007a) are presented in the Fort McKay Specific Assessment, the original table or figure number is included in brackets after the table or figure reference. The Data Report (Golder 2009) is attached as an electronic appendix (***Appendix 1-1***).

Other key sources of information used in the Fort McKay Specific Environmental Assessment include:

- data from the Shell EIA (Shell 2007) and other EIAs from the region;
- published scientific literature and guidelines;
- reports and frameworks completed for the Cumulative Environmental Management Association (CEMA);
- regional monitoring data (e.g., Wood Buffalo Environmental Association);
- information provided by the Community of Fort McKay; and
- Fort McKay internal reports and studies.

Specific information sources used by each component are detailed in the respective sections (e.g., air quality, wildlife, etc.).

1.4.2 Fort McKay Specific Cultural Heritage Assessment

The Cultural Heritage Assessment attempts to identify and assess what has happened to the culture of the people of Fort McKay over the past half-century; to understand what makes the Fort McKay situation unique; and to understand what role in this can be traced to industrial development. While acknowledging the many factors that have influenced the people of Fort McKay over the last 300 years since the arrival of the European fur trade, the report focuses on the influence of industrial development within Fort McKay's Traditional Lands on the culture of the people, describing the cultural shifts that have occurred in the Community since the 1960s.

Fort McKay has derived a large portion of information for its Cultural Heritage Assessment from a project report commissioned specifically for this process entitled ***Indicators of Cultural Change (1960 to 2009): A Framework For Selecting Indicators Based on Cultural Values in Fort McKay*** (Human Environment Group 2009; see the Cultural Heritage Assessment Baseline, Fort McKay IRC 2010b, ***Appendix C***). The objective of this project was to provide an assessment of the cumulative impacts that industrial development has had on the Cultural Heritage of Fort McKay. Project researchers gathered information from multiple community workshops as well as an extensive literature review.

Additional key sources of information for this Cultural Heritage assessment include:

- Fort McKay Specific Environmental Assessment
- Fort McKay First Nation Traditional Knowledge Report. Prepared for the Jackpine Mine Expansion and Pierre River Mine, Environmental Impact Assessment (FMA 2008)
- Traditional Knowledge and Land Use. Prepared for the Shell Canada Limited, Jackpine Mine Expansion and Pierre River Mine EIA (Shell 2007a)
- Traditional Land Use Environmental Setting for the Jackpine Mine Expansion & Pierre River Mine Project (Shell 2007b)
- Fort McKay internal reports and studies

1.5 Study Areas

1.5.1 Overview of Fort McKay's Study Areas

Study areas for the Fort McKay Specific Assessment were selected for their relevance to Fort McKay and to the specific component being assessed. The following is an overview of each of the key study areas and the rationale for their selection. Section 1.5.2 describes the study areas that were used by component.

1.5.1.1 Fort McKay Traditional Lands

Fort McKay's Traditional Lands encompass 3,526,226 hectares (ha; 35,262 km^2) and extend from Townships 89 to 104 and Range 0 to approximately Range 22-24, W4M. The Traditional Lands boundary is shown in Figure 1-2 (Figure 1.1-1 in Golder 2009). This includes an area extending north to the Wood Buffalo National Park Boundary, south to include Fort McMurray, east to the Alberta-Saskatchewan boundary and west to the Birch Mountains. Within Fort McKay's Traditional Lands, Fort McKay also has a number of Treaty Land Entitlement (TLE) lands: at the hamlet of Fort McKay; to the south, directly across from Fort McKay along the Athabasca River and the lower Muskeg River; to the north, directly across from Fort McKay consisting of Cree Burn Lake and area; to the northwest of the Community adjacent to Gardiner (Moose) and Namur (Buffalo) lakes; and to the northeast, adjacent to the proposed Jackpine Mine expansion, Fort McKay's oil sands lands. Fort McKay, through its own land use planning efforts has identified specific uses for each of its parcels of land. In particular the Cree Burn Lake area and Gardiner/Namur lake areas have been selected by the Community for protection and cultural heritage.

Development impacts within Fort McKay's Traditional Lands are of interest and concern to Fort McKay; and the Traditional Lands boundary is used as a study area for assessment of components where effects are likely to extend throughout Fort McKay's Traditional Lands (e.g., air emission effects on vegetation and land disturbance).

However, since the bulk of oil sands development is centered on the Community of Fort McKay and this affects the directly accessible portions of Fort McKay's Traditional Lands and many of the key traditional harvesting areas, it is necessary to also use study areas that are reflective of traditional use and accessibility. Therefore, two key types of study areas were used to focus the assessment: one based on Fort McKay's traditional land use (see Section 1.5.1.2 Traditional Land Use – Culturally Sensitive Ecosystems) and one that takes into account development affects in proximity to the Community (see Section 1.5.1.3) and provides an appropriate scale upon which to do a detailed assessment of effects on terrestrial resources of interest and concern to Fort McKay.

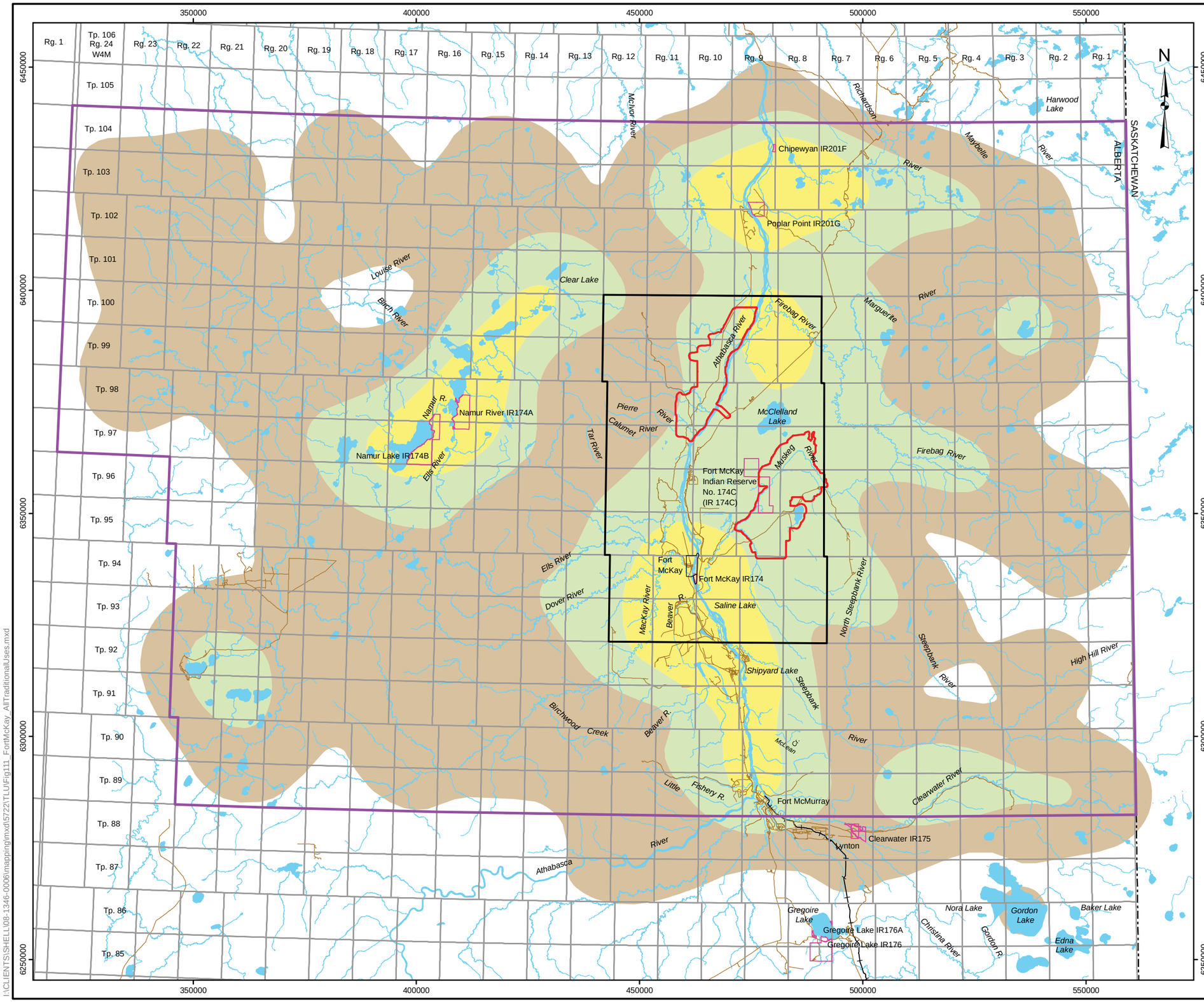
1.5.1.2 Traditional Land Use – Culturally Sensitive Ecosystems

Fort McKay's Traditional Land Use – Cultural Significant Ecosystems (CSEs) were developed by McKillop (2002) from a spatial analysis of data from a Fort McKay traditional use and occupancy study: ***There is Still Survival Out There*** (Fort McKay First Nations 1994). The intent was to provide traditional use maps that were relevant for the assessment of development impacts on key areas of Fort McKay's traditional land use. The analysis produced several maps, which identify broad areas of Fort McKay's intense, moderate and low traditional land use for a number of key traditionally harvested resources. Culturally sensitive ecosystem maps used in this Fort McKay Specific Assessment include large game, fur-bearers, fish, birds, traditional plants (berries) and all traditional uses (a map that combines information from the individual harvesting categories). The All Traditional Uses CSE is shown in Figure 1-2. The other CSE maps are shown, as appropriate in the relevant assessments (i.e., ***Section 6 – Wildlife*** or ***Section 9 – Access and Disturbance***).

Note that the CSE analysis was based on one data set and should not be considered a comprehensive mapping or analysis of Fort McKay's traditional use and occupancy. Substantial additional traditional use data have been collected since the 1994 study. The Culturally Significant Ecosystems do, however, provide a general spatial picture of Fort McKay's land use and are helpful in assessing effects from the Community's perspective. These maps should not be considered as a definition of the Community's relative value of specific areas of land.

1.5.1.3 Forty Township Study Area

While Fort McKay's Traditional Lands extend beyond the current oil sands development area, the majority of this development occurs close to the Community of Fort McKay and along the Athabasca River. It is important for Fort McKay to have a study area that is focused on the Community and the areas adjacent to it since the impacts that occur in the vicinity of the Community are experienced directly by Community members on a regular basis. Development and disturbances immediately surrounding the Community affect the quality and abundance of readily-accessible traditional resources and the opportunities to access and use



LEGEND

- FORT MCKAY TRADITIONAL USE
- FORT MCKAY 40 TOWNSHIP BLOCK
- TERRESTRIAL LOCAL STUDY AREA
- INDIAN RESERVE
- PROVINCIAL BORDER
- OPEN WATER
- PUBLIC ROADWAY
- RAILROAD

CULTURALLY SIGNIFICANT ECOSYSTEMS (CSE) AREAS

- INTENSE USE CSE (50% UTILIZATION DISTRIBUTION)
- MODERATE USE CSE (75% UTILIZATION DISTRIBUTION)
- LOW USE CSE (95% UTILIZATION DISTRIBUTION)

REFERENCE

Alberta digital data obtained from AltaLIS Ltd. (September 2004), IHS Energy Ltd. (August 2006), used under license.
Projection: UTM Zone 12 Datum: NAD 83

25 0 25
SCALE 1:850,000 KILOMETRES

PROJECT
FORT McKAY SPECIFIC ASSESSMENT AREAS
JACKPINE MINE EXPANSION &
PIERRE RIVER MINE PROJECT

TITLE
CULTURALLY SIGNIFICANT ECOSYSTEMS -
ALL TRADITIONAL USES

PROJECT NO. 08-1346-0006.5722			SCALE AS SHOWN	REV. 0
DESIGN	BDW	01 Dec. 2008	FIGURE 1-2	
CHECK	JH	26 Feb. 2009		
QA/QC	AR	09 Mar. 2009		
REVIEW	WS	09 Mar. 2009		

I:\CLIENTS\SHELL\08-1346-0006\mapping\mxd\5722\TLU\Fig111_FortMcKay_AllTraditionalUses.mxd

those resources. It also affects the use and enjoyment of the Community's residential area and quality of life.

As well, it is vital to have vegetation information at a detailed scale so that impacts on Fort McKay's key traditional terrestrial resources can be assessed. Typical regional-scale study areas for oil sands assessments are so large that a detailed level of vegetation mapping and analysis is not feasible. Usually a broad landscape classification is used and this does not provide a sufficient scale of information to assess impacts on terrestrial resources of interest to Fort McKay and to compare the impacts at the landscape level to those that are occurring at the local-scale.

Therefore, Fort McKay chose a study area that allowed for vegetation mapping using the Alberta Vegetation Inventory (AVI) classification system, which classifies ecosite phases and wetlands, as well as an Enhanced Wetland Classification System (Ducks Unlimited 2008) and also encompassed areas of high value and use by Fort McKay.

A Forty Township Study Area (FTSA) was selected that includes Shell's two proposed projects and the Community of Fort McKay (Figure 1-2). The FTSA (379,641 ha) is bounded by the following: Townships 93 to 100, Ranges 8 to 12, W4M). The FTSA is considered a regional-scale study area in this Fort McKay Specific Assessment. The Shell LSAs represent about 13.3% of the land within the FTSA and approximately 2.2% of the RSA of 2,277,376 ha used by Shell (2007) in the EIA for the proposed Projects.

This 379,641 ha study area straddles the Athabasca River and includes the lower portions of the MacKay River, Ells River, Joslyn Creek, Tar River, Calumet River, Pierre River, Asphalt Creek, Gymundson Creek, Big Creek, Firebag River, Fort Creek and Muskeg River watersheds. As a result, the FTSA encompasses many areas of high value and use by Fort McKay (FMFN 1994, Fort McKay IRC 2010a). This study area is used for terrestrial resources assessment.

1.5.1.4 Traplines

Fort McKay community members hold 29 Registered Fur Management Areas (RFMSAs; also referred to as Traplines). Traplines are an important traditional land use unit. While people are on the land trapping they, with their extended families, also participate in other traditional activities, so much of a family's traditional land use might occur within trapline areas. Therefore, effects at the trapline-scale were examined for disturbance and access-related impacts.

1.5.1.5 Watersheds

Watersheds are an ecologically relevant boundary for the assessment of effects on aquatic resources. Fort McKay's assessment of the surface water resources, water quality and fisheries resources used the same boundaries as Shell used in the EIA, which are based on the watersheds that the proposed projects occur in as well as a portion of the Athabasca River (these are shown in Section 4 - Surface Water

Resources *aquatics* section of this assessment and in Shell 2007, Volume 4A, Figures 6.2-3 and 6.2-4). In addition, the disturbance and access assessment examined key Athabasca tributary watersheds that are traditionally used by Fort McKay.

1.5.1.6 Local Study Areas

Fort McKay uses the same Local Study Area (LSA) boundaries for Shell's proposed projects as were used in the EIA (Shell 2007, Volume 3, Section 1.3.4). These are shown on Figure 1-2.

1.5.2 Study Areas by Component

Study areas are discussed within each environmental component section and are listed briefly in following sections.

1.5.2.1 Air Quality, Odours and Air Emission effects on Vegetation

The air quality assessment study areas include:

- Fort McKay's Traditional Lands – assessment of potential adverse effects on vegetation, and
- Community of Fort McKay – assessment of potential health and odour impacts

The high, moderate and low use areas within Fort McKay's traditional lands, and specific cabins were not individually assessed, but were referred to in individual issue or parameter assessments when appropriate.

1.5.2.2 Aquatics – Groundwater, Surface Water, Water Quality and Fisheries Resources

The local and regional study areas (RSA) for the aquatic components (groundwater, surface water, water quality and fisheries resources) are the same as those used by Shell in the EIA (Shell 2007, Volume 3, Section 1.3.4).

1.5.2.3 Wildlife

Study areas used for the wildlife assessment are as follows:

- Moose habitat, density and populations – (Large Game CSE, FTSA, and Wildlife Management Unit 531 – density and population only); and
- Beaver, Canada lynx and fisher/marten (Fur-bearers CSE, FTSA).

1.5.2.4 Vegetation and Biodiversity

Vegetation and biodiversity used the following study areas:

- regional-scale – FTSA, and
- local-scale – Shell's terrestrial LSAs for each of the proposed projects.

1.5.2.5 Disturbance and Access

For assessing disturbance implications for traditional use it is important to examine these at different spatial scales and within the context of access to traditional use areas. Therefore, disturbance and access are assessed at several scales and for a number of resources and/or harvesting areas:

- Fort McKay's Traditional Lands,
- Fort McKay's Traditional Land Use – Culturally Sensitive Ecosystems (intense, moderate and low use areas; FMFN 1994, McKillop 1992) for several of Fort McKay's key traditionally harvested resources:
  - Birds
  - Traditional plants (Berries)
  - Fish
  - Large game
  - Fur bearers
  - All traditional uses (synthesis of the above listed maps)
- Traplines
- FTSA; and
- Athabasca River tributary watersheds within Fort McKay's Traditional Lands.

1.5.2.6 Reclamation

The reclamation assessment is an assessment of reclamation as mitigation, from a technical and Community traditional land-use perspective and applies broadly to all of Fort McKay's Traditional Lands. Specific reclamation information for the proposed projects LSAs is presented.

1.5.2.7 Cultural Heritage Assessment

Fort McKay's cultural heritage impact assessment is linked to changes in environmental components and access to and health of traditional resources within Fort McKay's Traditional Lands.

1.6 Indicators and Receptors

Indicators and receptors used in the Fort McKay Environmental Specific Assessment are presented in Table 1-1 and discussed in further detail in the respective component sections. Most of the environmental indicators selected for the Environmental Specific Assessment are a subset of those used by Shell in the EIA;

the scope of the assessment was such that very few new indicators could be added. However, Fort McKay is confident that the indicators presented in this assessment are of interest and concern to the Community and reflect many of the major changes in the environment that affect the Community's opportunities to exercise their rights and interests within their Traditional Lands.

Table 1-1: Summary of Environmental Components and Indicators

Component	Indicators
Air Quality (*Section 2.0*)	Key air quality parameters: • Sulphur dioxide (SO_2) • Nitrogen Oxide (NO_2) • Ozone (O_3) • Particulate Matter ($PM_{2.5}$) • Particulate Matter (PM_{10}) • Carbon Monoxide (CO) • Benzene • Benzo-a-pyrene • Arsenic • Nickel • Total Hydrocarbons (THC) • Total Reduced Sulphur (TRS) Receptor: Community of Fort McKay
Odours (*Section 2.0*)	Key odour causing compounds: • Hydrocarbons (THC) • Total Reduced Sulphur (TRS) • Volatile Organic Compounds (VOCs) • H_2S (Hydrogen Sulphide) • Carbon Disulphide (CS_2) • Mercaptans • Thiophenes Receptor: Community of Fort McKay
Air Emission Vegetation/Ecosystem Effects (*Section 2.0*)	Key compounds that potentially affect vegetation: • Sulphur dioxide (SO_2) • Nitrogen Oxide (NO_2) • Ammonia (NH_3) • Ozone (O_3) • Nitrogen deposition • Potential acid input (PAI) Receptors: • Bogs and Jackpine stands (nitrogen deposition) • All vegetation (ambient air quality levels of SO_2, $NO\chi$, NH_3 and O_3) • Mineral (sensitive) soils (acid deposition)

Component	Indicators
Groundwater (*Section 3.0*)	Loss of groundwater resources Groundwater quantity: drawdown in fens and/or at cabins sites Groundwater quality: seepage of process-affected water
Surface Water Hydrology (*Section 4.0*)	State of Surface Water in the Watershed: • Maximum change in seasonal steam flow • Watershed area disturbed
Water Quality and Fisheries Resources (*Section 5.0*)	Aquatic Change Index: • Magnitude of change of key water quality parameters Key water quality parameters: • Naphthenic acids (NAs), • Polycyclic aromatic hydrocarbons (PAHs), • Total dissolved solids (TDS) or salinity (i.e., sodium), • Metals, • Acute and chronic toxicity, • Tainting potential, • Temperature, and • Dissolved oxygen. Fish health Loss of fish habitat and fishing opportunities
Wildlife (*Section 6.0*)	Moose habitat Moose density/populations Canada lynx habitat Fisher/marten habitat Beaver habitat
Upland (Forest) Vegetation (*Section 7.0*)	Distribution of upland forest Old growth Timber productive forest Riparian areas Rare plant potential
Wetland (Muskeg) Vegetation (*Section 7.0*)	Distribution of wetlands Peatlands Old growth Timber productive forest Riparian areas Rare plant potential
Traditional Plants (*Section 7.0*)	Traditional use plant potential Traditional use plants (berry harvesting sites)
Biodiversity (*Section 8.0*)	Ecosystem level biodiversity potential Landscape level heterogeneity

Component	Indicators
Disturbance and Access (*Section 9.0*)	Direct anthropogenic disturbance Traditional trails Linear disturbance Regional population levels Community member's experiences Protected areas
Reclamation (*Section 10.0*)	Area disturbed and reclaimed over time

Indicators selected for the Cultural Heritage Assessment are discussed briefly in Section 1.8 – Linkages between the Environmental Specific Assessment and Cultural Heritage Assessment and in more detail in the ***CHA Baseline*** (Fort McKay IRC 2010b).

1.7 Assessment Criteria and Approach

1.7.1 Assessment Criteria

Assessment criteria used in the Fort McKay Specific Assessment are summarized in Table 1-2. Fort McKay uses its own assessment criteria (note that in most cases these might differ from those used by Shell).

Each component section provides discussion and rationale for criteria selection. These are also described in Fort McKay's Healing the Earth Strategy (Fort McKay IRC 2010a). In general, Fort McKay's assessment criteria are conservative, precautionary and protective of people and the environment. Each component section describes the level of effect or exceedance of criteria that is assessed by Fort McKay as a significant adverse effect.

1.7.2 Green-Yellow-Red Rating System

To allow for comparisons across components, straightforward linkages between the environmental and cultural heritage assessments, and for easy-to-communicate summaries, Fort McKay uses a green–yellow–red rating system for this assessment. Each component categorizes impacts, as assessed using criteria described in Table 1-2, into one of three categories. In general, the following ratings are assessed for each category:

- **Green** (no or minor adverse effect),
- **Yellow** (possible adverse effect) and
- **Red** (significant adverse effect).

Table 1-2: Summary of Assessment Criteria for Environmental Components

Component	Assessment Criteria	Green-Yellow-Red Rating[1]
Air Quality (*Section 2.0*)	**Fort McKay's Health and Odour Criteria (Appendix 2-1)** • Health Canada's Air Quality Health Index (AQHI) • World Health Organization (WHO) criteria or Alberta Environment (AENV) criteria, depending on the basis for the limit Fort McKay's Keeping Clean Areas Clean (KCAC) Air Quality Targets (***Appendix 2-1***)	**Green:** • Parameter levels below KCAC targets **Yellow:** • exceedance of KCAC Targets • predicted increase of more than 5% in an air quality parameter as a result of the proposed Projects • knowledge gaps/uncertainties **Red:** • exceedance of health-based criteria • predicted increase of more than 10% in an air quality parameter as a result of the proposed Projects • knowledge gaps/uncertainties
Odours (*Section 2.0*)	**Fort McKay's Health and Odour Criteria** • Health Canada's Air Quality Health Index (AQHI) • World Health Organization (WHO) criteria or Alberta Environment (AENV) criteria, depending on the basis for the limit Fort McKay's Keeping Clean Areas Clean Air Quality Targets	**Green:** • Parameter levels below KCAC targets **Yellow:** • exceedance of KCAC Targets • predicted increase of more than 5% in an air quality parameter as a result of the proposed Projects • substantial knowledge gaps/uncertainties **Red:** • Since odours are currently a major problem in the Community, any predicted increase in odours in the Community was considered

Component	Assessment Criteria	Green-Yellow-Red Rating[1]
Air Emission Vegetation/ Ecosystem Effects (*Section 2.0*)	**Fort McKay's Vegetation/Ecosystem Protection Criteria** • 95% protection level for vegetation on undisturbed portions of Fort McKay's Traditional Lands Parameter-specific air/vegetation criteria: • SO_2 and NO_2: WHO criteria • NH_3: Economic Commission of Europe (ECE) criteria • O_3: Cumulative Environmental Management Association (CEMA) criteria • Nitrogen deposition: ECE and CEMA criteria • Potential Acid Input (PAI): CEMA criteria	**Green:** • Any predicted exceedence of air/vegetation criteria on undisturbed land that are less than 5% of the project development area or 5% of total cumulative development areas • Parameter levels below air/vegetation criteria (except where the project has a predicted increase of more than 5% in any air quality parameter) **Yellow:** • Any predicted exceedence of air/vegetation criteria on undisturbed land that exceeds 5% of the project development area or 5% of total cumulative development areas • predicted increase of more than 5% in an air quality parameter as a result of the proposed Projects • Substantial knowledge gaps/uncertainties **Red:** • predicted increase of more than 10% in an air quality parameter as a result of the proposed Projects
Groundwater (*Section 3.0*)	Groundwater quantity: drawdown in fens and/or at cabins sites • < 0.1 m – negligible effect • >0.1 and <1.0 m – potential effect • > 1.0 m – significant effect **Groundwater quality:** • No seepage of process-affected water predicted – negligible effects • Uncertainty as to whether these will be seepage – potential effect • Predicted seepage of process-affected water – significant effect	**Green:** • Any groundwater quantity or quality changes that will not or are unlikely to have a negative effect on a community member's direct or indirect use of groundwater on Traditional Lands. May require some ongoing monitoring to validate the predictions of little or no impact. **Yellow:** • Any groundwater quantity or quality impacts that might affect a community member's direct or indirect use of groundwater on Traditional Lands was considered as an adverse effect. Might require ongoing monitoring (the greater the uncertainty, the more extensive the monitoring will be) and potentially additional mitigation or suitable offset.

Component	Assessment Criteria	Green-Yellow-Red Rating[1]
Groundwater (*Section 3.0*) (cont'd)		**Red:** • Any groundwater quantity or quality changes that will affect a community member's direct or indirect use of groundwater on Traditional Lands is considered a **significant** adverse effect that would require further mitigation and/or accommodation.
Surface Water Hydrology (*Section 4.0*)	**State of the Surface Water in the Watershed:** • Maximum change in seasonal steam flow • Watershed area disturbed	**State of Surface Water in the Watershed** **Green – Sustainable:** • less than 10% change in stream flow in any given season and/or less than 20% of the watershed area affected by development and related land-use changes. No water management plan is needed at this time. **State of Surface Water in the Watershed** **Yellow – Threatened:** • 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. A water management plan should be developed to establish impact limits and provide direction to development. **Red – Endangered:** • 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. A water management plan is urgently needed to establish impact limits and provide direction to development.

Component	Assessment Criteria	Green-Yellow-Red Rating[1]
Water Quality and Fisheries Resources (*Section 5.0*)	**Water quality criteria** • Canadian Council of Ministers of the Environment (CCME) **Aquatic Change Index (water quality and fish health):** • an abbreviated version of the CCME Water Quality Index: pre-development median values are compared against future time snapshots and the number of times change in predicted median water quality concentrations is calculated **Fish Health** • Aquatic Change Index • Change in State of Watershed (% flow and % watershed disturbance) as assessed in the Hydrology assessment of this Fort McKay Specific Assessment (Section 4) and **Fishing Opportunities:** • Fish health (as described above) Consideration of the impacts to fish habitat described by Shell and the preliminary fish habitat compensation plan	**Aquatic Change Index** **Green – Low:** • less than 10 times change in predicted median water quality concentrations compared to pre-development to the given time snapshot in any given season and/or few guideline exceedances expected. If all variables are assessed as low (<10X multiple), no water quality or fishing opportunities management plan is needed at this time and is assessed by Fort McKay as no adverse impact. **Yellow - Moderate:** • between 10 and 25 times change in predicted median mean water quality concentrations expected and/or aquatic life guideline exceedances at certain times of the year. Where aquatic life might be at risk, a watershed management and fishing opportunities management plan should be developed to establish impact limits and provide direction to development. Professional judgment is required to assess whether the impact is significant. **Red – High:** • more than 25 times change in predicted median water quality concentrations and/or with guideline exceedances expected frequently; potential toxic effects related to mixtures of chemicals. Fishing opportunities are lost. A watershed management and fishing opportunities management plan is needed to establish impact limits, and provide direction to development. A significant adverse impact is likely to be the result. **Fish Health** Professional judgment based on Aquatic Change Index and State of Surface Water as described above, plus other relevant factors. **Fishing Opportunities** • Professional judgment based on Fish health as described above, loss of fish habitat as described in Shell's compensation plan, Community perspectives on effects to fishing opportunities, plus other relevant factors

Component	Assessment Criteria	Green-Yellow-Red Rating[1]
Wildlife (*Section 6.0*) **Upland Vegetation** (*Section 7.0*) **Wetland Vegetation** (*Section 7.0*) **Traditional Plants** (*Section 7.0*) **Biodiversity** (*Section 8.0*)	**Criteria and Numerical Scores[2]** **Direction** • Positive • Neutral • Negative **Magnitude** • Negligible (<1% change): score = 0 • Low (<10% change): score = +5 • Moderate (10 to 20% change): score = +10 • High (>20% change): score = +15 **Geographic Extent** • Local (within LSA): score = 0 • Regional (beyond LSA into FTSA): score = +1 • Beyond Regional (beyond FTSA): score = +2 **Frequency** • Low (occurs once): score = 0 • Medium (intermittent): score = +1 • High (continuous): score = +2 **Duration** • Short-term (< 3 years): score = 0 • Medium-term (3 to 10 years): score = +1 • Long-term (10-20 years): score = +2 • Far-future (one to several generations): score +3 **Reversibility** • Irreversible (occurs once): score = +3 • Reversible (intermittent): score = -3 • Partially reversible (continuous): score = 0	**Environmental Consequence[2]** • **Negligible** — 0 to 5 (a green situation): generally associated with effects that are of negligible magnitude; or effects of low magnitude, local in extent and reversible. • **Low** — 6 to 10 (a green situation): associated with effects of low magnitude that is reversible. • **Moderate**—11 to 15 (a yellow situation): associated with effects of moderate magnitude that are irreversible; or effects of low magnitude, that are local extent, irreversible and far future in duration; or effects of low magnitude, regional extent, irreversible, far future in duration. • **High**—>15 (a red situation); associated with effects of moderate magnitude, local in extent, far future in duration and irreversible; moderate magnitude, regional in extent, far future duration, irreversible and of medium frequency; high magnitude, local in extent, irreversible or partially reversible and long-term or far future in duration; high magnitude and regional in extent.

Component	Assessment Criteria	Green-Yellow-Red Rating[1]
Disturbance and Access (*Section 9.0*)	• Area disturbed	Professional judgement assessment based on location and magnitude of disturbance in relation to Fort McKay's key traditional use areas and resources, effects on access and Community concerns.
Reclamation (*Section 10.0*)	• Area disturbed and reclaimed over time	Professional judgment assessment based on scientific\technical uncertainties associated with reclamation, specific Community concerns and loss of traditional use opportunities, and project-specific data

[1] The assessment of significance varies slightly between components. But in general: green = significant adverse effect unlikely, yellow = possible significant adverse effect and red = significant adverse effect. Substantial knowledge gaps or uncertainty regarding the assessment of specific indicator was rated in the yellow or red category depending on the situation.

[2]Terrestrial assessment criteria and environmental consequence categories are based on the assessment criteria used by Shell (2007) in the EIA with slight modifications to the scoring system to reflect specific considerations for Fort McKay (see Vegetation – Section 7 for details).

However, impacts occur along a continuum and are rarely squarely within one category. Each assessment includes a discussion of the relative level of effect and the various factors and professional judgment considered in both the criteria and the ultimate rating.

Using the component-specific assessment criteria and the green-yellow-red rating system, a summary table is presented for each environmental component that includes each indicator and Fort McKay's assessment conclusion for each scenario or case (i.e., Pre-Development, Current, Base, Application and Planned Development). For linkage to the Cultural Heritage Assessments (baseline and project-specific) the green-yellow-red ratings were presented in the form of a speedometer gauge, with an arrow pointing to the appropriate rating.

The ratings of environmental consequence into green-yellow-red situation categories are specific to this Fort McKay assessment and were not used by Shell in the EIA.

1.8 Linkage between Environmental Specific Assessment and Cultural Heritage Assessment

The Environmental Specific Assessment and the ***Cultural Heritage Assessment*** are distinct yet interrelated parts of the Fort McKay Specific Assessment. The environmental specific assessment focuses on assessing impacts of oil sands development, and the Shell projects and planned development, in particular, on air, land, water and access. Each of the environmental components addresses specific Community concerns and issues for that particular aspect of the environment.

The Cultural Heritage Assessment (CHA) Baseline examines the cultural change that Fort McKay has experienced as a result of industrial activity from the 1960s until 2008. The Project-Specific CHA assesses the effects of the Shell projects and planned development against the CHA Baseline.

The Community, through workshops and focus groups conducted for the Cultural Heritage Assessment, developed an extensive list of Traditional Activities and indicators for their measurement. Together they comprise the ***indicators of cultural change*** that are used in the CHA.

- ***(Select) Traditional Activities*** – These are indicators of cultural values. They are used in the CHA Baseline report and CHA Project Specific Assessment. For this assessment these Traditional Activities include: Hunting, Fishing, Trapping, Berry Picking, Wage Employment, Education, Visiting and Raising Children.
- ***Industry Stressors*** - These indicators refer to Community-determined stressors caused by industry on Traditional Activities and include: Loss of Land, Pollution, Reduced Access to Land, Wage Economy and Increased Population.

- ***Measures of Industry Stressors*** – These measures are derived from Community workshops. When appropriate, they have been linked with indicators from the Environmental Specific Assessment.

Each of the Industry Stressors represents a suite of issues that are connected by a central theme. For instance, ***loss of land*** includes direct disturbance, linear disturbance as well as environmental changes that affect fish, plants and wildlife rendering them "lost" (or less available) for cultural purposes. Community perceptions and interpretation of industry-related stressors on the land and their cultural heritage are a collection of quantitative items involving measurements and qualitative items which often help contextualize the quantitative indicators and give them cultural meaning and significance.

Fort McKay linked indicators proposed by the Community with indicators available from the Environmental Specific Assessment. It should be noted that not all of the Community-proposed measures of industry stressors were assessed in the Environmental Specific Assessment. Similarly, not all of the indicators used in the Environmental Specific Assessment were used in the Cultural Heritage Assessment.

A common set of indicators was developed that had the following criteria:

- Reflective of Community concerns;
- Relevant to the Traditional Activities and Industry Stressors identified in the CHA;
- Could be developed and utilized based on currently available information within the scope of this pilot project
- Have a direct relationship between industry-related development and Traditional Activities; and,
- Correlate to environmental concerns rather than socio-economic issues (since a socio-economic assessment was outside of the scope of this Fort McKay Specific Assessment).

Table 1-3 shows the Industry Stressors that were determined by the Community, the Community-proposed measures of industry stressors and the final common set of indicators common to both the Environmental Specific Assessment and the Cultural Heritage Assessment.

Throughout the process of developing the Fort McKay Specific Assessment there was close linkage between the cultural heritage and environmental assessment. Ultimately, both of these are assessments of the effects of oil sands development on Fort McKay, its culture and the availability and opportunities to access traditional-used resources.

Table 1-3: Measures of Industry Stressors Proposed by the Community and Environmental Indicators

Industry Stressors	Measures of Industry Stressors Proposed during Community Workshops and Focus Groups	Measures of Industry Stressors (Indicators) used in the Environmental Specific Assessment and Cultural Heritage Assessment
Loss of Land	• % Land Disturbance • Kms of linear disturbance • ± wildlife/vegetation abundance/ distribution/quality • habitat disturbance • Wildlife habituation • Loss of TLU sites (FMFN 1994) • Loss of "berry" habitat	• Traditional Lands Disturbance • Traplines Disturbance • Wetlands (muskeg) • Upland Forest • Biodiversity • Traditional Plants • Moose habitat and populations • Canada lynx habitat • Beaver habitat • Fisher/marten habitat • Protected Areas • Reclamation
Pollution	• Unusual smell, colour, spotting of flesh • Air quality (visual and measured) • Smell • Water quality • Water quality perception • look/behaviour of animal (TEK: hair, flesh, fat, gait, etc.) • Government directed health advisories • colour/condition of fat and organs	• Air quality parameters: Sulphur Dioxide (SO_2) • Air quality parameters: Nitrogen Oxides (NO_X) • Odours • Air quality parameters: particulate matter ($PM_{2.5}$) • Air emission effects on vegetation

Industry Stressors	Measures of Industry Stressors Proposed during Community Workshops and Focus Groups	Measures of Industry Stressors (Indicators) used in the Environmental Specific Assessment and Cultural Heritage Assessment
Industrial Water Use	• # of Water licenses issued for the Athabasca River/traditional waterways • volume of permitted industrial water use/year • # of accidents/malfunctions reported/year • # of traditional waterways affected by industry	• Watershed disturbance • Watershed Index for Athabasca Watershed • Groundwater
Access to Land	• Gates • Permits to Access Land • Alterations to trails/roads • Trapper experience (reported delays, limitations etc.) • # of traditional waterways crossed by industry infrastructure	• Linear disturbance • Traditional trails
Wage Economy	• Average hours of work • # People working for industry • Consumption • Cost of living	• Indicators to be developed in the future
Increased Population	• Population growth in the area • # People with hunting permits • Recreation activities (clubs, tours) • Populations in work camps near McKay • # of incidents on McKay trap lines	• Regional population trends in the RMWB

1.9 Recommendations

Fort McKay provides recommendations within this assessment to address two levels of impacts. Project-specific recommendations are aimed at improving the performance of Shell's Projects, in the event they are approved and proceed. These recommendations are intended to lessen the adverse environmental impacts and the adverse impacts specifically on the Community of Fort McKay. Project-specific recommendations are limited in scope because they assume the project will proceed, and will proceed generally as designed and planned.

The greatest and most significant of the adverse impacts on Fort McKay arise from the cumulative effects of Shell's Projects combined with other existing, approved and planned projects. The mitigation and accommodation of cumulative effects requires strategies and measures that need governmental authority and action.

These two categories of recommendations overlap because Shell's Projects contribute and form part of the cumulative effects. In many cases, Shell can act in concert with other industry or government to implement the cumulative effects recommendations.

Fort McKay's recommendations are made in the context of Fort McKay's Healing the Earth Strategy and focus the tenets of retain, improve, reclaim and offset (Fort McKay IRC 2010a). Fort McKay's recommendations are presented at the end of each main section of the assessment and are summarized in Section 11 of this document.

1.10 References

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