FORT McKAY
FIRST NATION

August 17, 2015

Carolyn Dunn
Crown Consultation Coordinator
Canadian Environmental Assessment Agency
160 Elgin St 22nd Fl
Ottawa ON K1A 0H3
Sent via email: Carolyn.Dunn@ceaa-acee.gc.ca

Dear Ms. Dunn

RE: Fort McKay First Nation review of Frontier Oil Sands Mine Project – Project Update EPEA Application No. 001-247548, Water Act File No. 303079, CEAA Reference No. 65505 and ERCB Application No. 1709793; as well as Responses to Round 4 Supplemental Information Requests for EPEA Application No. 001-247548, Water Act File No. 303079, CEAA Reference No. 65505 and AER Application No. 1709793.

I am writing to you on behalf of Fort McKay First Nation. Please accept this letter as Fort McKay's submission of our review of Teck's Project update of June 15, 2015 and Round 4 Supplemental Information Requests of June 30, 2015 for Teck's Frontier Project.

Fort McKay remains open to scheduling a meeting in early October to discuss our submissions related to our review of the Teck's Project Update and SIR#4 as well as next steps in the process.

Since

<original signature removed>

Bori Arrobo, MSc.
Lead, Environment & Regulatory
Fort McKay Sustainability Department
Fort McKay First Nation

Cc
Fort McKay First Nation Chief and Council
Alvaro Pinto, Director, Fort McKay Sustainability Department
Daniel Stuckless, B.Sc., Senior Manager, Environment & Regulatory
Scott McKenzie, Regulatory Manager, Teck Resources Limited,
Janais Turuk, Community Relations, Teck Resources Limited
David Haddon, Panel Manager, CEAA
Julie Bugg, Process Engineer, Oil Sands Mining Authorizations, AER
Sean Carrier, Senior Project Manager, CEAA

FORT McKAY
FIRST NATION

Fort McKay's Review of Teck Resources Ltd.

Frontier Oil Sands Mine Project Integrated Application

Project Update June 15, 2015 and Supplemental Information Request No. 4

EPEA Application No. 001-247548, *Water Act* File No. 303079 CEAA Reference No. 65505 and AER Application No. 1709793

Review prepared for Fort McKay Sustainability Department by:

Dr. Shanti Berryman, Integral Ecology Group

Ron Bothe, Bothe & Associates Inc.

Dr. John Dennis, SolAeroMed Inc.

John Errington, John C. Errington & Associates

Ann Garibaldi, Integral Ecology Group

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Lorne Gould, Gould Environmental Ltd.

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Dr. Brenda Miskimmin, Summit Environmental Consultants Inc.

David Spink, Pravid Environmental Inc.

August 2015

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1. INTRODUCTION

1.1 Project Overview

Teck Resources Ltd. (Teck) submitted an Integrated Application to the Energy Resources Conservation Board (ERCB) and Environment and Sustainable Resource Development (ESRD) in 2011 for the Frontier Oil Sands Mine Project. The proposed project is an open pit oil sands mine with production of 277,300 bpd. In 2012 the project was referred to a joint federal-provincial review panel.

The proposed Frontier Oil Sands Mine Project is located:

- within the Fort McKay First Nation Traditional Territory and is within an actively used area relatively close to this Community that is important for Fort McKay's traditional land use values and cultural heritage—the area includes but is not limited to cultural or spiritual sites and values, habitation sites (e.g., historic and currently used cabins, gathering places), wildlife habitat or ecological values (including critical areas for woodland caribou, wolf, bison, moose fisher, marten and porcupine), transportation routes and trails and an important family hunting area;
- about 51 km north of the Community of Fort McKay and 40 km east of Fort McKay First Nation's reserves at Gardiner and Namur lakes (IR174A and IR174B); and
- near Fort McKay community member traplines (directly east of RFMA #850, northwest of RFMA#94 and west and across the Athabasca River from RFMA #1161. Traplines are important traditional use and cultural areas.

The project was referred to a joint federal-provincial review panel in 2012. The Fort McKay Sustainability Department (FMSD) reviewed the Integrated Application and submitted a statement of concern (SOC) and technical review to ESRD on June 4 2012. FMSD also submitted a letter to the Canada Environmental Assessment Agency (CEAA) on June 4, 2012 regarding the sufficiency of the information in the EIA.

There have been four rounds of supplemental information requests (SIRs) since the Integrated Application was filed. On June 15, 2015 Teck submitted a substantial Project Update as well as responses to SIR Round 4. This review provides comments on the Project Update.

Teck has modified the project definition with the following changes:[1]

- the south development area (SDA) has been removed
- the main pit has been marginally extended south and the east pit wall optimized

[1] Project Update; Volume 1, Section 1.3

- centrifuge technology is proposed to subsequently treat FFT instead of using thickened tailings and thin lift drying technologies
- in-pit tailings areas have been added for coarse sand tailings and centrifuged fine tailings (CFT)
- the bridge previously proposed by Shell for the PRM is now part of the project.

The following describes in more detail the project's key changes and updates:

- additional baseline and regional information was used in the updates assessment;
- feedback from Aboriginal communities, stakeholders and government SIRs was integrated;
- optimization of engineering includes:
    - in 2013, Teck and Shell exchanged leases near the south end of the project, resulting in the SDA being removed and the overall Project Development Area (PDA) being reduced in size
    - resources from the Shell lease incorporated in the mine plan adding another 200 million barrels (bbl) of resource and increasing the total recoverable to 3 billion bbl
    - updated tailings management strategy – using coarse combined tailings (CCT) instead of thickened tailings (TT) and thin lift drying
    - similar process technology as in the Integrated Application but the tailings thickener has been removed and the process operating temperature range has been increased 5°C to 45°C to 55°C
    - changed location of External Disposal Area (EDA) including moving the EDA over top of Unnamed lakes 1 and 2
    - extending the External Tailings Areas (ETA1 and ETA2) to the north
    - optimized production rate of 260,000 bbl/cd
    - changes in the project phasing to two phases instead of four
    - updated mine plan

- **Athabasca River Bridge and Access Road** – The Athabasca River bridge and access road are now assessed in both the Application Case (i.e., as part of the Frontier Project) as well in the Planned Development Case (as part of the Shell Pierre River Mine Project) – Shell withdrew its Application for the Pierre River Mine project so Teck would need to build the bridge and access road as part of the Frontier Project; however Teck indicates that the withdrawal of Shell's application occurred when it was well into its Project Update so the bridge is still included in the PDC;
- **change in the location of the Aerodrome** – moved to the east of the ETA 1, closer to the project lodge and out of key bison habitat;
- preferred location of the Athabasca River water intake changed from option 4 to option 3;
- updated Fisheries Offsetting Plan;

- identified a preferred routing option for a Regional Utility Corridor – west of the project along the base of the Birch Mountains; and
- updated water management and closure, conservation and reclamation plans

1.2 Reviewers

The review was coordinated by the FMSD. Specific components were reviewed by the following individuals:

- David Spink, Pravid Environmental Inc. – air quality
- Dr. John Dennis, SolAeroMed Inc. – noise and human health
- Lorne Gould, Gould Environmental Ltd – wildlife
- Ron Bothe, Bothe & Associates Inc. – surface water
- Dr. Brenda Miskimmin, Summit Environmental Consultants Ltd. – aquatic resources
- Doug Geller, Western Water Associates Ltd. – groundwater
- Dr. Shanti Berryman and Natalie Melaschenko, Integral Ecology Group – terrain and soils, vegetation and wetlands, biodiversity, conservation and reclamation plan, cumulative effects and access
- Ann Garibaldi, Integral Ecology Group – traditional land use and land and resource use, cultural impact assessment
- John Errington, John C. Errington & Associates – tailings management
- Marie Lagimodiere, Lagimodiere Finigan Inc.– socio-economic

1.3 Review Approach

The application review is based on our understanding Fort McKay's key concerns. It is focused on the environmental, social, cultural and traditional land use implications of impacts associated with the project with respect to air, water, land, wildlife, health and Fort McKay's opportunities for traditional use of the land for the exercise of their Treaty and Aboriginal rights. Our approach follows four steps:

- Summarizing the results of the assessment and assessing the completeness of the data and the appropriateness of the analysis presented in the application,
- Assessing the environmental consequences and possible mitigation,
- Providing requests based on our understanding of the Fort McKay's key concerns.
- Understanding the project in the context of cumulative effects within Fort McKay's Traditional Territory.

To enable easy tracking of issues we have numbered in [square brackets] comments and their associated requests, should the project proceed. These requests are also presented in summary tables with Fort McKay's key concerns. The category column of the tables indicates the potential path forward to address the issue. Categories are as follows:

- **Government Agencies (including AER, ACO, AEMERA, AEP)** – directed at the Crown – Fort McKay's request to the Crown, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved); and
- **Industry** – directed at the proponent – a deficiency or question or potential mitigation on which Fort McKay requests that a response or additional information from Teck is provided to Fort McKay and government, prior to the application being deemed completed by the regulators. When information or a response is requested from Teck, Fort McKay requests a reasonable opportunity to review the response and information and an opportunity to provide comments and input.

1.4 Disclaimer

This report is submitted to the FMSD for its use for such purposes as:

- assisting the Community to understand the project's potential impacts;
- consulting with Teck regarding project-specific mitigation;
- informing the Alberta Energy Regulator (AER) and governments of Alberta and Canada of Fort McKay's issues and concerns with respect to the project; and
- consulting with the governments of Alberta and Canada regarding potential impacts on Fort McKay's interests and Treaty and Aboriginal rights.

1.5 Review and Validation of Key Issues

The FMSD has reviewed and validated the key concerns and requests described in this review prior to its submission.

1.6 Fort McKay Internal Community Consultation

Note that the FMSD is in the process of consulting with community members and leadership regarding several projects. Initial community consultation focus group sessions related to this project were conducted in 2012. The FMSD compiled and synthesized information and input obtained from those community focus group sessions and met with leadership to discuss this information. Additional questions and concerns raised during these consultations were communicated to Teck, Alberta and Canada, as needed.

1.7 Cumulative Impacts to Treaty and Aboriginal rights

To date, no meaningful consultation process has been developed by Alberta for the taking up of land for mining and other development in Fort McKay's Aboriginal Traditional Territory. Fort McKay has an outstanding request to Alberta for consultation on the cumulative impacts of oil sands development and measures required to avoid and accommodate impacts to its rights and interests. This includes an outstanding request since 2003 for a Moose Lake access management

plan, which is in progress but not complete. Fort McKay has challenged LARP and the LARP Panel has made recommendations, but LARP still does not address cumulative effects; its frameworks were developed without taking into consideration Treaty Rights and as a result LARP fails to protect Treaty Rights.

To date, Alberta has not agreed to negotiate a consultation and accommodation agreement, or consultation protocol or best practices guideline with Fort McKay.

There is still no process by which Canada consults with Fort McKay regarding cumulative impacts of the taking up of land for oil sands development and the impacts of industrialization on the majority of Fort McKay's Traditional Territory and this needs to be rectified. Project-specific delegated consultation to proponents does not result in meaningful accommodation. Residual impacts are that the project's contribution to existing impacts is not mitigated by proponents. Proponents do not have jurisdiction over land-use decisions, managing wildlife and other Crown matters. Proponents do not consult during the design phase of their projects. Proponents will not consider relocating or abandoning their projects.

Community members have expressed concerns and objections to new development, including roads, within their Traditional Territory unless and until measures are developed to protect their Constitutional reasonable opportunities for the exercise of their constitutional rights and Reserves, including rights to their reserve lands, and preserving their cultural traditions.

Please see requests throughout this review that address these objections and issues.

2. CUMULATIVE EFFECTS

2.1 Context and Summary

Fort McKay is concerned with the contribution of the Frontier Project to cumulative environmental and related effects in Fort McKay's Traditional Territory and the extent to which these effects continue to impact Fort McKay's current and future generations' traditional livelihood, existence, culture and traditional economy.

It is the Fort McKay Community's view that it is not possible to fully assess the regional effects of continued mine development, and the mitigation of these effects through mine reclamation, in the absence of a regional closure plan for the mineable oil sands area and a cumulative-effects assessment based on that plan.

As such, Fort McKay requests that Teck and other oil-sands mine operators support (with data and funding) development of a regional closure plan and a corresponding cumulative-effects study for the mineable oil sands region.

2.2 Cumulative Effects Outstanding Key Concerns and Requests

[1] – [2] Cumulative Effects Assessment

[1] Request

Fort McKay requests that Teck supports, with funding and data, an ongoing and updated cumulative-effects assessment of impacts on Fort McKay's Traditional Territory and rights so that constructive and decisive measures can be developed to address cumulative effects within Fort McKay's Traditional Territory.

[2] Request

Fort McKay requests that Teck develops and implements, in collaboration with Fort McKay, in a Working Group created by Teck, follow-up programs and monitoring that specifically determine if the EIA projections and assumptions are valid and accurate and if proposed mitigation is effective.

2.3 Cumulative Effects Key Concerns and Requests Summary

Table 2-1: Cumulative Effects Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category*
[1]	Cumulative Effects Assessment	Fort McKay requests that Teck supports, with funding and data, an ongoing and updated cumulative-effects assessment of impacts on Fort McKay's Traditional Territory and rights so that constructive and decisive measures can be developed to address cumulative effects within Fort McKay's Traditional Territory.	Industry
[2]	Cumulative Effects Assessment	Fort McKay requests that Teck develops and implements, in collaboration with Fort McKay, in a Working Group created by Teck, follow-up programs and monitoring that specifically determine if the EIA projections and assumptions are valid and accurate and if proposed mitigation is effective.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

3. ACCESS MANAGEMENT

3.1 Context and Summary

The updated application states that Teck has begun consultations with Aboriginal communities in developing a project-specific access management plan (AMP) including a conceptual Access Management Plan draft Table of Contents.[2]

3.2 Access Management Outstanding Key Concerns and Requests

[3] Access Management Plan

> ***[3] Request***
>
> Fort McKay requests that Teck develops and finalizes an access management plan (AMP) in consultation with Fort McKay, and that it includes mitigations to concerns expressed by Fort McKay in order to meaningfully practice traditional activities.

3.3 Access Management Key Concerns and Requests Summary

Table 3-1: Access Management Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category*
[3]	Access Management Plan	Fort McKay requests that Teck develops and finalizes an access management plan (AMP) in consultation with Fort McKay, and that it includes mitigations to concerns expressed by Fort McKay in order to meaningfully practice traditional activities.	Industry

*Request Categories:

Government – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

[2] Volume 1 Appendices, Application Update, Appendix 14B (PDF pp. 3650-3653)

4. TRADITIONAL LAND USE

4.1 Context and Summary

The FMSD partnered with Integral Ecology Group to undertake a community-guided Traditional Land Use (TLU) study for the Teck and Silverbirch (now Teck) Frontier Project (August 9, 2011). This report was provided to Teck prior to completion of its EIA for inclusion in the original Frontier Project application (Fort McKay Sustainability Department and Integral Ecology Group 2011).

The Fort McKay-guided TLUS met the project Terms of Reference (ToR) and was designed to inform Teck of the community's assessment of the project's development effects on Fort McKay's TLU opportunities and Treaty and Aboriginal Rights.

Fort McKay and Teck agreed that Fort McKay's TLUS would be included in the project application as a standalone report and that Teck would not extract portions of Fort McKay's study for use in Teck's TLU assessment. The community-guided study concluded that:

> *…in absence of adequate mitigation and accommodation measures, the preliminary results of the assessment of the Frontier Project effects on the Treaty and Aboriginal rights of the Community of Fort McKay are considered significant by the Fort McKay Sustainability Department.*

A brief summary the results and conclusions of Fort McKay's TLU study for the Frontier Project is found in Appendix B.

Integral Ecology Group and Kwusen Research & Media completed a review of the TLU portion of the Frontier mine application (May 21, 2012). In addition, Evernorth Consulting completed a review of the Frontier Project SIRs Round 1. All of the material has been made available to Teck.

4.2 Traditional Land Use Outstanding Key Concerns and Requests

A review of the Project Update revealed that a number of additional mitigation actions have been proposed by Teck related to TLU.[3]

All indicators identified by Teck (hunting, trapping, plant harvesting and use of cultural sites), with the exception of "opportunities to fish for traditional important species" are deemed "regional" in extent, "long-term" in duration, and "irreversible". Overall, the assessment takes into consideration many of the requests that Fort McKay has asked for in previous studies, so there are fewer concerns and recommendations than in the original Frontier Project application and SIRs review.

[3] Volume 3, Section 17.6.1.1

[4] Mitigation Monitoring

In the original application, Teck indicated that "*potential effects to traditional land uses resulting from the Project will be mitigated primarily through access management and reclamation*".[4] Teck has modified its effects determination in the Project Update using what it terms a "conservative approach" that has resulted in a stronger effects prediction that better reflects the experience of and comments from Fort McKay community members. Teck's suggested mitigations include

1) "considering" input from Aboriginal communities on committees to join,
2) "discussing opportunities" to monitor TLU-related indicators or effects on culture identified in community Cultural Impact Assessments,
3) "consulting" in the development of project-specific monitoring and management plans,
4) "engaging" affected Aboriginal communities in the development of a CC&R plan, including end land use targets,
5) "consulting" on how best to monitor for reclamation success, and
6) "working with" Aboriginal communities on mitigation studies regarding historic resources.

The mitigation measures listed above need follow-up and detailed commitments including funding support to ensure they are effective at addressing community needs.

[4] Request

Fort McKay supports the above measures listed by Teck in Section 17.6.3 of the Project Update and requests that Teck commits to ensuring that it monitors, follows-up and tracks these commitments to the satisfaction of Fort McKay throughout the project's life.

[5] – [6] Reclamation

Teck's mine-related land disturbance, even when accounting for reclamation, will result in a minimum of two to three generations of Fort McKay Community members not having access to significant portions of their Traditional Territory. Even at closure, reclamation activities will not result in a landscape that resembles pre-disturbance conditions.

Teck articulates that a goal of the CC&R plan[5] is to reclaim habitat for "key" species traditionally hunted, trapped and harvested; however, even if recently reclaimed

[4] Teck Frontier Project EIA, Section 6.5.7, p. 6-22

[5] Volume 1, Section 13

sites are put on a trajectory toward recovering biological diversity and function at the time reclamation certification is granted, reclaimed sites will likely not be suitable for a pre-disturbance range of traditional activities. This further extends the duration of impact beyond two to three generations. Without access to the land for one or more generations, cultural knowledge transmission and people's connection to the land is irreparably changed.

Areas disturbed by the project will no longer be available for traditional purposes during the project's operational phase, and ability to reclaim these sites for traditional purposes remains unknown. The near-term and long-term impacts on cultural land use opportunities are significant as a result of the project, particularly when combined with other project developments taking place within Fort McKay's Traditional Territory. To address the collective concerns for the protection of these valued cultural locations, Fort McKay would like to collaborate with Teck to develop a mitigation and offset plan.

[5] Request

Fort McKay would like to collaborate with Teck to develop a mitigation and an offset plan in relation to the adverse effects and loss of key cultural and traditional use areas that would be affected by the plan in the Frontier Project Update.

Teck indicates that:[6]

> *once reclamation is complete and the land is returned to the Crown, it is* ***expected*** *[emphasis added] that the reclaimed areas will be available for traditional land use activities, while recognizing that Aboriginal land user's relationship with these reclaimed areas may be altered due to the Project.*

Though Teck has agreed to engage in a process with affected Aboriginal groups to develop reclamation criteria on Teck's lease,[7] Fort McKay requests further assurance from the federal and provincial governments that the to-be-established reclamation targets that will be jointly developed with Fort McKay and Teck and will be upheld by the Province of Alberta as well as the federal government as appropriate. As stated by Teck:[8]

> *Potentially affected Aboriginal communities will be consulted in the establishment of criteria to determine reclamation success. However, Teck*

[6] Volume 3, Section 17, p. 17-150

[7] Ibid.

[8] Volume 8, Section 6.5.4.1, p. 6-19

believes the government should have sole responsibility for the issuance of reclamation certificate.

Without binding assurance that both the jointly developed reclamation targets and the land it refers to will be upheld, Fort McKay will have very little confidence that its Traditional Territory will be able to support Treaty and Aboriginal rights including traditional harvesting and spiritual pursuits in the future.

Teck indicated that "*potentially affected Aboriginal communities will be consulted in the establishment of criteria to determine reclamation success*". Fort McKay supports this and would like to formalize a process with Teck that would outline how Community input would be part of criteria development.

[6] Request

Fort McKay requests that Teck:

i. formalizes a process with Fort McKay outlining how Community input would be part of a jointly developed reclamation criteria development for the Teck Frontier mine; and

ii. supports Aboriginal involvement in developing reclamation criteria in regional committees and research organizations.

Fort McKay also requests assurance from the provincial and federal governments that reclamation criteria will be developed with Aboriginal involvement with the Teck lease and will be binding and upheld during the reclamation certification process and once Teck has returned the land to the Crown.

[7] Access

Teck predicts that in Base Case, Application Case and Planned Development Case land users accessing the traditional land use Regional Study Area (RSA) from Fort McKay will experience interruptions to multiple trails, particularly those used to access areas to the northeast of Fort McKay.[9]

Further,

While access to some areas is provided by industry access roads, this may also result in increased use of areas by non-Aboriginal harvesters or recreational land users, and a corresponding increase in competition for traditionally important land areas or resources.

[9] Volume 3, Section 17.5.3.1, p. 17-77

Fort McKay land users have experienced access impacts firsthand, including loss of known access routes requiring identification of new safe travel routes.[10] FMSD has also raised concerns regarding increased access to portions of the Traditional Territory including more competition for plants and animals by non-Aboriginal land users.

[7] Request

Fort McKay requests that Teck formalizes an agreement with Fort McKay to support developing an access management plan on the West side of the Athabasca River than takes into consideration the bridge across the Athabasca River that Teck is proposing in the Project Update.

[8] – [9] Trappers

Fort McKay supports Teck's commitment to facilitate trappers and other traditional harvesters through the project area and to compensate affected trappers following industry standards. Fort McKay would like to formalize both of these commitments with Teck.

[8] Request

Fort McKay requests that Teck establishes access management plans, in collaboration with Fort McKay, to facilitate Fort McKay community member access to traplines and other traditional use areas throughout the life of the mine.

[9] Request

Fort McKay requests that Teck confirms it will continue ongoing consultation with affected trappers regarding project development and provide compensation or implement mitigation measures as needed following the Fort McKay Trapper Compensation Guidelines.

[10] Fort McKay Sustainability Department and Integral Ecology Group, 2011, p. 55

4.3 Traditional Land Use Key Concerns and Requests Summary

Table 4-1: Traditional Land Use Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category
[4]	Mitigation Monitoring	Fort McKay supports the above measures listed by Teck in Section 17.6.3 of the Project Update and requests that Teck commits to ensuring that it monitors, follows-up and tracks these commitments to the satisfaction of Fort McKay throughout the project's life.	Industry
[5]	Reclamation	Fort McKay would like to collaborate with Teck to develop a mitigation and an offset plan in relation to the adverse effects and loss of key cultural and traditional use areas that would be affected by the plan in the Frontier Project Update.	Industry
[6]	Reclamation	Fort McKay requests that Teck: i) formalizes a process with Fort McKay outlining how Community input would be part of a jointly developed reclamation criteria development for the Teck Frontier mine; and ii) supports Aboriginal involvement in developing reclamation criteria in regional committees and research organizations. Fort McKay also requests assurance from the provincial and federal governments that reclamation criteria will be developed with Aboriginal involvement with the Teck lease and will be binding and upheld during the reclamation certification process and once Teck has returned the land to the Crown.	Industry Government Agencies
[7]	Access	Fort McKay requests that Teck formalizes an agreement with Fort McKay to support developing an access management plan on the West side of the Athabasca River than takes into consideration the bridge across the Athabasca River that Teck is proposing in the Project Update.	Industry
[8]	Trappers	Fort McKay requests that Teck establishes access management plans, in collaboration with Fort McKay, to facilitate Fort McKay community member access to traplines and other traditional use areas throughout the life of the mine.	Industry
[9]	Trappers	Fort McKay requests that Teck confirms it will continue ongoing consultation with affected trappers regarding project development and provide compensation or implement mitigation measures as needed following the Fort McKay Trapper Compensation Guidelines.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

5. WILDLIFE

5.1 Context and Summary

Teck's updated environmental impact assessment (EIA) included an additional wildlife species-at-risk impacts assessment, an assessment of impacts from a bridge across the Athabasca River, a wildlife health assessment, and a report on additional wildlife surveys. Other changes noted were that a commitment to the Cumulative Environmental Management Association (CEMA) was not stated by Teck and the use of the natural range of variation (NRV) developed for the Terrestrial Environmental Management Framework (TEMF) was removed for determining environmental consequences (Cumulative Environmental Management Association 2008).

Wildlife species at risk that were added to the updated EIA included the following:

- horned grebe (*Podiceps auritus*) – designated as a Species of Special Concern by COSEWIC (formerly not assessed)
- barn swallow (*Hirundo rustica*) – designated as Threatened by COSEWIC (formerly not assessed)
- little brown myotis (*Myotis lucifugus)* – designated as Endangered by COSEWIC (formerly not assessed)
- northern myotis (*Myotis septentrionalis)* – designated as Endangered by COSEWIC (formerly not assessed)
- wood bison (*Bison bison athabascae)* – designated as a Species of Special Concern COSEWIC (formerly Threatened)
- wolverine (*Gulo gulo*) – designated as a Species of Special Concern by COSEWIC (formerly no status)

Wood bison and wolverine are traditional use species for Fort McKay that are also species at risk.

The objectives of the additional wildlife survey baseline work were to describe and map existing wildlife resources (amphibians, birds and terrestrial and aquatic mammals) and identify species of management concern in the terrestrial local study area (LSA).

5.2 Wildlife Outstanding Key Concerns and Requests

[10] – [16] Wildlife Surveys

Teck has completed numerous wildlife studies in support of its project application. These studies contribute to the knowledge of the local and regional wildlife community and provide essential data for the eventual reclamation of wildlife habitat. The stated objectives of the wildlife baseline work were to describe and map existing wildlife and identify species of management concern.

However, Fort McKay is concerned that the wildlife data are not sufficient to guide wildlife habitat reclamation and provide for re-establishing the wildlife community. In addition, Fort McKay believes that a description of the wildlife community is more than a species list and should include numerous population parameters (e.g., density and diversity).

Additional concern is raised because Teck included the statement in the update EIA that "*the relative abundance of breeding bird species in the terrestrial LSA is comparable with results from other breeding bird surveys conducted in the vegetation and wildlife RSA*". Considering the numerous studies completed in the oil sands region and the years of breeding bird and wildlife survey data collected by Teck this phrase appears vague and does not reflect the scientific rigour expected from years of survey results.

[10] Request

Fort McKay requests that AMERA validates breeding bird and wildlife survey data and presents the results to Fort McKay for review.

[11] Request

The term "comparable" does not express the expected scientific rigour considering the amount of survey data collected. Fort McKay requests a more scientific description (i.e., statistics) of how the bird and wildlife community compares to other areas of the RSA. Information should include population parameters, community diversity measures, and changes over time, if detected.

[12] Request

Teck has completed several years of wildlife surveys yet it is unclear if enough data has been obtained to meet the baseline survey objectives. Fort McKay requests that Teck completes an analysis to ascertain if sufficient surveys have been completed to determine if all wildlife species have been detected (e.g., analyze cumulative observations of species per visit) and if survey effort has been sufficient to confirm the absence of species of concern. Fort McKay also requests that Teck shares the survey data with Fort McKay.

Teck has indicated that breeding bird surveys followed standard practices for EIAs in the oil sands region in 2012 (i.e., one breeding bird survey per season). Current guidelines require replication for breeding bird surveys. Fort McKay is concerned that the breeding bird surveys do not meet best practices and that this is not indicative of a responsible development.

[13] Request

Fort McKay requests that Teck reviews the scientific rigour of the bird survey methods it employed in comparison to current EIA guidelines (requirement for replication of surveys). Fort McKay wishes to understand the scientific limits of the methods used by Teck and the potential need for additional field work.

Teck has indicated that the Ronald Lake Bison herd's range might not directly align with the area indicated by Teck's Ronald Lake BSA. Teck did not update the study area because ESRD (or designate) had not made the GPS radio-collar dataset available. Because of the cultural significance and importance to Aboriginal and Treaty rights of the bison herd it is important that the best available information is used in assessing impacts.

[14] Request

Teck has delayed the mine development. Fort McKay requests that through the work already done and in progress at the Roland Lake Bison Heard Technical Team Teck uses the best and most recent data and information available to redefine the bison herd boundary and study areas and reanalyze impacts to bison.

Teck monitored drilling effects on bison using remote cameras and a Before-After Control-Impact (BACI) sampling design; however, the power analysis indicated that approximately 300 cameras would be required to have 80% power and 90% confidence to detect a change in bison use. Teck used 40 cameras in the initial study.

[15] Request

Fort McKay is concerned about bison, it is a traditional use species and its sustainable populations are important for Fort McKay's exercise of its Aboriginal and Treaty rights. Fort McKay requests that Teck addresses sample size issues with regard to monitoring impacts on bison.

Bison wallows are illustrated in Figure 9-5. The observed wallows appear to occur along a linear path in a northwest direction from the south. The wallows also appear to be restricted to a very specific area. It is unclear if the wallow surveys extended south into the project LSA.

[16] Request

Fort McKay requests further discussion with Teck on the extent of the wallow surveys and if they extended into the LSA and how the presence of wallows might be indicative of bison distribution and seasonal land use.

[17] – [19] Wildlife Assessment

In the original EIA Teck incorporated wildlife Range of Natural Variation (RNV) parameters and processes identified in the TEMF. This method was supported by Fort McKay; however in the update EIA Teck has stated that:

> *"Range of natural variability (RNV) is no longer included when determining the magnitude and environmental consequence of an effect. Instead, changes to wildlife are considered only relative to predevelopment conditions. This revision was made in response to SIRs from regulators and requests from Aboriginal communities".*

Fort McKay has supported the use of RNV and the work to develop this approach in the TEMF. Fort McKay is concerned that RNV is not being used for the wildlife assessment and that the new method used by Teck does not improve on previous oil sands EIAs. Teck also used "soft" phrases such as *"changes to wildlife are considered only relative to predevelopment conditions",* raising concern about the scientific validity of the EIA's conclusions.

[17] Request

Fort McKay requests that Teck provides a more detailed explanation for no longer using RNV in the EIA to evaluate environmental consequence. In addition, Fort McKay would like to know how removing RNV improves the EIA.

Teck states that incorporating ecological resilience into oil sands management seems most applicable to reclamation. In addition, Teck states that CEMA is considering including ecological resilience in the Criteria and Indicators (C&I) Framework for assessing reclamation success in oil sands mines but further research is still needed to understand how resilience can be applied to ecological systems.

The C&I Framework is not complete and requires far more development. Teck seems to rely on CEMA work but does not list it in regional commitments.

[18] Request

Fort McKay requests that Teck becomes an active participant in CEMA or other multi-stakeholder organizations that include Aboriginal participation regarding wildlife issues.

Teck did not complete landscape-level connectivity on caribou and provided the following rationale:

> *"Landscape connectivity for boreal caribou was not assessed using linkage zone modelling because the availability of ESRD GPS collar locations from individuals*

monitored in the Red Earth and Richardson ranges facilitated a targeted assessment of movement outside of identified range boundaries. Movement patterns of collared individuals whose home ranges overlap the terrestrial LSA were delineated to identify potential corridors and assess potential effects on landscape connectivity".

Environment Canada (2012) indicated that connectivity between ranges such as the Red Earth, Richardson and WSAR is important for maintaining genetic diversity (Environment Canada 2012). Teck limited the linkage zone analysis because GPS-collared caribou did not move out of range boundaries; however, the data was limited to collared female caribou and did not include male caribou.

This does not consider male caribou dispersal, which is likely further than female dispersal and could extend between ranges and through the Teck LSA.

[19] Request

Fort McKay is concerned that Teck limited the scope of connectivity analysis based on female caribou data. Fort McKay requests that Teck ensures connectivity of caribou populations in the three caribou ranges near the project by securing movement corridors.

[20] – [23] Wildlife Health Assessment

The overall conclusions of the wildlife health assessment were that the project will not negatively impact wildlife health; however, Fort McKay is skeptical about wildlife health assessments and remains worried about the health of wildlife in the oil sands region.

Community members are both concerned about wildlife health and the ability to harvest and consume certain species. To assess wildlife health Teck completed a long and detailed wildlife health assessment. This document was unnecessarily complicated (e.g., animal weight expressed with scientific notation) and the wildlife weights used might not be incorrect (e.g., might not be from oil sands area).

The wildlife health assessment does not reference the sources for the wildlife weights used. This might be relevant as wildlife weights vary throughout a species range and more northerly animals are often heavier that southern animals. Another example is that there is a great deal of variation in Canada goose weights depending on specific sub-species.

The wildlife health assessment data does not necessarily describe the sub-species found in the oil sands.

Finally, a wildlife health assessment does not provide validation for its models or describe a process to validate the model predictions.

[20] Request

The wildlife health assessment predicts that the project will not adversely affect wildlife. Fort McKay community members will be skeptical of the results. Teck should consider writing a plain-language wildlife health assessment for the public and the non-expert readers. Teck should also be prepared to explain the wildlife health assessment to the Community of Fort McKay.

[21] Request

Fort McKay requests that Teck describes the model validation for the wildlife health assessment models and develops a monitoring program to confirm model predictions on wildlife.

[22] Request

Fort McKay requests that Teck provides references for the weights of wildlife species used in the wildlife health assessment and confirms that they are representative of wildlife found in the LSA.

In the updated EIA for wolverine it states "*food availability is the most influential factor determining distribution of wolverines and given that a large proportion of a wolverine's diet comprises scavenged ungulates*".

Therefore, wolverine habitat use was based on moose winter habitat suitability. In the wildlife heath assessment it indicates that a wolverine diet consists of 90% small mammals, 5% terrestrial invertebrates, and 5% berries (not scavenged ungulates).

[23] Request

There is a discrepancy in the diets of the wolverine used in the Teck updated EIA (wildlife health and wildlife habitat assessments). This would change the predicted wolverine habitat use and chemical exposure through ingestion. The correct diet should be determined and the assessment predictions adjusted.

[24] – [26] Mitigation and Monitoring

Teck has indicated that wildlife passageways would be provided under a bridge to allow for north-south wildlife movement along the Athabasca River. Movement would be facilitated by installing an underpass above the high-water mark.

Teck indicates that the height of the underpass will exceed 2.5 m and a passageway from the river to the bridge abutment will exceed 10 m. Fort McKay is skeptical

that this is sufficient width and height to maintain adequate wildlife movement along the Athabasca River corridor.

[24] Request

Fort McKay requests that Teck summarizes the scientific support for the planned underpass dimensions for maintaining connectivity. In addition, Fort McKay requests that Teck discusses other options to allow wildlife passage and connectivity in the Athabasca River corridor such as additional underpasses, overpasses, and alternate bridge designs. The feasibility and costs of options should also be discussed.

[25] Request

Fort McKay requests that Teck provides additional detail on the monitoring methods that will be used to determine the passageway's effectiveness and maintenance of connectivity in the Athabasca River corridor. Teck's response should include a power analysis (e.g., to determine the number of required cameras) and a contingency plan if the underpass is not effective (e.g., installing overpasses and underpasses).

Teck states that it will advance the development of a wildlife mitigation and monitoring plan (WMMP) using the data and analysis that was completed for the updated EIA. Teck cautions that the WMMP cannot be completed in 2015 as it will be informed by the Joint Review Panel process.

Fort McKay recommends that Teck is as pro-active as possible and develops a scientifically based WMMP as soon as possible with input from Fort McKay.

[26] Request

Fort McKay requests that Teck develops a scientifically robust WMMP prior to project approval. Fort McKay restates its requests to be involved in the WMMP's development.

5.3 Wildlife Key Concerns and Requests Summary

Table 5-1: Wildlife Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category
[10]	Wildlife Surveys	Fort McKay requests that AMERA validates breeding bird and wildlife survey data and presents the results to Fort McKay for review.	Government Agencies

Number	Fort McKay Key Concerns	Requests	Category
[11]	Wildlife Surveys	The term “comparable” does not express the expected scientific rigour considering the amount of survey data collected. Fort McKay requests a more scientific description (i.e., statistics) of how the bird and wildlife community compares to other areas of the RSA. Information should include population parameters, community diversity measures, and changes over time, if detected.	Industry
[12]	Wildlife Surveys	Teck has completed several years of wildlife surveys yet it is unclear if enough data has been obtained to meet the baseline survey objectives. Fort McKay requests that Teck completes an analysis to ascertain if sufficient surveys have been completed to determine if all wildlife species have been detected (e.g., analyze cumulative observations of species per visit) and if survey effort has been sufficient to confirm the absence of species of concern. Fort McKay also requests that Teck shares the survey data with Fort McKay.	Industry
[13]	Wildlife Surveys	Fort McKay requests that Teck reviews the scientific rigour of the bird survey methods it employed in comparison to current EIA guidelines (requirement for replication of surveys). Fort McKay wishes to understand the scientific limits of the methods used by Teck and the potential need for additional field work.	Industry
[14]	Wildlife Surveys	Teck has delayed the mine development. Fort McKay requests that through the work already done and in progress at the Roland Lake Bison Heard Technical Team Teck uses the best and most recent data and information available to redefine the bison herd boundary and study areas and reanalyze impacts to bison.	Industry
[15]	Wildlife Surveys	Fort McKay is concerned about bison, it is a traditional use species and its sustainable populations are important for Fort McKay’s exercise of its Aboriginal and Treaty rights. Fort McKay requests that Teck addresses sample size issues with regard to monitoring impacts on bison.	Industry
[16]	Wildlife Surveys	Fort McKay requests further discussion with Teck on the extent of the wallow surveys and if they extended into the LSA and how the presence of wallows might be indicative of bison distribution and seasonal land use.	Industry
[17]	Wildlife Assessment	Fort McKay requests that Teck provides a more detailed explanation for no longer using RNV in the EIA to evaluate environmental consequence. In addition, Fort McKay would like to know how removing RNV improves the EIA.	Industry
[18]	Wildlife Assessment	Fort McKay requests that Teck becomes an active participant in CEMA or other multi-stakeholder organizations that include Aboriginal participation regarding wildlife issues.	Industry

Number	Fort McKay Key Concerns	Requests	Category
[19]	Wildlife Assessment	Fort McKay is concerned that Teck limited the scope of connectivity analysis based on female caribou data. Fort McKay requests that Teck ensures connectivity of caribou populations in the three caribou ranges near the project by securing movement corridors.	Industry
[20]	Wildlife Health Assessment	The wildlife health assessment predicts that the project will not adversely affect wildlife. Fort McKay community members will be skeptical of the results. Teck should consider writing a plain-language wildlife health assessment for the public and the non-expert readers. Teck should also be prepared to explain the wildlife health assessment to the Community of Fort McKay.	Industry
[21]	Wildlife Health Assessment	Fort McKay requests that Teck describes the model validation for the wildlife health assessment models and develops a monitoring program to confirm model predictions on wildlife.	Industry
[22]	Wildlife Health Assessment	Fort McKay requests that Teck provides references for the weights of wildlife species used in the wildlife health assessment and confirms that they are representative of wildlife found in the LSA.	Industry
[23]	Wildlife Health Assessment	There is a discrepancy in the diets of the wolverine used in the Teck updated EIA (wildlife health and wildlife habitat assessments). This would change the predicted wolverine habitat use and chemical exposure through ingestion. The correct diet should be determined and the assessment predictions adjusted.	Industry
[24]	Mitigation and Monitoring	Fort McKay requests that Teck summarizes the scientific support for the planned underpass dimensions for maintaining connectivity. In addition, Fort McKay requests that Teck discusses other options to allow wildlife passage and connectivity in the Athabasca River corridor such as additional underpasses, overpasses, and alternate bridge designs. The feasibility and costs of options should also be discussed.	Industry
[25]	Mitigation and Monitoring	Fort McKay requests that Teck provides additional detail on the monitoring methods that will be used to determine the passageway's effectiveness and maintenance of connectivity in the Athabasca River corridor. Teck's response should include a power analysis (e.g., to determine the number of required cameras) and a contingency plan if the underpass is not effective (e.g., installing overpasses and underpasses).	Industry
[26]	Mitigation and Monitoring	Fort McKay requests that Teck develops a scientifically robust WMMP prior to project approval. Fort McKay restates its requests to be involved in the WMMP's development.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

6. NOISE

6.1 Context and Summary

The Project Update plan is to use open-pit mining to recover oil sands and produce partially desaphalted bitumen from the area. To enable bitumen extraction and subsequent processing of a saleable product, Teck has proposed the following components to be located on the project site.

- mining areas;
- tailings, overburden and reclamation disposal/storage areas;
- bitumen processing facilities and associated pumping, piping, solvent and diluent storage and other related tankage and chemical storage works;
- tailings management;
- a water intake from the Athabasca River;
- off-stream water storage (three to four months' reserve capacity);
- a compensation lake;
- utilities, including water and wastewater treatment, co-generation (heat and electricity) and steam or hot water boilers and heaters; and
- infrastructure facilities, including utility and pipeline corridors, accommodations for construction workers and operational staff, an aerodrome, an access road and on-site landfills.

Many of these facilities are sources of noise emissions. The Updated Project application provides project information and assessments on the type and amount of noise, air and water contaminant emissions and the potential impacts on human health from these emissions whether directly or indirectly through ingestion of contaminated wild foods.

Noise Impact Assessment Methodology and Findings

The Project Update's Noise Assessment is presented in Volume 3, Section 3, and describes a typical noise assessment using modelled noise emission and transmission to determine whether there is excessive noise emission resulting from project construction and operation according to ERCB Directive 038 (Alberta Energy Regulator 2007).

The Noise assessment seems adequately addressed and executed, and addresses predicted noise emissions from construction and operation of the mine itself and also includes an assessment of airplane noise associated with the project aerodrome. The Noise assessment concludes that excessive noise is not expected to be associated with the project.

6.2 Noise Outstanding Key Concerns and Requests

AER Directive 038 focusses on the overall noise level (dBA) associated with industrial activity, and has no provision to focus on what audible noise emission

might actually impact Fort McKay community members, particularly those engaging in traditional land use in the project's vicinity.

Audible noise is very often frequency-specific, and can impact traditional land use and quality of life, without any change in overall dBA. Directive 038 is limited in that it does not take these impacts into account in any way, yet they are the key noise issue for Fort McKay community residents.

To have a forum to raise and address audible noise impacting Traditional Land Use and Quality of Life, Fort McKay residents need an effectual forum to discuss and explore effective mitigation.

[27] Noise Complaint Process

> ***[27] Request***
>
> Fort McKay requests that Teck supports establishing a Noise Complaint Process that will hear and respect Community complaints around audible noise.

[28] Best Practice beyond Directive 038

> ***[28] Request***
>
> Fort McKay requests that Teck will work with the Community of Fort McKay to mitigate impacts of audible noise, even though it might be in compliance with AER Directive 038.

6.3 Noise Key Concerns and Requests Summary

Table 6-1: Noise Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category
[27]	Noise Complaint Process	Fort McKay requests that Teck supports establishing a Noise Complaint Process that will hear and respect Community complaints around audible noise.	Industry
[28]	Best Practice beyond Directive 038	Fort McKay requests that Teck will work with the Community of Fort McKay to mitigate impacts of audible noise, even though it might be in compliance with AER Directive 038.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

7. AIR QUALITY

7.1 Context and Summary

This review focuses on any changes to the project that might alter the previous air assessment conclusions and require additional discussions, beyond those currently underway, regarding mitigating and managing the project's air emissions and associated impacts. The review also includes a confirmation check that what were considered key air impact mitigation commitments in the original application are also part of the Project Update.

Teck's 4th Round Supplemental Information Request (SIR) Responses: The review of these responses did not identify any that were related to air.

Project Changes with Potential Air Emission and Impact Implications: The updated project application does not include any proposed major air-related emission changes. There are, however, some project changes that have air emission implications, which are:

- an approximate 5°C increase in the temperature of the slurry preparation and extraction processes, which results in increased steam and heat requirements and associated increased natural gas usage and related emissions; and
- changes to project scheduling (starting in 2026 instead of 2021), total resource recovery targets (increase of 200 million barrels) and the project mine operating life (41 years instead of 37), all of which have an impact on when emissions occur and the total emissions over the project's life.

The change in project scheduling also has implications in terms of what emission limits might or should apply to certain project emission sources.

The change in emissions from the Integrated Application are shown in Table 7-1. It should be noted that the significantly reduced $PM_{2.5}$ and VOC emissions are the result of the use of revised emission factors and are not the result of changes to processes or emission management, i.e., are not the result of any significant physical emission management changes between the initial and updated project.

Table 7-1: Teck Frontier Mine Project Air Emission Rates (t/d) – Comparison of Initially Projected Rates and Project Update Projected Rates

Emission Estimate Source	Pollutant			
	Sulphur Dioxide (SO_2)	Nitrogen Oxides (NOx)	Particulate Matter (< 2.5 µm; $PM_{2.5}$)	Total Hydrocarbons
2011 Application	1.46	19.29	0.84	83.05
2015 Update	1.54	20.94	0.56	18.70
% Change	+5%	+8%	-50%	-344%
Comment	Increases due to increased natural gas usage and mine fleet emissions associated with debottlenecking		Decreases largely due to using different or better emission factors	

Table 7-2 summarizes the change in the type and size of natural gas fired units being proposed. A comparison of the natural gas use between the Integrated Application (4890 GJ/h to 5923 GJ/h) and the updated application (5246 GJ/h to 8015 GJ/h) indicates the general predicted increase in natural gas usage associated with the updated project.[11] The increased projected natural gas usage is largely responsible for the increase in NOx emission. This increase in NOx emissions could be mitigated through better NOx controls and this issue is discussed in this review.

Table 7-2: Change in Number and Size of Boilers, Heaters and Co-generation Units between the Integrated Application and Updated Application

2011 Integrated Application Boiler, Heater and Co-generation Units and Sizes			2015 Project Update Boiler, Heater and Co-generation Units and Sizes		
Emission Source	**Count**	**Size**	**Emission Source**	**Count**	**Size**
Natural gas fired co-generation units (gas turbine and heat recovery steam generator)	2	1248 GJ_{in}/h GT 956 GJ_{in}/h HRSG	Natural gas fired cogeneration units (gas turbine and heat recovery steam generator)	2	1042 GJ_{in}/h GT 885 GJ_{in}/h HRSG
Natural gas fired auxiliary steam boilers	5	749 GJ_{in}/h	Natural gas fired auxiliary steam boilers	7	693 GJ_{in}/h
Natural gas fired once through steam generators (OTSG)	7	160 GJ_{in}/h	SRU Flash Drum Feed Heater	3	358 GJ_{in}/h
Natural gas fired once through steam generator (OTSG)	1	86.9 GJ_{in}/h	SRU Column Feed Heater	3	251 GJ_{in}/h
Natural gas fired heaters	6	28.3 GJ_{in}/h	Natural gas fired heaters	4	26.2 GJ_{in}/h
Natural gas fired heaters	2	17.7 GJ_{in}/h	Natural gas fired heaters (solvent reheater)	3	29.4 GJ_{in}/h
Once Through Hot Water Generators (OTHWG)	2	374 GJ_{in}/h	Variable size space heaters	9	0.2 – 31.3 GJ_{in}/h
Total Energy Input		~10,300			~10,900

With the increased use of natural gas and the four-year extension in project operation, i.e., from 37 to 41 years, there will also be an overall increase in air emissions from the project compared to the initially proposed project.

7.2 Air Quality Outstanding Key Concerns and Requests

Summary of the Updated Air Emission Impact Assessments: Teck updated the key potential "project only" and "cumulative" air emission impact issues associated

[11] Note: the ranges in the estimates reflect the variability in ore grade and ambient temperature with the highest natural gas usage associated with low grade ore mined in the winter.

with the Frontier Mine Project. The specific issues assessed and the results of the updated assessment can be briefly summarized as:

1) **Ambient air quality changes** – Updated air quality predictions for SO_2, NO_2 and $PM_{2.5}$ are similar to the previous predictions with some change (reduction) in plant boundary $PM_{2.5}$ due to the revised (lower) project $PM_{2.5}$ emissions. Overall the updated assessment for these parameters does not necessitate any change in the previous Fort McKay position and requested actions related to these substances, i.e., BATEA and best practices should be used to control the significant emission sources of SO_2, NO_2 and $PM_{2.5}$.

2) **Odours** – The updated odour impact assessment (which was something that Fort McKay had requested after its review of the Integrated Application) identified the potential for three compounds (acetaldehyde, thiophenes and NO_2) to be above potential odour threshold levels outside the project's planned development area. The assessment was very thorough; however, Teck might still be underestimating odour risks as the odour thresholds used for alkylthiophenes are likely high by an order of magnitude and there is a high degree of uncertainty in predicting the odour thresholds of mixtures.

   Definitive odour impact assessments are difficult to conduct due to very limited regional odorant emission information and the subjective nature of odours and responses to odours. Therefore, while Teck's odour assessment is very good, it cannot be considered as a reliable quantitative estimate of regional odour potential but rather only as a good qualitative indicator of the potential for regional odours. Teck's indication that it will give priority to managing the emissions of possible odorant compounds and will work with community members on any odour issues that arise related to the Frontier Mine Project is the appropriate strategy to address this issue.

3) **Acid Deposition and Effects** – The updated assessment uses recent regional information on base cation (BC) deposition that indicates that BC deposition is higher than previously estimated, which mitigates the effects and risk of acidification. The BC deposition is largely due to dust from mining activities and therefore as dust management improves the risk of acidification increases. Factoring in the mitigating effect of fugitive dust emissions is a new approach in the assessment of project and cumulative regional acidification risk and is one that Fort McKay challenges. The expectation should be that dust emissions off-lease are minimal and therefore such releases cannot and should not be considered as mitigating acidification impacts.

[29] Acid Deposition and Effects

> ***[29] Request***
>
> Fort McKay requests that Teck and AER acknowledge that fugitive-dust related base cation emissions cannot be used in offsite PAI calculations as the expectation is that there will be no or minimal offsite dust deposition.

1) **Nitrogen Deposition Effects** – The updated analysis is similar to the previous analysis in terms of nitrogen deposition rates and the areas above possible effect threshold levels and does not necessitate any change in Fort McKay's previous position and requested actions related to nitrogen emissions, i.e., nitrogen emissions should be managed through the application of BATEA.
2) **Polycyclic Aromatic Compounds (PAC) and Metal Substance Deposition Effects** – The updated predictions are similar to the previous predictions and confirm that model predictions for PAC deposition are similar to snowpack measured levels but that the model is underestimating metal deposition based on snowpack measurements. The updated analysis does not necessitate any change in the Fort McKay's previous position and requested actions related to these substances.
3) **Ozone** – The Project Update reaches the same conclusion as the Integrated Application regarding the impacts of regional development on ozone levels, i.e., oil sands development substantially increases the regional level of ozone precursors (NOx and VOCs) that could lead to increases in ambient ozone levels. Considerable work on examining the potential impacts of NOx and VOC emissions on regional ozone effects has been undertaken by CEMA. This work would indicate that regional ozone levels are expected to increase but not to levels that would exceed the Canadian Ambient Air Quality Standards. The updated analysis does not necessitate any change in Fort McKay's previous position and requested actions related to ozone, which were to ensure BATEA is applied to NOx and VOC emission sources.
4) **Haze and Visibility** – The Project Update reiterates the predictions presented in the Integrated Application that the project and other emissions in the region will contribute to regional haze and that the project will have visible plumes. The updated analysis does not necessitate any change in Fort McKay's previous position and requested actions related to these substances.
5) **Greenhouse Gas Emissions** – The GHG emission intensity in the Project Update is 40.4 kg CO_{2e}/bbl versus 46 kg CO_{2e}/bbl in the Integrated Application and even with the estimated 200 million bbl increase in overall bitumen production there is a reduction in overall project GHG emissions.
6) **Lighting** – In response to concerns regarding light pollution from the Frontier Mine Project, Teck has committed to developing a lighting plan for the project to avoid excess lighting that will include:

- appropriate fixtures to direct and shield lighting;
- minimum light intensity to allow safe performance of tasks; and
- lamp type and physical location of lights.

Although Fort McKay did not previously specifically request that Teck addresses light pollution, it is an issue that Fort McKay is concerned about and it is a positive that the Project Update has addressed the issue.

Air Emission Mitigation Measures: The Project Update indicates that the air emission mitigation measures are similar to those in the Integrated Application. Key mitigation measures include:

- using dust suppression;
- using tank vapour recovery with full redundancy;
- using a leak detection and repair program;
- using solvent recovery that results in less than four volumes of solvent per 1000 volumes of bitumen produced loss to tailings ponds;
- purchasing US EPA Tier IV compliant mine fleet equipment; and
- using low-NOx combustion-based controls for boilers, heaters and co-generation units that meet the ESRD *Emission Guidelines for Oxides of Nitrogen (NOX) for New Boilers, Heaters, and Turbines Using Gaseous Fuels Based on a review of Best Available Technology Economically Achievable (BATEA)* (Alberta Environment 2007).

In its review of the Integrated Application Fort McKay requested that emission-related management include:

- a set "target" solvent recovery rate that would be less than four volumes of solvent per 1000 volumes of bitumen produced loss to tailings ponds, which is the standard regulatory requirement;
- for heavy haulers, establish a NOx emission rate lower than Tier IV limits, since the Tier IV limits for heavy haulers does not represent BATEA;
- Teck's confirmation that it will meet the "performance" NOx emission targets in *Emission Guidelines for Oxides of Nitrogen (NOX)* and that the *EPEA* approval specifies that Teck must strive to meet these targets and prepare an annual report on its emissions relative to these targets; and
- Teck considering selective catalytic reduction controls for its two co-generation units.

The Project Update does not change any of the positions and requests related to air emissions management that were outlined in Fort McKay's review of the Integrated Application with the exception of emission controls and limits for the proposed two 85 MW co-generation units. The rationale for revising the position on co-generation units is as follows:

- **Emission Limits for Co-generation Units –** As in the Integrated Application, Teck is proposing two 85 MW co-generation units that will provide electricity and steam or heat for Phase 1 of the project. The additional electricity required for Phase 2 will be purchased from the grid and more boilers will be installed to provide the additional steam or heat required for Phase 2. The FMSD is currently discussing with Teck the NOx controls for the co-generation units and Teck has agreed to 1+ NOx controls for the co-generation gas turbines with discussions still underway regarding BATEA controls for the heat recovery steam generation (HRSG) portion of the co-generation units.

  In the updated application Teck makes several statements regarding co-generation that require further clarification and possible analysis. These are outlined below.

Co-gen and GHG Emissions[12]

> *"Cogeneration using natural gas has greenhouse gas (GHG) emission reduction benefits over the Alberta grid average. It also allows waste heat from the cogeneration plant to be used in the extraction process, further reducing GHG emissions."*

Comment:

This statement, while accurate, is somewhat misleading in that new generation in the Alberta grid is almost certainly to be largely from combined cycle (CC) generation units. Since co-generation replaces grid generation and on-site boilers, the energy efficiency of co-generation is more appropriately compared relative to CC and boiler units producing the same amount of heat and power. Such a comparison conducted as part of a CASA project looking at possible new NOx limits for gas-fired generation units indicated that the efficiencies of these two scenarios are similar. There is, therefore, not an inherent GHG advantage for co-generation and there might be a disadvantage based on overall emissions as noted below.

GHG Emissions and NOx Control Technology Selection[13]

> *"Greenhouse Gas Mitigation: Teck has chosen technology and processes that reduce GHG emissions. Examples include, but are not limited to:*

[12] Volume 1, Section 8.3.1

[13] Volume 1, Section 14.4.2.5

- *using dry low NOx 1+ technology to increase the efficiency of the cogeneration plant (as opposed to selective catalytic reduction, which uses an energy-consuming scrubber process)"*

Comment:

This statement is also technically accurate but it needs to be noted that the NOx emissions from co-generation units using dry low NOx controls might be twice as high as those from a comparable CC and boiler combination using dry low NOx controls. This is the result of the large amount of duct firing in the co-gen HRSG units, producing high levels of NOx compared to boilers. Therefore, while the dry low NOx 1+ technology proposed by Teck for the gas turbine portion of the co-gen is very good at controlling NOx this benefit is more than offset by the high HRSG NOx emission. The minor GHG emission control benefits from the use of dry low NOx technology, versus selective catalytic reduction, is therefore at the expense of significantly increased regional NOx emissions and associated local or regional air quality impacts. Since NOx emissions have direct potential health and environmental impacts in the region it is these emissions that should be the priority in terms of management.

For example, increased levels of nitrogen deposition can result in plant community composition changes and other ecosystem changes and effects (Wood Buffalo Environmental Association 2007) with associated potential implications to traditional land use practices and Fort McKay's Aboriginal and Treaty rights. CEMA's Air Working Group[14] has a major study underway to identify and quantify these possible nitrogen eutrophication effects on bogs, fens and forest upland sites and preliminary indications are that significant ecosystem changes might be associated with nitrogen deposition rates that are already occurring, or might in the future occur, in the region.

[30] – [31] Co-generation NOx Emission Limits

Teck indicates that the NOx emissions from the co-generation units will be managed as follows:

> *"The GTG and HRSGs will be designed to meet the Canadian Council of Ministers of the Environment's National Emission Guidelines for Stationary Combustion Turbines (CCME 1992)."*[15]

and

[14] Cumulative Environmental Management Association (CEMA). Contact Air Working Group Program Administrator for information on this study

[15] Volume 1, Section 8.3.1

"…design of boilers and cogeneration units to reduce emissions such as NOx through compliance with the ESRD Emission Guidelines for Oxides of Nitrogen (NOX) for New Boilers, Heaters, and Turbines Using Gaseous Fuels Based on a review of Best Available Technology Economically Achievable (BATEA; ESRD 2007)."[16]

Comment:

While the FMSD had agreed that dry low NOx-based controls for this project might be acceptable, now that construction has been deferred for about five years it is suggested that this position should be reviewed. A recent independent review on BATEA for gas-fired generation units for the Clean Air Strategic Alliance (CASA) indicated that for the type and size of co -generation units that Teck is proposing, selective catalytic reduction represents BATEA (Eastern Research Group, Inc. 2014). This review was conducted as part of a CASA five-year review of the Emissions Management Framework for the Alberta Electricity Sector and new provincial limits for gas-fired electrical generation units including co-generation units, are expected to be established in the near future as a result of this review. Also National NOx emission limits for gas turbines under the base-level industrial emissions requirements (BLIER) program are expected to be established in the near future. The delay in the Frontier Project combined with these near-term expected changes to the NOx limits applying to co-generation units make it premature to establish NOx limits for these units at this time.

[30] Request

Fort McKay requests that Teck and the regulators acknowledge that Fort McKay considers that BATEA for co-generation units is SCR and Fort McKay cannot support the NOx emission limits currently being proposed by Teck for its co-generation units.

[31] Request

Fort McKay requests that the regulators acknowledge that no NOx approval limits should be set for the co-gen units at this time and if an *EPEA* approval is issued for the project it should indicate that NOx emission limits will established for these units when design details for the unit are being finalized and equipment procurement is planned to occur within a year period.

[16] Volume 1, Section 14.4.1.1

Air Emission and Ambient Air Monitoring

The Project Update is proposing the same emission and ambient monitoring as was proposed in the Integrated Application which is:

Source Monitoring:

- continuous emission monitoring on the stacks of the larger NOx emission sources, i.e., the two co-generation units, the seven 693 GJ/h auxiliary steam boilers, and the two 358 GJ/h SRU flash drum-feed heaters supplemented with manual stack surveys;
- fugitive plant emissions through a leak detection and repair program and a periodic VOC and reduced sulphur monitoring program;
- mine fleet emissions based on fuel use and vehicle emission factors;
- tailings pond emissions through a periodic VOC and reduced sulphur monitoring program;
- mine face emissions through a periodic VOC and reduced sulphur monitoring program; and
- fugitive dust through a method or methods yet to be finalized but based on acceptable industry standards.

Ambient Monitoring:

- a continuous ambient air monitoring requirement **is anticipated** that would likely include monitoring for NO_X, NO, NO_2, $PM_{2.5}$, THC, TRS and meteorological parameters; and
- dust monitoring stations at strategic locations to evaluate the effectiveness of dust control measures.

In its review of the Integrated Application Fort McKay requested—related to monitoring—that:

- Teck installs a compliance or attribution continuous air monitoring station and that Fort McKay is consulted on the siting of this station;
- Teck undertakes passive monitoring related to acid and nitrogen deposition;
- certain source monitoring results are provided to Fort McKay on an annual basis; and
- Teck provides Fort McKay with information regarding its fugitive emissions monitoring programs to allow an evaluation of the technologies and approaches being used.

The Project Update does not specifically address or cover any of the monitoring positions or requests that were outlined in Fort McKay's Integrated Application SOCs. This is not a concern with respect to providing source monitoring results requests, which are a longer term Fort McKay-Teck consultation-related issue. The

issue of continuous monitoring is, however, one that could have been addressed more definitively by Teck in the Project Update and this issue is discussed below.

[32] Compliance or Attribution Continuous Ambient Air Quality Monitoring Requirements

Teck indicates that with respect to ambient air quality monitoring:

> *"Teck understands that the anticipated EPEA approval might require an ambient monitoring station be located near the Project. Teck will work with AER, ESRD, AEMERA, and the Wood Buffalo Environmental Association (WBEA) to select the location and determine the parameters that need to be measured. WBEA is an AEMERA partner."*

In its review of the original Teck Frontier Mine Project Fort McKay specifically requested a continuous ambient air monitoring station between the project and Fort McKay and also that Fort McKay would be consulted regarding the location of such a station. Fort McKay also indicated the air quality parameters it expected this station to monitor. It is Fort McKay's current understanding that Teck has agreed to both these requests and it is not clear why this commitment is not reflected in the Project Update.

Whether or not this monitoring station is part of AEMERA is irrelevant to Fort McKay. Fort McKay is currently not a member of AEMERA and expects that a continuous ambient air quality monitoring station will be installed and operated by Teck, or funded by Teck and operated by others, e.g., WBEA or AEMERA, regardless of Teck's participation in regional or provincial monitoring agencies and the requirements of these agencies. Fort McKay also expects to be directly involved with Teck in the location and nature of this continuous air monitoring station.

[32] Request

Fort McKay requests that Teck confirms that regardless of regulatory requirements Teck will install a continuous ambient air monitoring station between its central processing facility and Fort McKay and will consult with Fort McKay on the exact siting of this station.

[33] Air Emission and Ambient Air Monitoring

In the Integrated Application Teck indicated that:

> *"Participation is planned in CEMA and WBEA, and relevant subcommittees:*
>
> - *Specifically, CEMA AWG, which is charged with developing recommendations for regional air quality and air-related deposition*

management, will be supported. The AWG is responsible for the ADMF, OMF, NEP and ACMF.

- *Additionally, WBEA, which is responsible for regional ambient air quality monitoring in the region, will be supported. The WBEA initiatives include TEEM and HEMP."*

In the updated application Teck indicates that:

"In addition to AEMERA, participation is planned in the following organizations:

- *Canada's Oil Sands Innovation Alliance (COSIA)*
- *WBEA"*

And that:

"Teck will also participate in multi-stakeholder organizations that exist in the future but has not committed to becoming a member of CEMA as its status remains uncertain."

AEMERA and COSIA are not multi-stakeholder groups and are not considered by Aboriginal groups as collaborative or partnership organizations. Fort McKay continues to be an active participant in CEMA and WBEA as these are multi-stakeholder organizations addressing regional monitoring and environmental management issues in a collaborative way. While the future of CEMA is uncertain, the work of CEMA needs to continue and Fort McKay expects Teck to support CEMA as long as Aboriginal stake-holders are participating in the Association.

[33] Request

Fort McKay requests that Teck confirms with Fort McKay its expectations regarding support for and participation on CEMA and WBEA and that this issue is addressed in any Environmental Agreement the Community enters into with Teck.

Summary

The information in the Project Update does not indicate any significant changes in air emissions or mitigation measures relative to the information in the Integrated Application. The updated air assessment was very thorough and included an updated odour impact assessment that proposed the same emission and ambient monitoring as was recommended in the Integrated Application, which is something that Fort McKay requested in its Integrated Application SOCs.

Key outstanding project issues are:

- NOx emission limits for the co-generation units;
- continuous air quality monitoring between Fort McKay and the project; and

- Teck's participation in and support for regional multi-stakeholder groups.

The update raised one new issue related to how base cations associated with fugitive dust emissions are considered in the assessment of potential acid inputs and acidification risk. Recommendations related to each of these issues are provided.

7.3 Air Quality Key Concerns and Requests Summary

Table 7-3: Air Quality Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category
[29]	Acid Deposition and Effects	Fort McKay requests that Teck and AER acknowledge that fugitive-dust related base cation emissions cannot be used in offsite PAI calculations as the expectation is that there will be no or minimal offsite dust deposition.	Industry Government Agencies
[30]	Co-generation NOx Emission Limits	Fort McKay requests that Teck and the regulators acknowledge that Fort McKay considers that BATEA for co-generation units is SCR and Fort McKay cannot support the NOx emission limits currently being proposed by Teck for its co-generation units.	Industry Government Agencies
[31]	Co-generation NOx Emission Limits	Fort McKay requests that the regulators acknowledge that no NOx approval limits should be set for the co-gen units at this time and if an *EPEA* approval is issued for the project it should indicate that NOx emission limits will established for these units when design details for the unit are being finalized and equipment procurement is planned to occur within a year period.	Government Agencies
[32]	Compliance or Attribution Continuous Ambient Air Quality Monitoring Requirements	Fort McKay requests that Teck confirms that regardless of regulatory requirements Teck will install a continuous ambient air monitoring station between its central processing facility and Fort McKay and will consult with Fort McKay on the exact siting of this station.	Industry
[33]	Air Emission and Ambient Air Monitoring	Fort McKay requests that Teck confirms with Fort McKay its expectations regarding support for and participation on CEMA and WBEA and that this issue is addressed in any Environmental Agreement the Community enters into with Teck.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

8. GROUNDWATER

8.1 Context and Summary

The basis of the review was Volumes 1 through 4 of the Project Update, and focused on Section 5 of Volume 3 (Assessment Update – Groundwater); and also, pertinent sections of Volume 2 (Baseline Update). To date there have been four rounds of Supplemental Information Request (SIRs). We have reviewed the Integrated Application and EIA, the SOC responses and the first three rounds of SIRs.

Teck's SIR Rounds 1 to 3 are provided in Appendix G of Volume 1. We reviewed Round 4 and found no *Water Act* or Hydrogeology / Groundwater Questions in Round 4.

The main changes to the project since the Integrated Application was filed in 2011 pertain to water management and/or seepage control. In addition, the South Development Area (SDA) is no longer part of the project, and so the Main Development Area (MDA) is the focus of the Project Update. No changes were made to the hydrogeological RSA but the LSA was modified to reflect the elimination of the SDA.

For the Project Update, Teck has updated its hydrogeological understanding primarily through the use of groundwater data obtained from other operators via the Oil Sands Groundwater Agreement, drilling additional monitoring wells and piezometers, collecting additional groundwater quality samples, and performing additional groundwater flow modelling.

The main baseline assessment update findings are that Teck has further assessed the potential for shallow Karst collapse features to form in the MDA (which, in turn, could lead to unwanted upwelling of saline groundwater), and determined that this is not likely to occur at the proposed mine. Drilling around the perimeter of the proposed ETAs found that the Quaternary sediments directly overlie the Devonian bedrock (Waterways formation; aquitard).

The overall interpretation of regional and local groundwater occurrence and flow remains unchanged since the original application.

Summary of Main Changes to Project

The aforementioned elimination of the SDA from the project changed the LSA for the purposes of the application and EIA update, but the SDA will ultimately be mined by another operator, likely at a later date, and so from an impact assessment standpoint, the overall project remains similar to the 2011 application.

With regard to water management, there are two main changes proposed that have hydrogeological implications, summarized as follows:

- Teck proposes that some of the Basal Water Sand (BWS) depressurization water will be reinjected into the BWS within the Primary Development Area

(PDA) until such time that adequate storage capacity is available on-site for this water. Total BWS pumping is expected to range from about 4000 m^3/day to 6400 m^3/day. Teck also proposes to initiate pre-mining BWS depressurization.

- Seepage control around the External Tailings Areas (ETAs) will be by the originally proposed shallow perimeter ditch and for deeper groundwater flow, an active hydraulic barrier comprised of pumping wells during operations. This would transition to an external interceptor ditch system that will convey seepage to reclamation or pit lakes post-closure.[17] Extraction wells will be installed at the time the ETAs are constructed and then decommissioned post-closure. The post-closure interceptor ditch system would be some 24 km in length and would be downstream (downgradient) of the operational control structures (ditches and wells).

Teck previously updated the project in 2013 as part of the SOC and SIR process and at that time provided an updated groundwater model and an updated groundwater effects assessment. For the 2015 Project Update, Teck performed additional groundwater modelling with the 2013 model, and also incorporated a proprietary transport modelling package through Golder (GoldSim).

The modelling considered the changes to the project as well as changes in the timing of the Pierre River Mine. Predicted drawdowns in the Quaternary and BWS were estimated to be contained within the LSA except for small areas of the BWS outside the LSA to the south and west of the project. ETA seepage was modelled with particle tracking as extending in the far future simulation to the southeast of the ETAs, as shown conceptually in model-derived Figure 5-18 of Volume 3, Section 5.

Main Changes in the Assessment Update

Because of the change in the method of hydraulic control around the ETAs, Teck states the extent of drawdown will be greater than in the original application. This is because of the elimination of recharge wells to create a hydraulic barrier, which would offset drawdown to some degree; however, the elimination of groundwater recharge in turn has reduced the total diversion of water from the Athabasca River.

Although Teck acknowledges that the extraction well network will likely capture most but not all process-affected seepage, migration of process-affected water is expected to occur during operations and the post-closure period. Mitigation for this is in the form of an interceptor trench at closure, intended to convey affected waters back to reclamation or pit lakes, coupled with long-term groundwater monitoring.

[17] Volume 3, Section 5, Figure 5-8

Transport modelling indicates sub-surface long-travel times in the far future, such that "small amounts of process-affected waters may enter Big Creek and the Fish Habitat Compensation Lake in the far future"; however, the seepage components estimated with models suggest a negligible potential for effects on aquatic health in downstream receptors such as Ronald Lake, Redclay Lake, Big Creek and the Athabasca River.

8.2 Groundwater Outstanding Key Concerns and Requests

As requested, we summarize recommendations here based on our review of the 2015 Project Update. Previous recommendations from the Integration Application review are still relevant but are not repeated here.

[34] – [36] Seepage Control System

[34] Request

Fort McKay requests that Teck provides the opportunity to review annually performance reports on the seepage control wells and estimates of the percent of process-affected seepage captured by the wells.

It appears that some of the process-affected seepage will escape the seepage control system during operations, which is illustrated conceptually based on modelling in Figure 5-17 of Volume 3, Section 5. Presumably, the interceptor trench would not be installed until closure because there would be no suitable locations to drain the trench by gravity (i.e., pit lake, reclamation lake).

[35] Request

Fort McKay requests that Teck consults with the Community on whether or not it is considered feasible to install the interceptor trench earlier, i.e., before operations cease, if there are indications of process-affected seepage flowing downgradient of the interceptor wells that might travel beyond the proposed location of the interceptor trench by the time of closure.

[36] Request

Since far future seepage modelling suggests the potential for off-site migration to the southeast of the ETAs, Fort McKay requests that Teck considers the alternative of continuing to operate the active hydraulic control system (i.e., with pumping wells) for a longer period of time beyond operations.

Overall, the seepage control system design appears to be adequate but there is a greater likelihood that process-affected seepage could migrate away from the site

and so for this reason, the ability of Fort McKay to continue to be consulted on operations and monitoring of the seepage control system is critical.

8.3 Groundwater Key Concerns and Requests Summary

Table 8-1: Groundwater Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category*
[34]	Seepage Control System	Fort McKay requests that Teck provides the opportunity to review annually performance reports on the seepage control wells and estimates of the percent of process-affected seepage captured by the wells.	Industry
[35]	Seepage Control System	Fort McKay requests that Teck consults with the Community on whether or not it is considered feasible to install the interceptor trench earlier, i.e., before operations cease, if there are indications of process-affected seepage flowing downgradient of the interceptor wells that might travel beyond the proposed location of the interceptor trench by the time of closure.	Industry
[36]	Seepage Control System	Since far future seepage modelling suggests the potential for off-site migration to the southeast of the ETAs, Fort McKay requests that Teck considers the alternative of continuing to operate the active hydraulic control system (i.e., with pumping wells) for a longer period of time beyond operations.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

9. HYDROLOGY/SURFACE WATER

9.1 Context and Summary

Teck's 2015 Project Update proposes to withdraw fresh water from two locations in a tributary to the Athabasca River in addition to the Athabasca River itself. This is a significant change from the original proposal and is a major concern. The intent of the Surface Water Quality Management Framework (SWQMF) is to direct oil sands surface water withdrawals to the Athabasca River where limits and triggers can be enforced (Government of Alberta 2012).

Teck's proposal circumvents this Framework by taking upwards of 10% of its fresh water need during 2037 to 2066 from a tributary in its lease area. In addition, Teck proposes to use water from two sumps along an operational diversion channel to fill end pit lakes from 2067 to 2081.

The proposed Off Stream Storage Pond (OSSP), while situated off of the Athabasca River, is for a period of time located in the Unnamed Creek 2 valley. Teck proposes to divert a portion of a natural flow diversion to the OSSP. No assessment of the impact of this diversion is presented.

Surface Water Assessment

Teck has presented no environmental assessment of the Frontier Project's impact on Unnamed Creek 2 from which it now proposes to withdraw surface water. It simply states that during high flow periods a portion of the water in the stream diversion system will be diverted to the OSSP.

There is no detailed hydrologic analysis of this change. Teck states that if "unacceptable downstream effects" were to occur, water would be supplemented from additional withdrawal from the Athabasca River.

No assessment of these unacceptable downstream effects is presented.

9.2 Hydrology/Surface Water Outstanding Key Concerns and Requests

[37] – [39] Athabasca River and Tributary Water Use

The initial review of the Frontier Project states:

> *"Fort McKay requests that Teck is required to fill pit lakes only from the Athabasca River and that local streams are directed around a pit lake until its water levels and water quality are acceptable for it to be connected to the watershed."*

Teck's response to this SOC was:

"…watercourses and runoff from undisturbed areas will be diverted around the MDA and SDA in the diversion channels during mine operation as well as during the pit lake filling period."

Teck's response was acceptable; however, this commitment has since changed.

Teck's original peak annual withdrawal volume was 71.5 Mm^3. This has been modified. The maximum withdrawal rate of 4.2 m^3/s has remained the same as the original proposal.

The Project Update now calls for Athabasca River water withdrawals of:

- an increase to 98 Mm^3 from 2025 to 2032 to accommodate the ETA water cap and start-up of two process trains; and
- a decrease to 60 Mm^3 from 2033 to 2081.

Teck states that this latter number is 16% below the initial annual withdrawal licence requirement. Teck fails to account for the additional 6.5 Mm^3 of water that it proposes to withdraw from Unnamed Tributary 2. Taking water from a tributary that flows to the Athabasca River versus directly from the river has essentially the same impact on the Athabasca River. Moreover, it impacts the tributary as well.

The second change that Teck proposes is to use pristine tributary water as a fresh water supply. Teck proposes diverting some of the water from Unnamed Creek 2 in two ways:

- a maximum of 6.5 Mm^3 (peak rate of 0.58 m^3/s) from the OSSP that receives inflows from Unnamed Creek 2 (2037-2066), using a fresh water supply for the project; and
- a maximum of 1.0 Mm^3 (peak rate of 0.22 m^3/s) from two sumps located along an operational diversion channel in the Birch Mountains during the post-mining period (2067-2081), used to fill two closure lakes.

If "unacceptable downstream effects" were to occur, Teck proposes to supplement this water with water withdrawn from the Athabasca River.

Use of tributary water does not follow the intent of the SWQMF, where all surface water use is directed to the Athabasca River. There are two key reasons for this. Firstly, it enables established rules and limits for oil sands water withdrawal to be readily monitored and enforced. Secondly, it maintains as much pristine water in the tributaries as possible. Closed-circuit drainage from oil sands mines creates impacts to the natural tributary flow regime and then to environmental components dependent on those flows. Withdrawing additional pristine water would exacerbate the situation.

Teck states that diversions will return flows to their natural receiving watercourses. This needs to apply to Unnamed Creek 2 as well.

[37] Request

Fort McKay requests that Teck drops all plans for using tributary water as a fresh water source and obtains its entire fresh water supply from the Athabasca River.

Teck has stated that it can accommodate the SWQMF. But using pristine tributary water to supply its OSSP is not following the intent of this Framework. Teck needs to demonstrate that this is possible by using only Athabasca River water as its fresh water supply.

[38] Request

Fort McKay requests that, should Teck not change its *Water Act* application, AER deny Teck's proposal to use pristine water from tributaries and diversion channels associated with the Frontier Project.

Teck plans to use multiple water storage sites. Teck states:

> *"In the early life of the mine (i.e., 2025 to 2036), the OSSP will be located north of the mine maintenance facility in the main pit area. During the remaining mine life (i.e., 2037to 2066), most of the required off-stream water will be stored in the ETAs for process use, and a smaller OSSP will be constructed in the Unnamed Creek 2 valley to store fresh water for uses such a boiler feed and potable water. The location of the OSSP during the later stage of the mine life has changed from the one identified in the Integrated Application. The Integrated Application proposed an OSSP that was excavated into native ground south of the ETA. The design of the OSSP has been optimized for the Project Update to best use the local topography and to incorporate the OSSP into the release water system. Construction of the OSSP in the Unnamed Creek 2 valley will reduce earthwork requirements. At the new location, the OSSP will also serve as a polishing pond for the release water system."*

Teck further states that Big Creek will be diverted to facilitate mining OSL 744. It will be diverted to Unnamed Creek 2, where a dual-purpose OSSP and polishing pond will be constructed using the natural topography. This OSSP will be in use from Year 12 to 41.

Figure 4.5-13 in Volume 1 shows a split in the stream diversion channel (which carries pristine water), with flow directed both into and downstream of this OSSP. Teck states:

> *"In 2037, a flow-splitting structure and 4.85 km of additional diversion channel will be constructed to divert a portion of the flows diverted from Big Creek and Unnamed Creek 2 to the OSSP. When it is full, the OSSP will function as a flow-through structure with excess flows released through a spillway to a downstream reach of Unnamed Creek 2."*

Teck further states:

> *"The Big Creek and Unnamed Creek 2 diversion will convey runoff from the Birch Mountains around the southern boundary of the main pit. Most of the flows will be discharged to Big Creek after transiting a sedimentation pond. A portion of the flows may be diverted to the OSSP, located within the Unnamed Creek 2 valley, during periods of high flow."*

[39] Request

Fort McKay requests that Teck ensures that all pristine water in the stream diversion system is diverted around the project and not through the OSSP situated in the Unnamed Creek 2 valley.

Teck indicates that its Athabasca River water intake has been moved from downstream of Dalkin Island to Dalkin Island. This is because the channel has shifted away from the original intake location. The new site will enable the facilities to be located above the 1-in-100-year flood level.

9.3 Hydrology/Surface Water Key Concerns and Requests Summary

Table 9-1: Hydrology/Surface Water Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category*
[37]	Athabasca River and Tributary Water Use	Fort McKay requests that Teck drops all plans for using tributary water as a fresh water source and obtains its entire fresh water supply from the Athabasca River.	Industry
[38]	Athabasca River and Tributary Water Use	Fort McKay requests that, should Teck not change its Water Act application, AER deny Teck's proposal to use pristine water from tributaries and diversion channels associated with the Frontier Project.	Government Agencies
[39]	Athabasca River and Tributary Water Use	Fort McKay requests that Teck ensures that all pristine water in the stream diversion system is diverted around the project and not through the OSSP situated in the Unnamed Creek 2 valley.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

10. WATER QUALITY, FISH AND FISH HABITAT

10.1 Context and Summary

The key changes for water quality and aquatic resources are the removal of project activity in the Eymundson Creek and Pierre River watersheds, and expanded changes to Redclay Creek and Big Creek downstream of the Project Development Area (PDA). Also, the updated mine plan places an External Disposal Area (EDA) over Unnamed Lakes 1 (Oakley) and 2 (Small Sandy), resulting in the loss of these waterbodies. The Athabasca Bridge and east side access road are now included as part of the PDA Application Case and cumulative effects assessment.[18]

If development of the currently withdrawn application for the Shell Pierre River Mine is permanently abandoned[19], cumulative impacts to local aquatic ecosystems will be reduced.

Note that the Conceptual Fish Offsetting Plan (CFOP) described in the Project Update[20] was fully reviewed in a separate Memorandum to FMSD dated August 12, 2015, and is only briefly discussed here.

Impacts to water quality and fish habitat could be caused by project activities that are unchanged since the previous review, briefly stated as:

- suspended sediments released to lakes and watercourses during construction and other project phases;
- accidental releases of materials and substances during all phases of the project that might have negative effects on water quality;
- muskeg and overburden dewatering and releases into local watersheds and the Athabasca River;
- closed-circuiting of mine areas resulting in withholding as well as diverting natural runoff water;
- seepage of process-affected waters from back-filled mine pits and tailings disposal areas, and potential exposure to aquatic biota;
- pit lake releases to surface waters (including Ronald Lake and the compensation lake) and residual contamination within pit lake sediments;
- disturbance or elimination of waterbodies and watercourses resulting in lost fish and fish habitat, fishing opportunities, and traditional uses (at "habitation sites");
- aerial emissions from fleet vehicles, fugitive dust, and other sources resulting in fallout to runoff areas, snowpacks and directly to surface waters; and
- increased public or worker access and resulting additional fishing pressure.

[18] Volume 3, Section 18

[19] Unlikely, as this would sterilize the resource associated with OSL 352 (Volume 1, Section 2, p. 2-5).

[20] Volume 3, Section 15

The following watercourses and waterbodies are among those that will be affected by the Frontier Project:

- Athabasca River, Redclay Creek, Big Creek and numerous unnamed creeks;
- fish-bearing lakes: Ronald Lake, Unnamed Lake 1 (Oakley Lake), Unnamed Lake 22, the "waterbody complex in the northeast corner of the PDA" (Unnamed lakes 13, 33, 34), and
- Unnamed Lake 2 (Small Sandy Lake), and numerous other unnamed water bodies.

Some of the above watercourses and waterbodies support large-bodied fish and most of them support small-bodied forage fish. Teck indicated the overall updated assessment conclusion was the same as in the Integrated Application: effects on fish habitat are "*classified as low in magnitude with low environmental consequence*". Potential effects on fish abundance and fish and fish habitat diversity were considered negligible based on the offsets provided in the CFOP (reviewed separately).

Mitigation proposed to reduce project effects to water quality and aquatic resources includes:

- recycling process-affected waters and runoff during operations, where possible;
- perimeter ditches and wells to capture and retain seepage and runoff;
- passive post-closure seepage control system to be applied at the end of mine life (added for the Update);
- using wetlands to assist with biological remediation and particulate settling in reclamation waters before discharge;
- excluding *solid* tailings (MFT) from pit lakes;
- constructing suitable fish habitat within diversion channels, including retaining connectivity to the Athabasca River, whenever possible;
- a prohibition on fishing for project personnel along with access restrictions for the general public; and
- a variety of best management practices.

The water quality and fish habitat assessment was again reasonably well done, with attention to details like aerial deposition, effort to provide pre-development information, and good separation of impacts related to Base Case from Application Case. Cumulative impacts were sparsely assessed, perhaps in light of the uncertain future of Shell Pierre River. Additional studies since the Integrated Application were completed for surface water quality, and fish and fish habitat in the revised local study area (LSA) on lakes and watercourses upstream and downstream of the project footprint.

The Frontier Project is a very large mining project that will add impacts in the local area to the Shell Pierre River Mine, if it proceeds. In most cases Teck predicted that

the residual project impacts would be minimal following mitigation and fish habitat offsetting plans, with a range of confidence in predictions depending on the aquatic component and available model input. Two key waterbodies (Oakley and Small Sandy lakes) that previously were to be left intact will be removed under the updated plans for the project. Three large end pit lakes totalling approximately 48 km^2 are planned for the closure landscape. These lakes will ultimately cover land that is currently occupied streams, wetlands, muskeg and small lakes.

Some of the concerns include seepage, deposition and drainage of contaminants in water and snowpacks, using lakes and wetlands as polishing ponds, pit lake residual toxicity, application of CCME guidelines versus chronic effects benchmarks, residual impacts that cause reduced fish productivity and abundance in the LSA, lost fishing and traditional land use opportunities, and access to water-related habitation sites.

10.2 Water Quality, Fish and Fish Habitat Outstanding Key Concerns and Requests

[40] – [41] Process Water Seepage

The application described the capture of seepage in perimeter ditches and wells from backfilled mine pits and tailings disposal areas, and return to the tailings areas. Fort McKay is concerned about seepage flows, especially given the down-gradient location of the fish habitat compensation lake (FHCL).

Teck states that "*small components of seepage of process-affected waters may enter Big Creek and the fish habitat compensation lake in the far future*". It indicates that up to 40 L/s (3500 m^3/d) might flow towards the FHCL at this time. During operations, pumping wells are planned around the north, east and south perimeter of the external tailings areas (ETAs) to limit migration of process-affected waters to downstream receptors, but not all seepage is captured.

[40] Request

Fort McKay requests that Teck provides contingency plans and potential mitigation if the barrier walls and seepage capture of the External Tailings Areas do not perform as anticipated in preventing seepage from contaminating groundwater and surface waters.

[41] Request

Fort McKay requests that Teck assesses the potential impacts of discharging up to 40 L/s (3500 m^3/d; Figure 7-13) of process-affected seepage to the fish habitat compensation lake.

[42] – [43] Surface Water and Sediment Quality

Teck indicates that a number of polycyclic aromatic compounds (PAC/PAHs) will be monitored downstream of the project. The oil sands-characteristic PAC, dibenzothiophene, is missing from the list of monitored compounds. This substance is one associated with fish tainting. Further, the analytical detection limits for copper, mercury and silver were above the acute or chronic guideline for the protection of aquatic life on some occasions.

[42] Request

Fort McKay requests that Teck adds dibenzothiophene in sediments to the list of monitored substances for any watercourses downstream of the project, plus sediments of pit lakes and the FHCL.

[43] Request

Fort McKay requests that Teck provides assurance that the analytical laboratories contracted for water and sediment analyses are capable of achieving detection limits at criteria intended to protect aquatic life.

[44] Muskeg and Overburden Drainage – Mercury

Wetlands are known for exporting mercury and methylmercury that are typically associated with dissolved organic carbon (DOC). It is possible that downstream ecosystems might be exposed to elevated mercury that is exported more rapidly than is natural during muskeg and overburden drainage. Downstream fish both in the FHCL and Athabasca River might then become contaminated with methylmercury despite proposed mitigative efforts.

[44] Request

Fort McKay requests that Teck models mercury and methylmercury loadings to the FHCL and any downstream waters, including the Athabasca River, considering uptake by piscivorous fish. Models should consider the potential methylmercury production and augmentation of mercury export by muskeg and overburden drainage activities under both the Application and Planned Development (cumulative impact) cases.

[45] – [47] Pit Lake Residual Toxicity and Research

The Frontier Project plans three large pit lakes for the reclamation landscape. Open-water areas will increase from 14.2 km^2 pre-development to 47.6 km^2 at closure. In addition to oil sands process-affected water and Athabasca River water, flows of local tributaries will be used as source water for pit lakes.

Pit lake outflows will be monitored, and the company believes that pit lakes will become viable aquatic ecosystems. Pit lake outflows will be directed to Ronald Lake, the fish habitat compensation lake and various tributaries of the Athabasca River.

There is a lack of published research on pit lake sediments that could remain contaminated despite the lack of solid tailings directly added to the lakes. The pit lakes might in fact support aquatic biota, but whether healthy ecosystems will result remains unproven.

[45] Request

Fort McKay requests that Teck commits to ongoing participation in pit lake research, including studies of bottom sediments and possible contaminants transfer through the aquatic food chain, as well bioturbation and wind-induced sediments resuspension.

[46] Request

Fort McKay requests that Teck provides results and/or reports on any studies into pit lake sediments and transfer of contaminants to aquatic food webs.

[47] Request

Fort McKay requests that Teck provides further discussion about the fate and transport of napthenic acids and PAHs over time in its pit lakes, and discuss those substances that are expected to exceed effects benchments, notably in sediments.

[48] – [50] Derivation of Site-specific Guidelines

Chronic effect benchmarks (CEBs) are now described as "site-specific guidelines" that are "consistent with federal guidance for guideline development". Unlike the previous CEBs produced that were simply the outcome of single laboratory toxicity tests, Teck has adjusted the CEBs to reflect project-site conditions (pH, hardness, DOC and temperature).

In some cases, Teck chose to accept CCME water quality guidelines, but in other cases calculated CEBs where it believed CCME guidelines either did not apply to its site or were considered too conservative. It was not possible to verify the derivation for the CEBs because there was no detailed description of the process used for each substance, as there would typically be for site-specific water quality objectives (WQO).

While, in some cases, the approach to deriving regionally relevant CEBs might be valid, there is little support for dismissing more protective CCME guidelines or for accepting newly derived CEBs in the absence of peer review of the report.

While CCME guidelines might be lower than CEBs, more conservative guidelines also provide a measure of protection against mixtures of substances occurring together.

[48] Request

Fort McKay requests that Teck accepts published CCME guidelines for all substances for which they are available until such time as CCME or a provincial government agency evaluates and approves the newly-derived CEBs presented by the company.

[49] Request

Fort McKay requests that Teck provides a tabulated comparison of CCME guidelines to its site-specific guidelines (CEBs) for those substances where guidelines exist.

[50] Request

Fort McKay requests that Teck address the potential impact and toxicity of *mixtures* of contaminants that might all occur simultaneously.

[51] – [52] Aerial Emissions and Snowmelt Concentrations

Predicted snowmelt concentrations of three metals and two selected PAHs were greater than surface water quality guidelines in the Application Case. While these concentrations would, indeed, be diluted in receiving waters, there is concern that a high volume flush of meltwater might still impact biota and contaminate sediments downstream. Teck commits to share snow survey data with Aboriginal communities, upon request.

[51] Request

Fort McKay requests that Teck provides an update of the cumulative impacts of aerial emissions in surface waters, including any further snow survey results.

[52] Request

Fort McKay requests that Teck commits to sharing with the Community snowmelt data that exceed water quality guidelines, as soon as possible, not just upon request.

[53] Loss of Traditionally Significant Surface Waters

The updated project plans include the loss of Oakley Lake (UNL #1), Small Sandy Lake (UNL#2), and most of Big Creek and Redclay Creek. While compensation for lost fish is accounted for, the loss of special places and habitation sites for people is not.

[53] Request

Fort McKay requests that Teck meets with Fort McKay to discuss how it might support the Community with access to and preservation of special places, including but not limited to, habitation sites in the Frontier Project lease and the Moose Lake area.

[54] Fish Rescue from Destroyed or Diverted Streams and Lakes

Teck indicates that a fish rescue plan will be developed and implemented according to regulatory requirements in instances where development activities (e.g., watercourse drainage or diversions) result in the isolating or dewatering fish-bearing habitats.

[54] Request

Fort McKay requests that Teck confirms that it will rescue all fish species from all aquatic habitats that will be destroyed or diverted, that support fish during any season, and that it will not limit the rescue operations to only those waters that support large-bodied fish species.

[55] – [56] Tissue Residue Guideline - Mercury

Teck provided some estimated future fish tissue concentrations for mercury that appear to be very low given the known concentrations of mercury that occur in piscivorous fish in the region today. Mercury in edible fish tissue (e.g., walleye) in the Athabasca River often exceed the human consumption guidelines (0.5 mg/kg), subsistence guideline (0.2 mg/kg), and the CCME tissue residue guideline (TRG) for the protection of wildlife consumers of fish (0.033 mg/kg). Teck indicates that fish mercury concentrations pre-development are 0.058 mg/kg, and might increase under the application case to 0.39 mg/kg.

No information about the type or size of fish is provided.

[55] Request

Fort McKay requests that Teck provides justification and further information about the source of information, species and size of fish that show a current concentration that is very low (0.058 mg/kg), and that presumably was used in the prediction of a future concentration that is correspondingly low.

[56] Request

Given that Teck's calculation of future fish tissue residue for mercury under the application case is close to seven times higher than the current level, Fort McKay requests that Teck addresses impacts to wildlife consumers of fish that might be caused (the future predicted level is more than ten times higher than the TRG to protect wildlife consumers of aquatic biota).

[57] Accounting for Residual Impacts on Fish Abundance and Productivity

Teck anticipates residual effects on fish abundance and productivity in the LSA, including in lower Big Creek and Redclay Creek. The effects are related to reductions of mean annual flow in these creeks downstream of the PDA that are considered "temporary and reversible at closure". The 60 ha compensation lake will not replace all habitat units that will be lost because offsetting plans in other regions are proposed to support some of those gains. It would appear that fish abundance in the LSA will not be replaced in local streams and lakes, thus creating the local residual impact.

Although effects on the overall habitat productivity in Big Creek will be offset by the CFOP, residual effects might remain for some migratory Athabasca River fish species that use Big Creek because, according to Teck, the CFOP might not provide direct benefits for these species (e.g., Arctic grayling).

[57] Request

Fort McKay requests that Teck:

i. clarifies statements that indicate effects on fish abundance are not anticipated in the aquatics LSA, when it is known that the compensation lake will not likely account for all losses in the LSA;

ii. provides values and percent reduction of *low flows* (e.g., 7Q2, 7Q10) in addition to reduction in mean annual flows, including whether there might be occasions when there is no flow in these watercourses compared to the current scenario, since fish might occur in the lower reaches of Big and Redclay creeks during any open water season;

iii. identifies which species will lose habitat in Big Creek and Redclay Creek that will not benefit from the compensation lake;

iv. justifies ranking residual effects to fish as 'reversible' and 'medium duration' when the timespan to reversibility spans several generations of most species; and

v. discusses possible mitigative solutions that might provide additional instream flow needs to these watercourses rather than gradually diminishing flows over the course of operations, given the cause of lost habitat in lower Big and Redclay creeks is lack of flow (due to withheld or re-directed water).

[58] Pit Lakes as Fish Habitat

Teck is hopeful that its three end pit lakes will eventually become productive aquatic habitat. Colonization by fish to these large waterbodies is unknown given the distance and potentially restricted connectivity through wetlands and unmaintained channels in the future.

[58] Request

Fort McKay requests that Teck further explains the functionality as fish habitat and planned incorporation into local ecosystems of its large end pit lakes that will be located far from fish that might naturally colonize them.

[59] Fish Habitat Offsetting Plans

The full CFOP[21] was reviewed separately. Note that Fort McKay expects that DFO will consider Aboriginal fishery species to include longnose sucker, white sucker and lake chub, in addition to the list of recreational fish species.

[59] Request

Fort McKay requests that Teck summarizes how its calculations (HADD versus "serious harm to fish") related to fish habitat offsetting might have changed for the Updated project scenario as a result of recent amendments to the *Fisheries Act* (input values, not compensatory plans).

[60] Access Management Plans

Teck will develop and implement an access management plan (AMP) to limit access by the general public to fish-bearing watercourses or waterbodies.

[21] Section 15

[60] Request

Fort McKay requests that Teck consults with the Community about access to lands and waters in the project area.

[61] Climate Change Impacts to Project

Teck did not address how climate change might impact fish habitat and aquatic resources in light of its plans for water use, diversion and closed circuiting.

[61] Request

Fort McKay requests that Teck specifically discusses how climate change in addition to industrial demand might reduce or impact water availability for its project and for fisheries in the Athabasca River mainstem and project-area tributaries.

[62] – [63] Consultation – Bridge and Monitoring

Teck indicated it would assess fisheries offsets for the Athabasca Bridge with DFO.

Teck also indicated that aquatic monitoring plans for the project were conceptual and to be finalized at a later date.

[62] Request

Fort McKay requests that Teck consults with them about navigation and fisheries concerns and offsets related to the Athabasca Bridge.

[63] Request

Fort McKay requests that Teck consults with them about all project-specific aquatic monitoring plans, including community-based monitoring (CBM).

10.3 Water Quality, Fish and Fish Habitat Key Concerns and Requests Summary

Table 10-1: Water Quality, Fish and Fish Habitat Key Concerns and Requests Summary Table

Number	Fort McKay Key Concern(s)	Requests	Category*
[40]	Process Water Seepage	Fort McKay requests that Teck provides contingency plans and potential mitigation if the barrier walls and seepage capture of the External Tailings Areas do not perform as anticipated in preventing seepage from contaminating groundwater and surface waters.	
[41]	Process Water Seepage	Fort McKay requests that Teck assesses the potential impacts of discharging up to 40 L/s (3500 m^3/d; Figure 7-13) of process-affected seepage to the fish habitat compensation lake.	
[42]	Surface Water and Sediment Quality	Fort McKay requests that Teck adds dibenzothiophene in sediments to the list of monitored substances for any watercourses downstream of the project, plus sediments of pit lakes and the FHCL.	
[43]	Surface Water and Sediment Quality	Fort McKay requests that Teck provides assurance that the analytical laboratories contracted for water and sediment analyses are capable of achieving detection limits at criteria intended to protect aquatic life.	
[44]	Muskeg and Overburden Drainage - Mercury	Fort McKay requests that Teck models mercury and methylmercury loadings to the FHCL and any downstream waters, including the Athabasca River, considering uptake by piscivorous fish. Models should consider the potential methylmercury production and augmentation of mercury export by muskeg and overburden drainage activities under both the Application and Planned Development (cumulative impact) cases.	
[45]	Pit Lake Residual Toxicity and Research	Fort McKay requests that Teck commits to ongoing participation in pit lake research, including studies of bottom sediments and possible contaminants transfer through the aquatic food chain, as well bioturbation and wind-induced sediments resuspension.	
[46]	Pit Lake Residual Toxicity and Research	Fort McKay requests that Teck provides results and/or reports on any studies into pit lake sediments and transfer of contaminants to aquatic food webs.	
[47]	Pit Lake Residual Toxicity and Research	Fort McKay requests that Teck provides further discussion about the fate and transport of napthenic acids and PAHs over time in its pit lakes, and discuss those substances that are expected to exceed effects benchments, notably in sediments.	
[48]	Derivation of Site-Specific Guidelines	Fort McKay requests that Teck accepts published CCME guidelines for all substances for which they are available until such time as CCME or a provincial government agency evaluates and approves the newly-derived CEBs presented by the company.	

Number	Fort McKay Key Concern(s)	Requests	Category*
[49]	Derivation of Site-Specific Guidelines	Fort McKay requests that Teck provides a tabulated comparison of CCME guidelines to its site-specific guidelines (CEBs) for those substances where guidelines exist.	
[50]	Derivation of Site-Specific Guidelines	Fort McKay requests that Teck address the potential impact and toxicity of mixtures of contaminants that might all occur simultaneously.	
[51]	Aerial Emissions and Snowmelt Concentrations	Fort McKay requests that Teck provides an update of the cumulative impacts of aerial emissions in surface waters, including any further snow survey results.	
[52]	Aerial Emissions and Snowmelt Concentrations	Fort McKay requests that Teck commits to sharing with the Community snowmelt data that exceed water quality guidelines, as soon as possible, not just upon request.	
[53]	Loss of Traditionally Significant Surface Waters	Fort McKay requests that Teck meets with Fort McKay to discuss how it might support the Community with access to and preservation of special places, including but not limited to, habitation sites in the Frontier Project lease and the Moose Lake area.	
[54]	Fish Rescue from Destroyed or Diverted Streams and Lakes	Fort McKay requests that Teck confirms that it will rescue all fish species from all aquatic habitats that will be destroyed or diverted, that support fish during any season, and that it will not limit the rescue operations to only those waters that support large-bodied fish species.	
[55]	Tissue Residue Guideline - Mercury	Fort McKay requests that Teck provides justification and further information about the source of information, species and size of fish that show a current concentration that is very low (0.058 mg/kg), and that presumably was used in the prediction of a future concentration that is correspondingly low.	
[56]	Tissue Residue Guideline - Mercury	Given that Teck's calculation of future fish tissue residue for mercury under the application case is close to seven times higher than the current level, Fort McKay requests that Teck addresses impacts to wildlife consumers of fish that might be caused (the future predicted level is more than ten times higher than the TRG to protect wildlife consumers of aquatic biota).	

Number	Fort McKay Key Concern(s)	Requests	Category*
[57]	Accounting for Residual Impacts on Fish Abundance and Productivity	Fort McKay requests that Teck: i) clarifies statements that indicate effects on fish abundance are not anticipated in the aquatics LSA, when it is known that the compensation lake will not likely account for all losses in the LSA; ii) provides values and percent reduction of low flows (e.g., 7Q2, 7Q10) in addition to reduction in mean annual flows, including whether there might be occasions when there is no flow in these watercourses compared to the current scenario, since fish might occur in the lower reaches of Big and Redclay creeks during any open water season; iii) identifies which species will lose habitat in Big Creek and Redclay Creek that will not benefit from the compensation lake; iv) justifies ranking residual effects to fish as 'reversible' and 'medium duration' when the timespan to reversibility spans several generations of most species; and v) discusses possible mitigative solutions that might provide additional instream flow needs to these watercourses rather than gradually diminishing flows over the course of operations, given the cause of lost habitat in lower Big and Redclay creeks is lack of flow (due to withheld or re-directed water).	
[58]	Pit Lakes as Fish Habitat	Fort McKay requests that Teck further explains the functionality as fish habitat and planned incorporation into local ecosystems of its large end pit lakes that will be located far from fish that might naturally colonize them.	
[59]	Fish Habitat Offsetting Plans	Fort McKay requests that Teck summarizes how its calculations (HADD versus "serious harm to fish") related to fish habitat offsetting might have changed for the Updated project scenario as a result of recent amendments to the Fisheries Act (input values, not compensatory plans).	
[60]	Access Management Plans	Fort McKay requests that Teck consults with the Community about access to lands and waters in the project area.	
[61]	Climate Change Impacts to Project	Fort McKay requests that Teck specifically discusses how climate change in addition to industrial demand might reduce or impact water availability for its project and for fisheries in the Athabasca River mainstem and project-area tributaries.	
[62]	Consultation – Bridge and Monitoring	Fort McKay requests that Teck consults with them about navigation and fisheries concerns and offsets related to the Athabasca Bridge.	

Number	Fort McKay Key Concern(s)	Requests	Category*
[63]	Consultation – Bridge and Monitoring	Fort McKay requests that Teck consults with them about all project-specific aquatic monitoring plans, including community-based monitoring (CBM).	

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

11. VEGETATION AND WETLANDS

11.1 Context and Summary

The updated project disturbance area (PDA) in the Project Update is 29,217 hectares (ha), which is 118 ha smaller than the original Integrated Application. The most relevant project changes that have occurred that might have implications to vegetation, wetlands and the Conservation and Reclamation (C&R) Plan are as follows:

- the project timeline from initial vegetation clearing to final pit lake filling has increased from 47 to 62 years (2019-2081) due to increased production;
- the project footprint is smaller (118 ha) and the Southern Development Area (SDA) has been removed from the project and will no longer be disturbed;
- there is an increase in the post-reclamation wetland area (477 ha); no peatlands will exist in the post-reclamation landscape; and,
- additional soil, vegetation and wildlife surveys were completed in the Local Study area (LSA) due to changes in the project footprint and requests for additional information as part of the initial Integrated Application review process.

Teck states that all peat-forming wetland ecosystems on the pre-disturbance landscape will be lost and replaced with reclaimed upland areas and non-peat forming wetland types. This will include 3,295 hectares (ha) of peatland type wetlands, which is 11.3 % of the overall project footprint.[22]

Fort McKay places high value on peat-forming wetlands for their importance to regional ecology and to Fort McKay's traditional land uses. The community is therefore concerned about the permanent removal of these ecosystems through the development of the Frontier project, both through direct disturbance and the inability to replace pre-disturbance peatlands through reclamation, and through disruption or alteration of surface and shallow sub-surface water movement and chemistry.

[22] Volume 1, Application Update, Table 13.4-9, p. 13-28 (PDF p. 386): 3295 ha peatlands/29,217 ha overall total PDA.

11.2 Vegetation and Wetlands Outstanding Key Concerns and Requests

[64] – [68] Wetlands

[64] Request

Fort McKay requests that Teck develops and participates in research programs focused on wetland reclamation, with an emphasis on peat-forming wetlands (bogs and fens).

[65] Request

Fort McKay requests that Teck develops best management practices for peatlands in a multi-stakeholder group (in CEMA or in a group similar to CEMA) acceptable to Fort McKay that allows for participation by Fort McKay.

[66] Request

Fort McKay requests that Teck follows up-to-date wetland reclamation guidelines: the *Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region*, 2nd Edition (Alberta Environment 2010), and the *Guideline for Wetland Establishment on Reclaimed Oil Sands Leases* (Alberta Environment 2008).

[67] Request

Fort McKay requests that Teck includes Fort McKay in the development and review of wetland monitoring programs. These monitoring programs should focus on wetlands adjacent to the Planned Development Area (PDA) to assess the effects of potential hydrologic alterations to intact wetlands adjacent to the mine disturbance. In addition, a program should be designed and implemented to mitigate any wetland effects that occur.

[68] Request

Fort McKay requests that organic soils are salvaged where possible and that direct placement of these soils is implemented in locations that have a high potential for peatland reformation.

[69] – [73] Traditional-use Plant Potential

In the updated application, Teck commits to the following activities, in consultation with Aboriginal communities, related to traditional-use plant potential:[23]

- co-create Reclamation Working Group(s) to seek input from Aboriginal communities into the reclamation plan, and measures and targets to determine its success;
- gather information on species of traditional value to gain input for the reclamation plan;
- develop and implement a program to salvage and relocate known occurrences of rare (vascular) plant species to areas outside the PDA;
- collect native tree and shrub species seeds, including species of traditional use, from the local area for revegetation stock;
- focus the reclamation plan on diverse vegetation types that include species that are important to Aboriginal communities (shrubs and trees of medicinal and cultural importance);
- identify species of traditional importance to local Aboriginal communities;
- collaborate with Aboriginal communities in reclamation research at both the project and regional level and incorporate the results into future project planning;
- integrate new trails with existing traditional trails in the post-reclamation landscape;
- consider traditional land uses in the design of the CC&R plan, which will evolve over the course of the project;
- acknowledge that the post closure landscape will be different, but there will still be opportunities for traditional land use. Consultations will continue to determine the final land form of the post-closure landscape;
- invite traditional harvest users to harvest plants pre-disturbance;
- target natural ecosites in the reclamation program, and include traditional plants in the revegetation plans;
- reclaim land for key wildlife species that are traditionally hunted and harvested; and,
- include peatlands in the CC&R plan if future research results and recommendations prove that this is feasible and appropriate.

In order for Fort McKay to adequately collaborate with Teck to provide information on cultural plant species, more community research is required to document this knowledge, specifically with regard to the traditional use plant habitats that are preferred for cultural harvesting.

[23] Volume 1, Updated Application, Section 13.9, pp. 13-145 to 13-150 (PDF pages 503- 508)

[69] Request

Fort McKay requests that Teck engages Fort McKay in collecting Traditional Use plant seeds that Teck plans to collect from the surrounding project area for reclamation purposes. Fort McKay requests that Teck collects plant seeds, including fungi and lichen in addition to the tree and shrub seeds Teck already plans to collect.

[70] Request

Fort McKay requests that Teck provides support to Fort McKay to continue traditional plant research within the community. This would include: field verification of the traditional use plant list, including both scientific and traditional names; documentation of all ecosites in which the plant grows; and, documentation and field verification of preferred ecosites/habitats for harvesting the plant. This research would include all plants, including fungi and lichen.

[71] Request

Fort McKay requests that Teck:

i. commits to engaging Fort McKay following established community protocols to ensure that appropriate and culturally relevant species are used in revegetation planning for reclamation of ecosystems that support traditional land uses – details on how this engagement/collaboration will occur should be outlined in an agreement;

ii. provides a formal plan that describes how it will protect and reclaim traditional plant species in collaboration with the Fort McKay community and specifically defined traditional use end land-use targets in the reclamation plan; and,

iii. provides a formal plan that describes how research on traditional-plant species and other ecosystem elements will be developed and supported and/or synthesized to produce functional reclaimed landforms and landscapes with equivalent traditional-use capability.

[72] Request

Fort McKay requests that Teck engages in an active on-site research and trial reclamation program to develop techniques for:

i. re-establishing native shrub and groundcover species identified as traditional-use plant species on reclaimed areas, and

ii. the reclamation and conservation of fen and bog land-cover classes that will be eliminated on the Frontier Project footprint.

[73] Request

Fort McKay requests that Teck endeavours to reclaim the land so that the reclaimed soils and landforms are capable of supporting self-sustaining, locally common boreal forests, regardless of the end land use, and so that the maximum number of pre-disturbance ecosites is present.

[74] – [77] Non-native and invasive species

Fort McKay anticipates that throughout the course of continued development at the Frontier Project, increased surface disturbance and road traffic could lead to establishment and spread of non-native and invasive species, which might have an impact on the overall ecological integrity of the area.

Teck alludes to a weed management plan in the updated Application,[24] but there is no indication that a formal and integrated program is in place. It is Fort McKay's view that a rigourous weed monitoring and control program should be established on the Frontier Project site to limit the establishment of non-native and invasive species during construction, operation, reclamation and closure phases.

[74] Request

Fort McKay requests that Teck implements a monitoring and control program for non-native and invasive species during the project's construction, operation, reclamation and closure phases to ensure that these species do not invade disturbed sites and compete with native species.

Teck also states that when natural revegetation of soil stockpiles is inadequate, Teck plans to seed stockpiles with non-persistent cover crops such as barley, to limit erosion and allow native species to colonize.

[24] Volume 1, Updated Application, Section 18.6.4.2, p.18-82 (PDF p. 755)

[75] Request

Fort McKay requests that Teck avoids any seed mixes that include non-local and non-native species for erosion control, to reduce the potential for introducing persistent grass species and to ensure that the natural recovery of vegetation communities on site is returned to those of pre-disturbance conditions. Furthermore, BMP 15 in Alberta Environment and Water (2012) indicates that the use of seed mixes should be avoided to preserve propagule diversity and integrity (Alberta Environment and Water 2012). If a seed mix is used, Fort McKay requests that the seed mix contains only native species local to the project area.

[76] Request

Given the relative lack of opportunity for direct placement of surface soils in the Frontier reclamation plan, Fort McKay requests that Teck develops and implements a reclamation material stockpile revegetation specifically designed to re-establish a diversity of native vegetation species and to develop a propagule (seed, root) bank in these stockpiles. This bank might then aid in natural regeneration of vegetation upon placement of these materials. Stockpile configuration and use could be designed to optimize this strategy. Fort McKay requests that the results of this planning and implementation are reported to Fort McKay.

Additionally, Teck plans to use slash and non-merchantable timber as rollback to prevent erosion of exposed soil and as padding for temporary roads. Excess slash and non-merchantable timber will be burned.[25] Teck states that incorporating the timber and slash into stockpiles can have negative effects on soil nutrient ratios (e.g. C:N); however, Fort McKay disagrees with this statement.

C:N ratios can be negatively affected if materials have *both* a high C:N ratio *and* high surface to volume ratios. Slash that includes branches and leaves has a low C:N ratio and coarse woody debris has a low surface-volume ratio; slash and non-merchantable timber should therefore not have negative effects on soil nutrient ratios.

[77] Request

Fort McKay requests that excess slash and non-merchantable timber are saved, either in soil stockpiles, or in separate slash/non-merchantable timber stockpiles and replaced as coarse woody debris and slash on the reclaimed sites.

[25] Volume 1, Updated Application, Section 13.5-1, p. 13-43 (PDF p. 401)

11.3 Vegetation and Wetlands Key Concerns and Requests Summary

Table 11-1: Vegetation and Wetlands Key Concerns and Requests Summary Table

Number	Fort McKay Key Concern(s)	Requests	Category
[64]	Wetlands	Fort McKay requests that Teck develops and participates in research programs focused on wetland reclamation, with an emphasis on peat-forming wetlands (bogs and fens).	Industry
[65]	Wetlands	Fort McKay requests that Teck develops best management practices for peatlands in a multi-stakeholder group (in CEMA or in a group similar to CEMA) acceptable to Fort McKay that allows for participation by Fort McKay.	Industry
[66]	Wetlands	Fort McKay requests that Teck follows up-to-date wetland reclamation guidelines: the Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region, 2nd Edition (Alberta Environment 2010), and the Guideline for Wetland Establishment on Reclaimed Oil Sands Leases (Alberta Environment 2008).	Industry
[67]	Wetlands	Fort McKay requests that Teck includes Fort McKay in the development and review of wetland monitoring programs. These monitoring programs should focus on wetlands adjacent to the Planned Development Area (PDA) to assess the effects of potential hydrologic alterations to intact wetlands adjacent to the mine disturbance. In addition, a program should be designed and implemented to mitigate any wetland effects that occur.	Industry
[68]	Wetlands	Fort McKay requests that organic soils are salvaged where possible and that direct placement of these soils is implemented in locations that have a high potential for peatland reformation.	Industry
[69]	Traditional-use Plant Potential	Fort McKay requests that Teck engages Fort McKay in collecting Traditional Use plant seeds that Teck plans to collect from the surrounding project area for reclamation purposes. Fort McKay requests that Teck collects plant seeds, including fungi and lichen in addition to the tree and shrub seeds Teck already plans to collect.	Industry
[70]	Traditional-use Plant Potential	Fort McKay requests that Teck provides support to Fort McKay to continue traditional plant research within the community. This would include: field verification of the traditional use plant list, including both scientific and traditional names; documentation of all ecosites in which the plant grows; and, documentation and field verification of preferred ecosites/habitats for harvesting the plant. This research would include all plants, including fungi and lichen.	Industry

Number	Fort McKay Key Concern(s)	Requests	Category
[71]	Traditional-use Plant Potential	Fort McKay requests that Teck: i) commits to engaging Fort McKay following established community protocols to ensure that appropriate and culturally relevant species are used in revegetation planning for reclamation of ecosystems that support traditional land uses – details on how this engagement/collaboration will occur should be outlined in an agreement; ii) provides a formal plan that describes how it will protect and reclaim traditional plant species in collaboration with the Fort McKay community and specifically defined traditional use end land-use targets in the reclamation plan; and, iii) provides a formal plan that describes how research on traditional-plant species and other ecosystem elements will be developed and supported and/or synthesized to produce functional reclaimed landforms and landscapes with equivalent traditional-use capability.	Industry
[72]	Traditional-use Plant Potential	Fort McKay requests that Teck engages in an active on-site research and trial reclamation program to develop techniques for: i) re-establishing native shrub and groundcover species identified as traditional-use plant species on reclaimed areas, and ii) the reclamation and conservation of fen and bog land-cover classes that will be eliminated on the Frontier Project footprint.	Industry
[73]	Traditional-use Plant Potential	Fort McKay requests that Teck endeavours to reclaim the land so that the reclaimed soils and landforms are capable of supporting self-sustaining, locally common boreal forests, regardless of the end land use, and so that the maximum number of pre-disturbance ecosites is present.	Industry
[74]	Non-native and invasive species	Fort McKay requests that Teck implements a monitoring and control program for non-native and invasive species during the project's construction, operation, reclamation and closure phases to ensure that these species do not invade disturbed sites and compete with native species.	Industry
[75]	Non-native and invasive species	Fort McKay requests that Teck avoids any seed mixes that include non-local and non-native species for erosion control, to reduce the potential for introducing persistent grass species and to ensure that the natural recovery of vegetation communities on site is returned to those of pre-disturbance conditions. Furthermore, BMP 15 in Alberta Environment and Water (2012) indicates that the use of seed mixes should be avoided to preserve propagule diversity and integrity (Alberta Environment and Water 2012). If a seed mix is used, Fort McKay requests that the seed mix contains only native species local to the project area.	Industry

Number	Fort McKay Key Concern(s)	Requests	Category
[76]	Non-native and invasive species	Given the relative lack of opportunity for direct placement of surface soils in the Frontier reclamation plan, Fort McKay requests that Teck develops and implements a reclamation material stockpile revegetation specifically designed to re-establish a diversity of native vegetation species and to develop a propagule (seed, root) bank in these stockpiles. This bank might then aid in natural regeneration of vegetation upon placement of these materials. Stockpile configuration and use could be designed to optimize this strategy. Fort McKay requests that the results of this planning and implementation are reported to Fort McKay.	Industry
[77]	Non-native and invasive species	Fort McKay requests that excess slash and non-merchantable timber are saved, either in soil stockpiles, or in separate slash/non-merchantable timber stockpiles and replaced as coarse woody debris and slash on the reclaimed sites.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

12. BIODIVERSITY

12.1 Context and Summary

The application states that biodiversity is expected to naturally increase over time as "*habitats become established and succession provides greater variation across the landscape*".[26]

Fort McKay is concerned that Teck will need to take a more active role in ensuring the return of biodiversity to pre-development conditions.

12.2 Biodiversity Outstanding Key Concerns and Requests

[78] – [79] Biodiversity

[78] Request

Fort McKay requests that Teck commits to establishing a biodiversity research and monitoring program to better understand changes in biodiversity on reclaimed sites over time and assesses how to increase biodiversity on the post-reclamation landscape.

[79] Request

Fort McKay requests that Teck defines goals for re-establishing biodiversity and appropriate reclamation techniques such that biodiversity in the post-reclamation landscape is equivalent to the pre-mining landscape. 'Equivalent' should be defined in terms of ecosite types and not equivalent land capability as measured by forest productivity.

12.3 Biodiversity Key Concerns and Requests Summary

Table 12-1: Biodiversity Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category
[78]	Biodiversity	Fort McKay requests that Teck commits to establishing a biodiversity research and monitoring program to better understand changes in biodiversity on reclaimed sites over time and assesses how to increase biodiversity on the post-reclamation landscape.	Industry

[26] Volume 1, Application Update, p. 13-13

Number	Fort McKay Key Concerns	Requests	Category
[79]	Biodiversity	Fort McKay requests that Teck defines goals for re-establishing biodiversity and appropriate reclamation techniques such that biodiversity in the post-reclamation landscape is equivalent to the pre-mining landscape. 'Equivalent' should be defined in terms of ecosite types and not equivalent land capability as measured by forest productivity.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

13. HUMAN HEALTH

13.1 Context and Summary

The Human Health Risk Assessment (HHRA) is presented in Volume 3, Section 12 of the Project Update, with supporting Appendices.

The Project Update adopts an approach to the HHRA that includes identifying chemicals expected to be emitted from the project during construction and operation and models their emission concentration and resulting exposure to humans through inhalation, absorption and ingestion directly through contaminated air and water and indirectly through consuming contaminated wild foods.

The Project Update then compares the overall dose with published limits of exposure related to 'acute' and 'chronic' exposures that are assumed to be 'safe' limits in regard to human health with the aim of assessing health 'risk' related to the exposure.

Further, the HHRA undertakes this for four groupings of humans selected to have different exposure profiles and wild food consumption rates including:

- a recreational group
- a residential group
- a cabin group
- an Aboriginal group

The HHRA undertakes this process with three assessment cases:

- Baseline Case
- Application Case, and
- Planned Development Case

These three scenarios allow demonstration of the contribution of pollution to the overall project within the existing contamination that has already occurred (Baseline) and the expected future contamination once this and other projects have occurred (Planned Development).

Human Health Risk Assessment Review

The basic approach to HHRA in the Project Update has been used before in assessing regional impacts on human health in Alberta. It reflects a process that would be expected to result in a low or negligible health risk because of the way the overall Terms of Reference (ToR) are interpreted; however, this risk assessment process, though involved and well established in the regional Alberta HHRA regulatory paradigm, is limited and does not take into account potential

major indirect health impacts that are related to the proposed Frontier Mine Project.

The ToR need not be so narrowly interpreted. This HHRA review challenges the assumed conservatism in health risk, limitations in the scope of the HHRA, gaps in regional health impact recognition and management.

Challenge to Conservative Assumptions within the Project Update Human Health Risk Assessment

Within the Project Update HHRA, a series of steps are sequentially followed in order to estimate human health risk. These sequential steps include:

1) identifying chemicals likely to be contained within the industrial emissions
2) estimating emission concentrations to various media (mainly air), but also to water and ground and bioaccumulation in wild foods including animals and plants
3) estimating dilution rates
4) estimating exposure dose (inhalation, ingestion, absorption)
5) estimating 'safe' exposure limits – these are often derived from a combination of sources from Canada, the United States, Europe and international organizations (e.g., World Health Organization (WHO)), and are more often than not based on occupational exposure risks relating to health and safety of the workforce
6) estimating risk to human health from individual chemical and chemical group exposures
7) estimating risk to human health from exposure to mixtures of chemicals

These various estimates are made throughout each step of the HHRA process. Estimates are needed because the HHRA process incorporates many unknowns and uncertainties. HHRA is not an exact science, it is more a best-guess prediction based on the known science of the day. Because of the consequences of getting a HHRA wrong, conservatism should be built into responsible HHRA as a priority.

As with all traditional HHRA there are a great many estimated factors to take into account before concluding the presence or absence of significant risk to human health. Because health risk assessment is an imprecise science, conservative safety factors are built into the process; for example:

- extrapolating toxicity data between chemicals of similar molecular structure and therefore assumed similar toxicity (itself often a leap of faith);
- extrapolating toxicity data from laboratory animal test species to human beings; and

- extrapolating healthy worker health-based limits to the general population (including young, old and sick).

Safety factors are needed to 'offset' the potential of synergistic interaction between chemicals, which might have a disproportionately high impact on health, compared to chemicals acting in simply an additive manner. Ideally, conservative risk assessment will introduce large safety factors such as ten-fold or 100-fold to err well on the side of caution and promote of conservatism; however, the realities of multiple estimates often preclude using larger more desirable safety factors as they inevitably lead to a high provisional estimate of risk.

Thus, there is pressure to adopt smaller safety factors within the step-by-step approach to HHRA (e.g., two-, three-, or five-fold). The choice of what safety factors to incorporate is a controversial one, as higher or lower adopted factors can easily lead to different conclusions on estimated health risk. The choice of what safety factor to use is influenced by the viewpoint and purpose driving the risk assessment.

For example, an environmental or public health group might opt for higher safety factors to be employed to ensure public health protection is more likely to be achieved, whereas industry (and some elements of government) proponents might argue for lower safety factors to be used to help ensure industrial developments are approved. That this Project Update was undertaken on behalf of industry cannot be ignored in reviewing and evaluating the choice of safety factors incorporated within the HHRA process.

HHRA is an imprecise science as evidenced by many well accepted uncertainties used within the HHRA derivation, including:

- estimating underlying emissions, dilutions, and exposure estimations
- a lack of human epidemiological data on exposure effect
- knowledge gaps in toxicity of common chemicals
- large knowledge gaps in toxicity of uncommon chemicals, leading to uncertainties in use of chemical surrogates
- uncertainties in the extrapolation of toxicity data for individual chemicals to exposure matrices involving many hundreds of different chemicals
- potential for synergism between different chemical moieties as they interact with human biochemistry
- selecting low-fold and high-fold safety factors within the HHRA process and the necessity to balance pressures to ensure public safety with the perceived need for industrial development.

Given this background, it is clear that western science is not able to define human health risk with certainty and precision; therefore, HHRA can be usefully viewed as less of precise science and more as an educated guess, often biased by the purpose

of the risk assessment, which attempts to estimate the real risk to human health from variable exposures to complex matrices of industrial chemicals.

It is good HHRA practice to err on the side of caution and safety when assumptions are made. The same conservative philosophy should be maintained in interpreting HHRA and summarizing conclusions – otherwise public health and safety is not served.

With this background, the overall conclusion of the HHRA embodied in the Project Update dismisses the underlying uncertainty of the HHRA. The HHRA presents a biased view of the extent of its imbedded conservatism. The HHRA promotes certain assumptions that appear to lead to increased conservatism in the HHRA, while seemingly sidelining discussion concerning assumptions made within the HHRA that do not promote conservatism.

13.2 Human Health Outstanding Key Concerns and Requests

[80] Chemical Mixtures and Synergism

The HHRA includes consideration only of potential additive effects in its assessment of chemical mixture. There is no consideration of potential synergistic effects between the identified chemicals. The absence of any reference to synergism does not support the 'conservative' nature claimed to have been adopted throughout this Project Update.

[80] Request

Fort McKay requests that Teck presents clear justification for not including potential synergism in its HHRA and comments on whether potential synergism could occur within the identified CofC and other chemicals already present in the regional air and water sheds and further explains how the exclusion of synergism supports conservatism claimed throughout the HHRA approach.

Human Health Risk Assessment Identifies No Human Health Risks

In general the HHRA was conducted in a comprehensive and competent manner, using conventional risk assessment within the limitation of this standard approach. The HHRA concludes that overall emissions from the project alone, and in combination with emission from other sources, are not expected to result in adverse health effects in the oil sands region.

Further, the HHRA concludes that cumulative environmental risks associated with the additional projects and activities planned for the region are not expected to result in adverse health effects; however, the HHRA does highlight that some modelled emissions are of greater concern than others, and cannot be too readily dismissed. Among these are acute inhalation health risks from $PM_{2.5}$, NO_2 and acrolein, and chronic inhalation health risks from $PM_{2.5}$ and acrolein.

Overall Conclusions from the Human Health Risk Assessment

Basically, the HHRA concludes that Acute and Chronic Health effects from exposure to the project, as well as Lifetime Cancer Risk from exposure to project emissions are low to negligible with few exceptions. The overall HHRA conclusions from the Project Update state that low health risks might be associated with some emissions, including NO_2, $PM_{2.5}$ and acrolein, but that large degrees of conservatism built into the HHRA should mitigate any real impacts.

Nonetheless, the Project Update does contribute to greater emissions in the region, and this in conjunction with current and future overall industrial development will slowly but progressively impact human health. Routine monitoring of pollutant levels in and around the Community of Fort McKay would provide assurance that emission and exposure modelling systems are valid and direct inhalation exposure and indirect exposure through ingestion of contaminated wildlife and plants present low health risk.

The limitations and restricted view of health impacts inherent within the Project Update HHRA are addressed in the next section.

Human Health Impact Assessment

Within the Community of Fort McKay there exists many longstanding health problems that community members have voiced and at various times have associated with industrial development. These are documented and available, for example, within the Fort McKay Health Strategy (2007)]. Below are some of the concerns expressed by community members in relation to health and industry.

Health Strategy May 2007 Approved by C&C

Appendix C: Verbatim Community Comments Relating to Health and Wellness

• Drug problem in McKay
• Quality of life is worse
• Issues – drugs, needs to be extremely addressed
• Try to work together instead of being jealous of each other segregates the community
• Everybody blames problems on cocaine
• Issues that need addressing are drug abuse, pill popping, law breaking
• If we don't have a healthy community we are beating ourselves
• Need help with the drug problem
• Worse – crack issue
• Contamination, traffic safety, respiratory disease, allergies because of industries around. Disease comes from pollution from the oil industries
• Trap lines are ruined and taken from people
• Cancer problems started after industries
• Processed food

• Oil companies are contaminating the water
• Have a regular store without sugar and candies
• Help with our spirituality
• Need to heal from the past
• It would be good to have oil companies build a cultural center. It would be good for our kids
• Need traditional healing circles
• Should have a community sweat lodge
• Spiritual healing needs to be here, we must get it back
• Need a cultural space, people would feel more comfortable
• Not much to do right now
• Young mothers at the Elders Centre used to be good, people just don't go anymore
• People don't get along anymore
• Need to have something to get people to reunite
• Community sweat lodge
• More equipment for fitness
• Cancer problems, asthma – there's nothing you can do about that
• People are sick and no one goes to see them
• People should know when a person is sick
• There should be an Elder's advocate to make sure people get visits, to make sure they are taken care of
• The Elders advocate will keep everyone in the loop with what is happening
• Elder abuse is a problem – they take them grocery shopping and then take all of their money
• People are stealing clothes, food and money from Elders
• Air quality control
• Kids are left alone while parents are playing bingo
• Should be told where the air monitors are
• Need a full time nurse
• Make diet and exercise available for everyone
• Air purifiers needed for asthma
• Need more activities for kids like pool tables, arcades, etc.
• Too many kids with drug issues
• Need a facility for the evenings for the youth
• Drug issues, people think only young people are using drugs
• Need a spiritual healer available for sick people
• Traditional healer needed
• Asthma assistance/workshop to inform people about it

• Cancer is becoming a big problem
• Oil company polluted air
• Need to get traditional food back (moose meat)
• Younger generation should listen to elders to learn more
• More assistance needed
• Pollution is affecting our health
• Too many people are getting cancer – the air causes cancer
• Asthma problems may be caused by the air
• Should have more variety in the store
• Store should be checked out by health inspector

[81] – [83] Community Wellness

This is a selection of comments recorded directly from community members asked to discuss and reflect on health and wellness within the Community of Fort McKay. At first glance, many of these comments might not seem related to industrial development in general, and this project specifically; however, on reflection, all are related indirectly to regional industrial development, of which the Frontier Project will form a significant future proportion. It is these indirect links to industrial development that are not addressed in the HHRA.

Taken together these comments clearly present a community concerned about the health impacts related to industrial emissions – particularly asthma and cancer. The comments lead to a dependence on store-bought food, partly as a result of concerns of wild foods contamination.

The comments identify an eroded traditional culture from increasing alcohol and substance abuse.

These community statements put forth a belief that the rates of disease are higher today because of industry, compared to when there was less industry. Further, the statements present a disconnection between elder and youth, between leaders and community members, and a growing disconnection between the land and its people. There appears to be widely held belief that wild foods (berries, vegetation, wildlife, fish) are more and more contaminated. This in turn, drives community members to rely more on store-bought foods, and this in turn, leads to a poorer diet than offered by collecting and consuming wild foods.

The HHRA is limited because Teck chose to limit the HHRA to only a single determinant of health – namely the physical environment, and the presence and quantity of pollution.

There are other determinants of health including diet, mental wellbeing, and strength of family, culture and community. If there is widespread fear that cumulative industrial emissions are contaminating Fort McKay's Traditional Territory, as more and more industry comes into the region, the resulting decrease

in land use leads to cultural erosion, which in turn leads to stress in individuals, family and community. This upset promotes negative health impacts including poor diet (obesity, diabetes and other illnesses), substance abuse, depression and mental illness or suicide. In fact, all these major health issues are related to each other, and all are indirectly linked to industrial development of which the proposed Frontier Project is only the latest application among many.

These are the major health issues within the Community of Fort McKay – and none are addressed in the current HHRA.

If these issues were addressed in the HHRA, these issues could be better understood and accepted as linked to industrial development, and efforts could be made to mitigate these health impacts – for example, through more effective communication on the promoted lack of wild food contamination; cultural promotion through culture and youth camps; however, these 'indirect' but most significant health impacts on the Community of Fort McKay are not identified in the HHRA, and hence they are conveniently ignored within the Project Update. Thus, the HHRA is severely limited as it:

- does not consider health impacts and concerns generated by the Fort McKay community; and
- fails to look at the broader determinants of health impacts associated with their proposed development, instead concentrating only on the physical environment.

Human health is not solely related to the presence or absence of toxic chemicals in the environment. Medical textbooks will define health in relation to key determinants. These include the following:

- Income and Social Status
- Social Support Networks
- Education and Literacy
- Employment/Working Conditions
- Social Environments
- Physical Environments
- Personal Health Practices and Coping Skills
- Healthy Child Development
- Biology and Genetic Endowment
- Health Services
- Gender
- Culture
- Mental Wellbeing – including stress

Within the EIA the primary stated purpose of the Project Update HHRA is to estimate the likely health impact on human health from the proposed project. For the sake of argument, let's accept at face value the HHRA conclusions (which can

never have absolute certainty) that there seem to be little acute or long-term health risks associated with predicted exposures to chemicals emitted from the project and inhaled, ingested, or absorbed by Fort McKay community members.

The general public at large, and Fort McKay community members in particular, have persistent concerns over their health relating to regional development of industry that are intimately connected with Fort McKay's Traditional Territory. It would be unreasonable to expect any community in the air and water shed of the proposed project not to be concerned. These concerns are evident in listening to Fort McKay community members, who are under considerable stress because of rapid industrial development within their traditional lands, and fear of the effects of air, water, and land pollution on their health, as well as the effects of consuming contaminated wild foods. This fear has been fed by various reports recently distributed through Alberta media including:

- increased rare cancers within Fort Chipewyan community brought to attention of press and since confirmed by a review undertaken by Alberta Cancer Board, and more recently highlighted in a CBCs Nature of Things documentary
- high Arsenic levels in moose-meat
- tailing ponds contamination of migrating wildfowl
- contaminated water and health effects
- lack of provincial government oversight and recent establishment of federal oversight for environmental monitoring in northern Alberta related to the oil and gas industry

These and other issues continually emerge, highlighting an association with industrial development and its increased pollution and human and environmental ill health.

Discussions with many community members indicate that there is real fear within the Community about widely reported health issues and contaminated wildlife. Aboriginal community members rely on land use as an anchor to their traditional culture. Harvesting traditional foods has been, and remains, a fundamental part of community identity. The sense of community and culture surrounding traditional food harvesting and sharing runs deep in the Community of Fort McKay, as it does with many Aboriginal peoples in Canada.

The serious concerns within the Community of Fort McKay relating to the health of the land, water, air and wildlife act to increase stress within individuals, between family members, and within the community at large. Stress is very much related to health (blood pressure, mental wellbeing, social and cultural stability).

Examination of all health determinants is an unconventional addition in the current Project Update. Nonetheless, stress and associated wider health determinants are a valid and important consideration that should not be ignored. The determinants of health listed above cannot be disputed, and the impact the

planned project has on these health determinants has not been assessed as part of the HHRA. Interviews with Community of Fort McKay members would be expected to reveal serious concerns over industrial development in general and the human health impact of all regional industrial developments including Teck's proposed Frontier Mine Project. These concerns are affecting and will continue to affect the mental and physical health of Fort McKay individuals, family groups and the wider Fort McKay community at large.

Assessing these wider health effects within the HHRA can be guided by the general principal and use of adopting conservative safety factors inherent in responsible HHRA when the underlying science is unknown or poorly understood. The Community of Fort McKay will be constantly reminded of the physical presence of the proposed Frontier Mine Project during construction and operation.

Prudent HHRA should lead to the 'conservative' conclusion that the very presence of this large industrial development adjacent to Fort McKay traditional lands, and contributing to the air shed and watershed will impact health. Further, prudent health risk assessment leads to adopting conservative assumptions erring on the side of caution. Without any objective assessment, prudent conservatism would lead to the conclusions that wider health impacts would be negative.

Other national and international organizations recognize the wider more holistic approach relating industrial development to health impacts beyond simply examining chemical emissions. These organizations include US Centers for Disease Control (Centers for Disease Control and Prevention 2011), the World Health Organization (World Health Organization 2011), as well as Health Canada (Health Canada 2010). This more comprehensive approach is becoming commonly named as a 'Health Impact Assessment' (HIA) and is progressively being developed and applied throughout the world (Hebert, et al. 2012).

Using HIAs in the oil and gas industry is well established and its underlying principles and methodology is supported by the International Petroleum Industry Environmental Conservation Association (IPIECA) and the International Association of Oil and Gas Producers (OGP) who jointly published A Guide to Health Impact Assessments (International Petroleum Industry Environmental Conservation Association 2005).

To date, much effort has been put behind documenting a paper-based HHRA. Correspondingly little effort has been devoted to a communication plan with provision of evidence to ensure Fort McKay community members have secure knowledge they will be 'safe'. Within the HHRA, there appears to be no plan for effective communication to Fort McKay community members that would ensure they feel safe, or at least feel as safe as they can reasonably expect to be with such major adjacent industrial developments.

[81] Request

Fort McKay requests that Teck provides evidence whether or not the HHRA has taken into consideration community concerns on industrial impacts on health and wellness, e.g., issues related to drugs, alcohol or cultural integrity.

[82] Request

Fort McKay requests that Teck undertakes a risk assessment on the likely health impacts on all determinants of health from the Project Update. Fort McKay also requests that Teck considers the value of a more holistic approach to human health risk assessment using an established Health Impact Assessment approach and adopts results of a HIA in evaluating the human health impacts of the proposed Frontier Mine Project.

[83] Request

Fort McKay requests that Teck constructively discusses with Fort McKay strategies to effectively communicate health risks associated with the proposed Frontier Mine Project to mitigate health concerns and fear within the Community of Fort McKay.

[84] Health Programs

[84] Request

Fort McKay requests that Teck constructively discusses with Fort McKay ways to explore what programs could be supported or devised to promote health so as to offset potential negative health impacts of the proposed project resulting from a more comprehensive HIA.

[85] Regional Multi-stakeholder Groups

[85] Request

Fort McKay requests that Teck constructively participates in and supports existing and future environmental and health management and monitoring programs within the region including WBEA and CEMA.

[86] – [88] Cancer

The Project Update HHRA includes a review of cancer-causing CoC in relation to modelled air emissions and known toxicity and exposure limits. The HHRA concludes that there is a negligible cancer risk in the region related to Baseline, Application or Planned Development Case scenarios.

The Project Update HHRA includes recognizing Aboriginal stakeholder concerns around perceptions of increased cancer rates in the region.[27]

The HHRA presents a short summary of Alberta Cancer Board findings related to general and rare cancers in the Aboriginal community of Fort Chipewyan. The HHRA relies on this section to dismiss cancer concerns and concludes there should be no cancer issues related to the project and none in the region.

Statements in this section include that there are higher than expected rare cancers (cholangiocarcinoma) in Fort Chipewyan, and there is no credible evidence of rare-cancer causing pollutants in the region that might explain a cause versus effect.

This is a false and dangerous conclusion. It does not in any way support conservatism. The excess cancer issues in the region need to be addressed further by Teck.

[86] Request

Fort McKay requests that Teck provides further details on the Alberta Cancer Board's assessment of rare cancers in the community of Fort Chipewyan, in particular, providing an numerical estimate of the observed versus expected rates of cholangiocarcinoma.

[87] Request

Fort McKay requests that Teck provides a rationale to explain the excess cholangiocarcinoma in the region, and in particular if environmental causes are to be dismissed, provides an acceptable rationale and an acceptable alternative hypothesis.

[27] Volume 2, Section 12.10.3.10

[88] Request

Fort McKay requests that Teck provides support to investigate further the potential causes of cholangiocarcinoma in the region, with a specific focus on risks to the Community of Fort McKay.

[89] Regional Multi-stakeholder for Human Health

[89] Request

Fort McKay requests that Teck constructively supports initiation or progression of a regional multi-stakeholder initiative to explore recognizing and managing indirect health impacts of industrial development on human health.

13.3 Human Health Key Concerns and Requests Summary

Table 13-1: Human Health Key Concerns and Requests Summary Table

Number	Fort McKay Key Concern(s)	Requests	Category*
[80]	Chemical Mixtures and Synergism	Fort McKay requests that Teck presents clear justification for not including potential synergism in its HHRA and comments on whether potential synergism could occur within the identified CofC and other chemicals already present in the regional air and water sheds and further explains how the exclusion of synergism supports conservatism claimed throughout the HHRA approach.	Industry
[81]	Community Wellness	Fort McKay requests that Teck provides evidence whether or not the HHRA has taken into consideration community concerns on industrial impacts on health and wellness, e.g., issues related to drugs, alcohol or cultural integrity.	Industry
[82]	Community Wellness	Fort McKay requests that Teck undertakes a risk assessment on the likely health impacts on all determinants of health from the Project Update. Fort McKay also requests that Teck considers the value of a more holistic approach to human health risk assessment using an established Health Impact Assessment approach and adopts results of a HIA in evaluating the human health impacts of the proposed Frontier Mine Project.	Industry
[83]	Community Wellness	Fort McKay requests that Teck constructively discusses with Fort McKay strategies to effectively communicate health risks associated with the proposed Frontier Mine Project to mitigate health concerns and fear within the Community of Fort McKay.	Industry
[84]	Health Programs	Fort McKay requests that Teck constructively discusses with Fort McKay ways to explore what programs could be supported or devised to promote health so as to offset potential negative health impacts of the proposed project resulting from a more comprehensive HIA.	Industry

Number	Fort McKay Key Concern(s)	Requests	Category*
[85]	Regional Multi-stakeholder Groups	Fort McKay requests that Teck constructively participates in and supports existing and future environmental and health management and monitoring programs within the region including WBEA and CEMA.	Industry
[86]	Cancer	Fort McKay requests that Teck provides further details on the Alberta Cancer Board's assessment of rare cancers in the community of Fort Chipewyan, in particular, providing an numerical estimate of the observed versus expected rates of cholangiocarcinoma.	Industry
[87]	Cancer	Fort McKay requests that Teck provides a rationale to explain the excess cholangiocarcinoma in the region, and in particular if environmental causes are to be dismissed, provides an acceptable rationale and an acceptable alternative hypothesis.	Industry
[88]	Cancer	Fort McKay requests that Teck provides support to investigate further the potential causes of cholangiocarcinoma in the region, with a specific focus on risks to the Community of Fort McKay.	Industry
[89]	Regional Multi-stakeholder for Human Health	Fort McKay requests that Teck constructively supports initiation or progression of a regional multi-stakeholder initiative to explore recognizing and managing indirect health impacts of industrial development on human health.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

14. TAILINGS MANAGEMENT

14.1 Context and Summary

Late last year a meeting was arranged between Teck and Fort McKay to discuss the revised tailings management program but Teck cancelled the meeting. We believe that because of the major changes to the tailings management program it would be beneficial to have a meeting to fully discuss these changes.

As a general comment, Fort McKay does not believe that the revised tailings management program is a major improvement and in many respects appears much worse than the original plan.

A benefit of the revised tailings management program is the plan to use coarse combined tailings to capture more than 50% of the fines. Certainly, the more fines that can be captured by the coarse sands will be a large benefit, and Teck will strive to capture an even greater proportion of fines in future.

Teck states that "*…overall, the revised strategy is superior to that presented in the Integrated Application because*":

> *…the strategy is consistent with the Tailings Management Framework for the Mineable Athabasca Oil Sands (TMF).*

Just because the strategy is consistent with the new Tailings Management Framework doesn't make it superior. The strategy allows each company to provide its own plan to manage fine tailings with little guidance other than to ensure that tailings are at a ready-to-reclaim state within ten years following mine closure.

It is agreed that thin-lift drying has a number of drawbacks—especially the requirement for large areas for tailings disposal—in effect requiring double-handling of dried tailings materials; however, going away from the practice of thickening tailings from the plant site is an unfortunate choice. In addition, while the new strategy might be consistent with the Tailings Management Framework, it might not be consistent with the regulatory requirements that have not yet been released.

14.2 Tailings Management Outstanding Key Concerns and Requests

[90] Fines Treatment

Teck stated:

> *…fines treatment is decoupled from the extraction and bitumen recovery process, which helps to reduce the risk of producing off-spec tailings and improves operational robustness and reliability.*

There are major advantages to support using thickeners as part of the extraction and bitumen recovery process, which would allow hot water to be circulated back to the plant thereby saving major energy costs as well as reducing the size of external tailings facilities, and thereby reducing the aerial extent of these impoundments and saving construction costs. If off-spec material was produced then Teck would be no further behind by simply discharging fluid fine tailings into an impoundment.

[90] Request

Fort McKay requests that Teck attends a technical meeting to discuss the revised tailings management program.

[91] Tailings Management Program

Under the revised tailings management program the peak inventory of FFT goes from 63 Mm^3 up to 242 Mm^3. This is a major concern for Fort McKay and difficult to believe that the revised tailings management program is an improvement.

[91] Request

Fort McKay requests that Teck attends a technical meeting to explain the revised tailings management program and why Teck considers it an improvement.

[92] Cyclones

Teck states:

> *…the strategy is based on technologies that are currently used successfully in oil sands operations.*

There is no real evidence that cyclones have been successful on a fully operational scale. As with thin lift drying, the hydrology of thickened tailings and the ability to shed water during all seasons of the year is still open to question.

[92] Request

Fort McKay requests that Teck attends a technical meeting to explain how successful using cyclones has been during all seasons.

[93] Water Use

Teck states:

> *…the strategy uses less water overall.*

This does not appear to be the case. The river water withdrawal requirements are similar although the 2015 plan requires more water at the outset.

[93] Request

Fort McKay requests that Teck provides evidence that water withdrawal requirements are similar to the 2011 Integrated Application plan.

[94] Rehanding Tailings

Teck states:

> *…rehandling of tailings is avoided (i.e., both to and from the thin lift drying area).*

This statement is correct; however, Teck will need to rehandle tailings from the ET Areas to the centrifuge.

[94] Request

Fort McKay requests that Teck attends a technical meeting to explain how it plans to avoid rehandling tailings from the ET Areas to the centrifuge.

[95] Thin Lift Drying Area

Teck states:

> *…challenges associated with operating a large thin lift drying area are removed.*

There are likely similar challenges with centrifuge discharge material.

[95] Request

Fort McKay requests that Teck clarifies its statement in relation to the possibility that there will be similar challenges with centrifuge discharge material.

[96] ETA Surface Reclamation

Teck states:

> *…the strategy enables progressive reclamation of the surface of an ETA during operations.*

While this might be true on an ETA, the overall pace of reclamation appears to be much slower for the revised program; for instance, at Year 20 in Table 13.5-7

(September 2011) Teck indicates a cumulative reclaimed area of 4798 ha whereas at Year 20 in Table 13.5-9 (June 2015) Teck indicates a cumulative reclaimed area of only 2257 ha, less than half as much.

[96] Request

Fort McKay requests that Teck attends a technical meeting to explain the overall reclamation pace.

[97] In-pit CFT Placement

Teck states:

> *…in-pit placement of CFT is better than ex-pit options because it eliminates long-term storage of treated fine tailings behind dams and provides a more robust reclamation landscape.*

This statement is puzzling. If one compares the external tailings areas of the original and revised projects the revised ETAs appear even larger than the original. Is this because of the plan to store both coarse combined tailings as well as fluid fine tailings to allow a supply of MFT to accumulate before centrifuge treatment into completed pit areas?

Fort McKay would like to see external tailings facilities reduced greatly or eliminated entirely and this revised plan does not accomplish this.

[97] Request

Fort McKay requests that Teck attends a technical meeting to explain how the revised plan could accomplish reducing or eliminating external tailings facilities.

In summary, Fort McKay cannot support the revised tailings management plan and would like to meet with Teck to discuss this program in further detail.

14.3 Tailings Management Key Concerns and Requests Summary

Table 14-1: Tailings Management Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category
[90]	Fines Treatment	Fort McKay requests that Teck attends a technical meeting to discuss the revised tailings management program.	Industry
[91]	Tailings Management Program	Fort McKay requests that Teck attends a technical meeting to explain the revised tailings management program and why Teck considers it an improvement.	Industry

Number	Fort McKay Key Concerns	Requests	Category
[92]	Cyclones	Fort McKay requests that Teck attends a technical meeting to explain how successful using cyclones has been during all seasons.	Industry
[93]	Water Use	Fort McKay requests that Teck provides evidence that water withdrawal requirements are similar to the 2011 Integrated Application plan.	Industry
[94]	Rehanding Tailings	Fort McKay requests that Teck attends a technical meeting to explain how it plans to avoid rehandling tailings from the ET Areas to the centrifuge.	Industry
[95]	Thin Lift Drying Area	Fort McKay requests that Teck clarifies its statement in relation to the possibility that there will be similar challenges with centrifuge discharge material.	Industry
[96]	ETA Surface Reclamation	Fort McKay requests that Teck attends a technical meeting to explain the overall reclamation pace.	Industry
[97]	In-pit CFT Placement	Fort McKay requests that Teck attends a technical meeting to explain how the revised plan could accomplish reducing or eliminating external tailings facilities.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

15. LAND AND RESOURCE USE

15.1 Context and Summary

There are no significant changes to Land & Resource Use in the Project Update.

15.2 Land and Resource Use Outstanding Key Concerns and Requests

Follow up commitments for all of Teck's SoC responses (SoC requests 169-176) are needed to ensure recorded follow through.

16. CONSERVATION AND RECLAMATION PLAN

16.1 Context and Summary

Fort McKay is a highly affected stakeholder and the primary long-term land user of the landscape within and surrounding the Frontier Project site. The community has a keen interest in ensuring that reclamation of industrial activities in its Traditional Territory occurs as quickly and effectively as possible. Reclamation should occur in such a way that it reduces the period of lost access to the Traditional Territory, and with a focus on restoration that supports the community's land-use needs.

The following points highlight areas of key concern in ensuring that this objective is achieved and that:

- reclamation at the Frontier Oil Sands Mine Project (Frontier Project) proceeds as quickly as possible;
- there is a consistent focus on reclamation goals centered on intended end land-use, and that Teck maintains communication with Fort McKay throughout the closure planning process to ensure that Fort McKay's land-use requirements and interests are considered; and
- reclamation areas are on a trajectory to become self-sustaining ecosystems that meet the stated end land-use objectives; and
- consistent monitoring and research programs are in place to verify that ecosystem trajectories are on target.

16.2 Conservation and Reclamation Plan Outstanding Key Concerns and Requests

[98] Reclamation Schedule Pace

Fort McKay expects that reclamation of the Frontier Project will proceed as quickly as possible in order to realize opportunities for direct placement of surface soil materials. Most of the planned reclamation for the Frontier Project (80%) is scheduled more than 20 years after initial mining development (2041 – closure).[28]

This reclamation schedule will limit direct-placement opportunities of soil materials for extensive areas of reclamation.

Rapid reclamation of disturbed areas is of critical concern to Fort McKay.

[98] Request

Fort McKay requests that Teck:

[28] Volume 1, Updated Application, Table 13.5-7, p.13-59 (PDF p. 438)

i. examines its mining and reclamation plans to identify all opportunities for progressive (accelerated) reclamation and direct soil placement; and

ii. consults with Fort McKay regarding any potential shifts in surface disturbances within the project footprint from the planned locations and that the appropriate regulatory bodies request assessment of direct and cumulative effects due to shifts in the planned locations and associated disturbances.

[99] – [101] Adaptive Management Framework

Teck states it is committed to an adaptive management approach to managing the success of its reclamation activities. This means that as best practices in reclamation evolve and improve over time through the monitoring of landscape performance and improvements in technology, all relevant improvements will be incorporated into future reclamation, monitoring and closure planning at the Frontier Project.

One of the specific elements of Teck's adaptive management program is to include "*specific key performance indicators that are consistent with those used in the Cumulative Environmental Management Association's (CEMA's) regional initiatives*";[29] however the Government of Alberta and industry have recently announced they will not support CEMA in the upcoming years and the organization will likely dissolve at the end of 2015.

Therefore, CEMA will likely not be in place to further best practices guidelines for oil sands mining into the future, and Teck will need to participate in other regional multi-stakeholder organizations to further these initiatives.

Preferably this type of regional work would engage industry, government and Aboriginal stakeholders in the process. Although Teck cites CEMA guidelines, Teck does not present clearly defined performance benchmarks against which to measure the adaptive management of its reclamation program.

Teck does not propose planned mitigations or initiatives to address the cumulative effects predicted for landscape diversity. The total active footprint for all oil sands mining activities as of September 2013 was 84,395 ha (Government of Alberta 2013).

Of this total disturbance, only 104 ha of reclaimed land have been certified in the 30+ years of oil sands mining in northeastern Alberta. Furthermore, there have been substantial delays in implementation of the Lower Athabasca Regional Plan and as a result, there is considerable uncertainty if this plan will adequately address and limit cumulative effects in the region.

It is essential that an adaptive management framework is defined to improve reclamation outcomes and to facilitate integrated closure planning for oil sands

[29] Volume 1, Updated Application, Section 13.3.4, pg. 13-11 (PDF pg. 390)

mines to address the cumulative effects of development on landscape diversity in Fort McKay's Traditional Territory.

[99] Request

Fort McKay requests that Teck participates in regional and local initiatives to develop key performance indicators to define and improve the adaptive management framework for the evaluation of regional reclamation success and pace in the Athabasca oil sands.

[100] Request

Fort McKay requests that an adaptive management framework for progressive reclamation and closure plan integration for oil sands mines is developed on a priority basis.

[101] Request

Fort McKay requests the opportunity to participate in development of an adaptive management framework as part of a regional initiative and that Teck is a leader in initiating this process with other mine operators in the region.

[102] – [103] Equivalent Land Capability

Incorporate Traditional Knowledge into Reclamation Planning

Teck indicates that developed lands will be reclaimed, for primary land users, to a land capability equivalent to what was present on the landscape before development of the Frontier Project.[30]

Teck, however, also acknowledges that regulatory trends are shifting away from a blanket application of equivalent land capability related to commercial forest fibre production and a linear view of soils and associated ecosystems as "better" and "worse", where upland soils are considered "better" due to their potential for high forest production. Instead, reclamation targets are moving towards focusing on target ecosites and ecosite phases as per the *Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region* (Alberta Environment 2010).

Fort McKay is concerned with protecting ecosystem integrity, restoring ecological diversity, and reclaiming capability of the post-reclamation landscape to support traditional uses. Throughout the course of continued development of the Frontier Project, traditional land-use opportunities will be reduced or eliminated on the

[30] Volume 1, Updated Application, Sections 13.1.2, 13.6.2.3

project landscape, and it is not clear how traditional land-use values will be addressed throughout the reclamation planning or implementation processes.

In particular, Fort McKay is concerned with the loss of peat-forming wetlands (11.3% of the PDA)[31] and the absence of reclamation plans in the Conservation, Closure and Reclamation (CC&R) Plan to re-establish peat-based ecosystems. As Teck acknowledges, there is no demonstrated research indicating that disturbed deep peat will recover naturally to functioning bog or fen ecosystems. As a result, Fort McKay views disturbance to deep peat areas as a significant, permanent long-term net loss to the traditional land-use capability of the project area.

In general, Fort McKay is concerned that the CC&R Plan does not adequately describe how the biological, physical and chemical processes that support land capability re-establishment for traditional uses will be restored to the post-reclamation landscape.

It is the view of Fort McKay community members that project approval should be contingent upon a detailed discussion of this type of information. Furthermore, Fort McKay community members should be a part of the process of developing reclamation certification and success criteria and long-term monitoring through community-based participatory research methods. Further research is required to develop criteria and indicators for reclamation certification and success to meet traditional land use objectives, as this is a current knowledge gap in the region.

Fort McKay has identified a number of Cultural Keystone Species (CKS) – species with high cultural salience that play an important role in Community identity. These species include: moose (*Alces alces*), beaver (*Castor canadensis*), ratroot (*Acorus americanus*), bog cranberry (*Oxycoccus oxycoccus*), lowbush cranberry (*Viburnum edule*) and blueberry (multiple species).

[102] Request

Fort McKay requests that Teck expressly considers its Cultural Keystone Species and their habitat during reclamation planning and develop a more detailed reclamation plan in collaboration with Fort McKay that will include explicit planning and methods that focus on reclamation for traditional land uses, including targeting traditional plant species and wildlife habitat.

[31] Volume 1, Application Update, Table 13.4-9, p. 13-28 (PDF p. 386): 3,295 ha peatlands/29,217 ha overall total PDA.

[103] Request

Fort McKay requests that Teck supports Fort McKay in funding research focusing on the development of criteria and indicators for determining reclamation certification and success for traditional land use objectives. Very little research is available on this topic, and Teck is in a unique position to partner with and support Fort McKay in moving forward this research for the region.

[104] Closure Landform Design

The planned-closure landscape is drastically different from the pre-disturbance landscape, as well as from adjacent undisturbed areas. There will be a significant increase in topographic relief, open-water wetlands, and a complete loss of peat-forming wetlands. Accompanying these changes, there will be significant constraints on the design of the post-closure landscape that will preclude a return to pre-disturbance conditions, including:

- the nature of mining and materials, which will lead to a significant increase in the total volume of material that must be stored onsite;
- hydrological restrictions due to a requirement that water onsite is treated and/or assessed prior to being released off-site; and
- difficulty in reclaiming self-sustaining peat-forming wetlands.

Within these constraints, the closure landscape should integrate with the surrounding environment, both directly across mine boundaries, and in a wider conceptual sense of forming a congruent landscape with a natural appearance that is characteristic of the region. To achieve this, closure landforms must integrate into the landscape aesthetically and support ecosystem function; they should be designed with the qualities of natural landforms in mind. Landforms in the closure plan developed by Teck have linear edges and are thus not characteristic of natural landforms in the region.[32]

Teck has provided a plan for closure landforms in its CC&R plan.[33] The plan states that drainage will be captured in "*drainage channels, shallow wetlands, constructed lakes, sedimentation lakes and pit lakes*".[34] The most notable feature of the post-closure landscape plan in comparison to the surrounding landscape is the lack of peat-forming wetlands.

It is understood that there is a current lack of certainty on the ability to restore self-sustaining peat-forming wetlands, but that lack of certainty applies to all

[32] Volume 1, Updated Application, Figure 13.6-3, p. 13-83 (PDF p. 441)

[33] Volume 1, Updated Application, Section 13.4.6.3, pp. 13-95-13-97 (PDF pp. 453-456)

[34] Volume 1, Updated Application, Section 13.6.4.2 (p. 13-92, PDF p.450)

reclamation outcomes, and should not preclude or deter efforts directed at peatland reclamation.

[104] Request

Fort McKay requests that Teck provides a detailed explanation of how the current landscape design plan will shift if restoration of peat-forming wetlands becomes possible.

[105] – [106] Mine Reclamation Materials Balance

Teck provides a reclamation materials balance as part of the CC &R plan.[35] The plan states that Teck has made adjustments to reclamation material balances in the updated application to reduce "*the amount salvaged and stockpiled while maintaining a large surplus of reclamation material*".

[105] Request

Fort McKay requests that Teck clarifies why it is reducing the amount of salvaged and stockpiled reclamation material and whether this corresponds to an increase in the volume of direct-placed (i.e., non-stored) reclamation material.

Teck also states that the Frontier mine will be progressively reclaimed over the course of the project's lifetime; however, the reclamation materials handling table indicates that only 25.7% of the reclamation material will be directly placed.[36] Additionally, only half of the mine disturbance will be reclaimed by 2052, 33 years after initial disturbance, with final reclamation taking place 62 years after initial disturbance.[37]

Fort McKay is concerned about the cumulative disturbance in its Traditional Territory increasing substantially due to the Frontier Project footprint and the length of time to final reclamation.

[106] Request

Fort McKay requests that Teck:

i. reduces the time gap between disturbance and reclamation;

ii. makes every effort to maximize direct placement of soils during reclamation; and

[35] Volume 1, Updated Application, Section 13.5.2.4, pp. 13-63, (PDF pg. 422)

[36] Volume 1, Updated Application, Table 13.5-10, p 13-65 (PDF p. 424); sum of total "Material Direct Placed"/sum of total "reclamation material salvage

[37] Volume 1, Updated Application, Figure 13.5-9, p. 13-62 (p. 420 of the PDF)

iii. ensures that Fort McKay plays a meaningful role in closure and reclamation planning so as to minimize the cumulative disturbance and loss of access in its Traditional Territory caused by Frontier mining operations.

[107] Reclamation Monitoring, Certification and Security

Community Capacity for Reclamation Monitoring

Teck discusses reclamation monitoring in the CC&R Plan, and commits to "*co-create Reclamation Working groups with potentially affected Aboriginal communities to guide more detailed reclamation planning and monitoring to determine reclamation success*."[38]

Fort McKay is the primary long-term land user in the region and a highly affected stakeholder. For these reasons, Fort McKay is extremely concerned with the restoration of ecological integrity on the project footprint and requests that the Community is provided the opportunity to participate in reclamation planning and monitoring to gain an understanding of how reclamation techniques are achieving the re-establishment of land capability to support traditional land uses.

[107] Request

Fort McKay requests involvement in the reclamation monitoring program throughout all phases of continued development at the Frontier Project site. Specifically, Fort McKay requests that Teck commits to:

i. developing a reclamation monitoring program that incorporates traditional knowledge to identify and evaluate indicators representing key elements of traditional uses and cultural practices; and

ii. developing an indigenous research monitoring program to evaluate the re-establishment of land capability to support traditional land uses, and to assist the community in building capacity (e.g., training, providing contracts, communication of results).

[108] – [109] Reclaimed Lands Certification

Given the project's location in Fort McKay's Traditional Territory, Fort McKay has great interest in the reclamation certification process.

[38] Volume 1, Project update, Section 13.9, p. 13-150(PDF p. 508)

[108] Request

Fort McKay requests that Teck supports Fort McKay's participation in reclamation certification application reviews and site inspections, and obtains Fort McKay's consent to any reclamation certification within its Traditional Territory.

[109] Request

Fort McKay requests that reclamation certification is not granted until such time as it can be conclusively demonstrated that ecosystem recovery is on a trajectory acceptable to Fort McKay, Teck and the regulators.

16.3 Conservation and Reclamation Plan Key Concerns and Requests Summary

Table 16-1: Conservation and Reclamation Plan Key Concerns and Requests Summary Table

Number	Fort McKay Key Concerns	Requests	Category
[98]	Reclamation Schedule Pace	Fort McKay requests that Teck: i) examines its mining and reclamation plans to identify all opportunities for progressive (accelerated) reclamation and direct soil placement; and ii) consults with Fort McKay regarding any potential shifts in surface disturbances within the project footprint from the planned locations and that the appropriate regulatory bodies request assessment of direct and cumulative effects due to shifts in the planned locations and associated disturbances.	Industry
[99]	Adaptive Management Framework	Fort McKay requests that Teck participates in regional and local initiatives to develop key performance indicators to define and improve the adaptive management framework for the evaluation of regional reclamation success and pace in the Athabasca oil sands.	Industry
[100]	Adaptive Management Framework	Fort McKay requests that an adaptive management framework for progressive reclamation and closure plan integration for oil sands mines is developed on a priority basis.	Industry
[101]	Adaptive Management Framework	Fort McKay requests the opportunity to participate in development of an adaptive management framework as part of a regional initiative and that Teck is a leader in initiating this process with other mine operators in the region.	Industry

Number	Fort McKay Key Concerns	Requests	Category
[102]	Equivalent Land Capability	Fort McKay requests that Teck expressly considers its Cultural Keystone Species and their habitat during reclamation planning and develop a more detailed reclamation plan in collaboration with Fort McKay that will include explicit planning and methods that focus on reclamation for traditional land uses, including targeting traditional plant species and wildlife habitat	Industry
[103]	Equivalent Land Capability	Fort McKay requests that Teck supports Fort McKay in funding research focusing on the development of criteria and indicators for determining reclamation certification and success for traditional land use objectives. Very little research is available on this topic, and Teck is in a unique position to partner with and support Fort McKay in moving forward this research for the region.	Industry
[104]	Closure Landform Design	Fort McKay requests that Teck provides a detailed explanation of how the current landscape design plan will shift if restoration of peat-forming wetlands becomes possible.	Industry
[105]	Mine Reclamation Materials Balance	Fort McKay requests that Teck clarifies why it is reducing the amount of salvaged and stockpiled reclamation material and whether this corresponds to an increase in the volume of direct-placed (i.e., non-stored) reclamation material.	Industry
[106]	Mine Reclamation Materials Balance	Fort McKay requests that Teck: i) reduces the time gap between disturbance and reclamation; ii) makes every effort to maximize direct placement of soils during reclamation; and iii) ensures that Fort McKay plays a meaningful role in closure and reclamation planning so as to minimize the cumulative disturbance and loss of access in its Traditional Territory caused by Frontier mining operations.	Industry
[107]	Reclamation Monitoring, Certification and Security	Fort McKay requests involvement in the reclamation monitoring program throughout all phases of continued development at the Frontier Project site. Specifically, Fort McKay requests that Teck commits to: i) developing a reclamation monitoring program that incorporates traditional knowledge to identify and evaluate indicators representing key elements of traditional uses and cultural practices; and ii) developing an indigenous research monitoring program to evaluate the re-establishment of land capability to support traditional land uses, and to assist the community in building capacity (e.g., training, providing contracts, communication of results).	Industry
[108]	Reclaimed Lands Certification	Fort McKay requests that Teck supports Fort McKay's participation in reclamation certification application reviews and site inspections, and obtains Fort McKay's consent to any reclamation certification within its Traditional Territory.	Industry

Number	Fort McKay Key Concerns	Requests	Category
[109]	Reclaimed Lands Certification	Fort McKay requests that reclamation certification is not granted until such time as it can be conclusively demonstrated that ecosystem recovery is on a trajectory acceptable to Fort McKay, Teck and the regulators.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

17. CULTURAL IMPACT ASSESSMENT

17.1 Context and Summary

Awareness of cultural impacts is not new to Fort McKay, but it is only recently that growing attention is being placed by government and industry on the effects that land disturbance is having specifically on cultural values and the ability of people to maintain their cultural practices and ultimately their social resiliency.

17.2 Cultural Impact Assessment Key Concerns and Requests

Teck indicated in a phone meeting with the FMSD on July 23, 2015 that Teck would support a Fort McKay-directed Cultural Impact Assessment (CIA). As such, Fort McKay is currently scoping a CIA including key issues, approach, timeframe and budget.

Teck agreed that any CIA findings would be considered throughout the life of the project. The methodologies for how this linkage would be made will be determined once the CIA is underway. In the Project Update, Teck indicated it is:[39]

> *…open to discussing opportunities to monitor indicators, such as avoidance by Aboriginal land users, or other effects to culture as identified in community cultural impact assessments in collaboration with Aboriginal communities.*

[110] Cultural Impact Assessment

[110] Request

Fort McKay requests support from Teck for a community-led Cultural Impact Assessment.

17.3 Cultural Impact Assessment Key Concerns and Requests Summary

Table 17-1: Cultural Impact Assessment Key Concerns and Requests

Number	Fort McKay Key Concern(s)	Requests	Category*
[110]	Cultural Impact Assessment	Fort McKay requests support from Teck for a community-led Cultural Impact Assessment.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

[39] Volume 3, Section 17.3.5.1

18. SOCIO-ECONOMIC

18.1 Context and Summary

Teck's socio-economic impact assessment update addressed the following topics:[40]

- economic and fiscal effects;
- population effects;
- community effects;
- project closure; and
- responses to Aboriginal community concerns.

Teck indicates that there were relevant changes to the project and additional information that was used in the assessment, including:

- a delay in the project timing and change in sequencing – construction in the Integrated Application was between 2030 and 2013, with four phases being constructed at the same time—the Project Update has Phase 1 constructed from 2019 to 2026 and Phase 2 starting construction in 2030 and production starting in 2037;
- temporal snapshots and workforce assessed include:
    - 2024 – construction of Phase 1
        - peak workforce 6400 people in 2024
        - due to schedules 4000 to 5,000 on-site at a time
    - 2026 – operation start of Phase 1
        - work force 2000 to 2300
    - 2038 – Phase 1 and 2 both operational
        - peak workforce 2800 people in 2036
        - additional workforce for Phase 2 is 600 to 800
- larger peak workforce but lower overall construction workforce;
- two peaks of construction workforces when Phases 1 and 2 are constructed instead of a 15 year continual construction period;
- cost of Teck constructing the Athabasca River bridge and east side access road (previously to be constructed by Shell for the Pierre River Mine, which is now delayed indefinitely);
- changes in planned projects and regional estimates;
- updated economic estimates;
- information on mitigation including fly-in/fly out with on-site camp and bussing;
- input from Aboriginal communities and third-party technical reviewers;

[40] Volume 1, Section 16

- additional baseline data, scientific information, previous SIRs (Rounds 1-4), regulatory changes and stakeholder input.

This review focuses on changes in socio-economic variables that are of interest and concern to the Fort McKay First Nation and that could affect its Aboriginal and Treaty rights. Teck indicates that it responds to specific Aboriginal community concerns and requests in Sections 16.4.4, 16.5.5, 16.7, 16.7.5, 16.7.7, 16.7.9 of the Socio-economic assessment.

18.2 Socio-Economic Outstanding Key Concerns and Requests

[111] Economics and Workforce

Teck estimates the Updated Project cost at $20.6 billion, which is 2.3 billion less than the cost estimate in the Integrated Application due to efficiencies in construction and mine and plant engineering optimization. Annually, Teck expects to spend $2.1 billion plus energy costs.

Due to changes in the timing and sequencing of the project there is an overall lower construction workforce but a higher peak workforce. There will be two peaks of construction workforces for Phases 1 (6300) and 2 (2800), with a five-year break in between instead of a 15-year continual construction period as was planned in the original Integrated Application.

During operations the workforce will be approximately 2500 people (1440 mine operations, 720 facilities, 340 management/general support).[41] Most of these will be direct Teck employees but there will be some contractors.

Teck provides data on predicted municipal, provincial and federal fiscal effects.[42] Teck indicates that it expects economic and employment benefits will result in approximately $592 million of total construction spending, and $219 million annually in operation spending to the study area from wages and contractor income.[43]

Teck does not specify estimated fiscal benefits for individual Aboriginal communities. Teck makes some general commitments regarding measures to maximize benefits for local business including working with Aboriginal communities on procurement policies, Aboriginal employment and business development polices and workforce development.

[41] Volume 1, Section 16.3

[42] Ibid.

[43] Volume 1, Section 16.8.1

[111] Request

Fort McKay requests that Teck works with Fort McKay to establish specific fiscal targets for business opportunities and Community-specific processes to enhance workforce and training.

[112] Community-specific Socio-economic Information

Teck stated that several Aboriginal communities have requested that Teck provides community-specific socio-economic information.[44] Fort McKay had also requested this in its review of the Integrated Application, including a request for a pre-development socio-economic baseline to be part of the assessment.

Teck did not provide a pre-development socio-economic assessment for Fort McKay and states, with regard to Aboriginal communities' requests that "*many of the information requests represent a level of analysis beyond the broadly applicable regional considerations required for the regulatory filing that the Project Update comprises".*

Teck does commit to working with individual communities to work on specific interest areas that are either directly affected by project-related activities or are affected through cumulative activities and broader trends such as a rapid transition from a traditional to a wage-based economy and a changing social and environmental landscape in the region. Teck is also in ongoing discussion with potentially affected Aboriginal communities regarding their specific socio-economic concerns and interests with regard to the effects of oil sands development on Aboriginal culture.

Teck also commits to funding Community-led cultural impact assessments.[45]

Fort McKay does not agree that community-specific socio-economic assessments are beyond what is applicable to Teck's regulatory filing. As the Community of Fort McKay is located nearest to the project and is most strongly impacted socio-economically, it is appropriate to provide a community-specific socio-economic assessment.

[112] Request

Fort McKay requests that Teck consults with Fort McKay on socio-economic issues, identifying key information gaps, supporting a community-led collection of socio-economic information, as needed, and jointly developing with Fort McKay appropriate socio-economic mitigation measures and strategies.

[44] Volume 1, Section 16.7.2

[45] See Section 17of this review

[113] Fly in/Fly out

Teck will fly-in and out most of its employees. While fly-in/fly-out reduces road traffic it does also result in regular noise from aircraft, which can affect the Community and Fort McKay's Traditional Territory.

> ***[113] Request***
>
> Fort McKay requests that Teck considers the Community of Fort McKay when developing its flight patterns to avoid community overflight where feasible.

[114] Traffic Volumes and Road Maintenance

Teck indicates that "*Aboriginal communities have requested further information on Project-related traffic volume estimates and mitigation related primarily to Highway 63 and the Fort Chipewyan winter road north of Fort McKay*".[46] Traffic estimates are presented in Section 16.5.5 and indicate an increase in annual average traffic of 33% south of Fort McKay and 27% north of Fort McKay.

Teck makes the following commitment:

> *Commitment to support maintenance and upgrading of Highway 63 from Fort McKay to Fort Chipewyan – Teck is committed to providing funding to assist in the maintenance and safety of applicable segments of the road affected by the Project. Teck has not yet undertaken discussion with the RMWB regarding road maintenance and safety, but plans to as Project development advances.*

> ***[114] Request***
>
> Fort McKay requests that Teck affirms its commitment to consult with Fort McKay regarding traffic safety issues and concerns and the timing and specifics of Highway 63 maintenance and upgrading.

[115] On-site Lodge

There will be a worker lodge and most employees will fly in/fly out. Teck's winter drilling camp would be used initially for construction workers while the on-site lodge is constructed. The construction lodge is expected to house 1500 people by 2022 and to be completed by 2023, with a capacity of 4000 to 5000 people.[47]

[46] Volume 1, Section 16.7.3.2

[47] Volume 1, Section 16.3.6.2

[115] Request

Fort McKay requests that Teck continues to consult with Fort McKay on social, cultural and traditional land use issues related to the presence of worker camps.

[116] Population Change and Infrastructure Effects

Teck estimated that cumulative development in the region will result in a growth within the Community of Fort McKay of 4.4% per year. In terms of project-specific effects Teck did not view the project as contributing directly to population growth within Fort McKay, although it states that business and employment opportunities might assist people in remaining in the community and might attract former residents back to the community.

In terms of regional impacts on infrastructure and services Teck listed the type of stresses that can occur on infrastructure and services within Rural and Aboriginal communities but does not provide Community-specific information.[48] It also indicated that the economic gains associated with business opportunities can provide increased community revenues for infrastructure.

Teck made the following commitment:

> *Teck plans to continue providing direct support to community initiatives through its social investment programs. These programs contribute towards the long-term sustainability of communities in the region, and intended to positively contribute to the quality of life in communities, including those community members unable to directly participate in employment and contracting activities of the Project.*

Teck discussed, very generally, the stresses associated with increased demand for infrastructure and some of the potential infrastructure benefits; however, more detail is needed at the Community level.

[116] Request

Fort McKay requests that Teck works with Fort McKay to understand the specific community-level stressors regarding infrastructure and services and to develop, with Fort McKay, appropriate social investments and initiatives to mitigate these impacts.

[48] Volume 1, Section 16.7.3.4

[117] Community Sustainability

In the Aboriginal and Stakeholder Consultation section,[49] Teck indicates that it is corporately committed to sustainability and that this is focused on six key areas:

- biodiversity,
- energy,
- community,
- water,
- materials stewardship and
- our people.

Fort McKay is pleased to see Teck's focus on community sustainability. As described in Fort McKay's cultural heritage assessment baseline (Fort McKay Industry Relations Corporation 2010), environmental, social and cultural aspects of community sustainability are linked.

[117] Request

Fort McKay requests that Teck works with Fort McKay on developing mitigation measures and initiatives that focus on Community sustainability including social, health and cultural aspects of Community sustainability. A Cultural Impact Assessment is a key study needed to understand project impacts and cumulative development on social resiliency and culture and to develop appropriate mitigation to offset impacts (see Request [110]).

18.3 Socio-Economic Key Concerns and Requests Summary

Table 18-1: Socio-Economic Key Concerns and Requests Summary Table

Number	Fort McKay Key Concern(s)	Requests	Category*
[111]	Economics and Workforce	Fort McKay requests that Teck works with Fort McKay to establish specific fiscal targets for business opportunities and Community-specific processes to enhance workforce and training.	Industry
[112]	Community-specific Socio-economic Information	Fort McKay requests that Teck consults with Fort McKay on socio-economic issues, identifying key information gaps, supporting a community-led collection of socio-economic information, as needed, and jointly developing with Fort McKay appropriate socio-economic mitigation measures and strategies.	Industry

[49] Volume Section 17.7

Number	Fort McKay Key Concern(s)	Requests	Category*
[113]	Fly in/Fly out	Fort McKay requests that Teck considers the Community of Fort McKay when developing its flight patterns to avoid community overflight where feasible.	Industry
[114]	Traffic Volumes and Road Maintenance	Fort McKay requests that Teck affirms its commitment to consult with Fort McKay regarding traffic safety issues and concerns and the timing and specifics of Highway 63 maintenance and upgrading.	Industry
[115]	On-site Lodge	Fort McKay requests that Teck continues to consult with Fort McKay on social, cultural and traditional land use issues related to the presence of worker camps.	Industry
[116]	Population Change and Infrastructure Effects	Fort McKay requests that Teck works with Fort McKay to understand the specific community-level stressors regarding infrastructure and services and to develop, with Fort Mckay, appropriate social investments and initiatives to mitigate these impacts.	Industry
[117]	Community Sustainability	Fort McKay requests that Teck works with Fort McKay on developing mitigation measures and initiatives that focus on Community sustainability including social, health and cultural aspects of Community sustainability. A Cultural Impact Assessment is a key study needed to understand project impacts and cumulative development on social resiliency and culture and to develop appropriate mitigation to offset impacts (see Request [111]).	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

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Frontier Oil Sands Mine Project Update

Key Concerns and Requests Summary Table

Appendix A

Number	Fort McKay Key Concern(s)	Requests	Category*
Cumulative Effects			
[1]	Cumulative Effects Assessment	Fort McKay requests that Teck supports, with funding and data, an ongoing and updated cumulative-effects assessment of impacts on Fort McKay's Traditional Territory and rights so that constructive and decisive measures can be developed to address cumulative effects within Fort McKay's Traditional Territory.	Industry
[2]	Cumulative Effects Assessment	Fort McKay requests that Teck develops and implements, in collaboration with Fort McKay, in a Working Group created by Teck, follow-up programs and monitoring that specifically determine if the EIA projections and assumptions are valid and accurate and if proposed mitigation is effective.	Industry
Access Management			
[3]	Access Management Plan	Fort McKay requests that Teck develops and finalizes an access management plan (AMP) in consultation with Fort McKay, and that it includes mitigations to concerns expressed by Fort McKay in order to meaningfully practice traditional activities.	Industry
Traditional Land Use			
[4]	Mitigation Monitoring	Fort McKay supports the above measures listed by Teck in Section 17.6.3 of the Project Update and requests that Teck commits to ensuring that it monitors, follows-up and tracks these commitments to the satisfaction of Fort McKay throughout the project's life.	Industry
[5]	Reclamation	Fort McKay would like to collaborate with Teck to develop a mitigation and an offset plan in relation to the adverse effects and loss of key cultural and traditional use areas that would be affected by the plan in the Frontier Project Update.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[6]	Reclamation	Fort McKay requests that Teck: iii) formalizes a process with Fort McKay outlining how Community input would be part of a jointly developed reclamation criteria development for the Teck Frontier mine; and iv) supports Aboriginal involvement in developing reclamation criteria in regional committees and research organizations. Fort McKay also requests assurance from the provincial and federal governments that reclamation criteria will be developed with Aboriginal involvement with the Teck lease and will be binding and upheld during the reclamation certification process and once Teck has returned the land to the Crown.	Industry Government Agencies
[7]	Access	Fort McKay requests that Teck formalizes an agreement with Fort McKay to support developing an access management plan on the West side of the Athabasca River than takes into consideration the bridge across the Athabasca River that Teck is proposing in the Project Update.	Industry
[8]	Trappers	Fort McKay requests that Teck establishes access management plans, in collaboration with Fort McKay, to facilitate Fort McKay community member access to traplines and other traditional use areas throughout the life of the mine.	Industry
[9]	Trappers	Fort McKay requests that Teck confirms it will continue ongoing consultation with affected trappers regarding project development and provide compensation or implement mitigation measures as needed following the Fort McKay Trapper Compensation Guidelines.	Industry
Wildlife			
[10]	Wildlife Surveys	i) Fort McKay requests that AMERA validates breeding bird and wildlife survey data and presents the results to Fort McKay for review.	Government Agencies
[11]	Wildlife Surveys	ii) The term “comparable” does not express the expected scientific rigour considering the amount of survey data collected. Fort McKay requests a more scientific description (i.e., statistics) of how the bird and wildlife community compares to other areas of the RSA. Information should include population parameters, community diversity measures, and changes over time, if detected.	Industry

*Request Categories:

Government Agencies – Fort McKay’s request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[12]	Wildlife Surveys	iii) Teck has completed several years of wildlife surveys yet it is unclear if enough data has been obtained to meet the baseline survey objectives. Fort McKay requests that Teck completes an analysis to ascertain if sufficient surveys have been completed to determine if all wildlife species have been detected (e.g., analyze cumulative observations of species per visit) and if survey effort has been sufficient to confirm the absence of species of concern. Fort McKay also requests that Teck shares the survey data with Fort McKay.	Industry
[13]	Wildlife Surveys	iv) Fort McKay requests that Teck reviews the scientific rigour of the bird survey methods it employed in comparison to current EIA guidelines (requirement for replication of surveys). Fort McKay wishes to understand the scientific limits of the methods used by Teck and the potential need for additional field work.	Industry
[14]	Wildlife Surveys	v) Teck has delayed the mine development. Fort McKay requests that through the work already done and in progress at the Roland Lake Bison Heard Technical Team Teck uses the best and most recent data and information available to redefine the bison herd boundary and study areas and reanalyze impacts to bison.	Industry
[15]	Wildlife Surveys	vi) Fort McKay is concerned about bison, it is a traditional use species and its sustainable populations are important for Fort McKay's exercise of its Aboriginal and Treaty rights. Fort McKay requests that Teck addresses sample size issues with regard to monitoring impacts on bison.	Industry
[16]	Wildlife Surveys	vii) Fort McKay requests further discussion with Teck on the extent of the wallow surveys and if they extended into the LSA and how the presence of wallows might be indicative of bison distribution and seasonal land use.	Industry
[17]	Wildlife Assessment	viii) Fort McKay requests that Teck provides a more detailed explanation for no longer using RNV in the EIA to evaluate environmental consequence. In addition, Fort McKay would like to know how removing RNV improves the EIA.	Industry
[18]	Wildlife Assessment	ix) Fort McKay requests that Teck becomes an active participant in CEMA or other multi-stakeholder organizations that include Aboriginal participation regarding wildlife issues.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[19]	Wildlife Assessment	x) Fort McKay is concerned that Teck limited the scope of connectivity analysis based on female caribou data. Fort McKay requests that Teck ensures connectivity of caribou populations in the three caribou ranges near the project by securing movement corridors.	Industry
[20]	Wildlife Health Assessment	xi) The wildlife health assessment predicts that the project will not adversely affect wildlife. Fort McKay community members will be skeptical of the results. Teck should consider writing a plain-language wildlife health assessment for the public and the non-expert readers. Teck should also be prepared to explain the wildlife health assessment to the Community of Fort McKay.	Industry
[21]	Wildlife Health Assessment	xii) Fort McKay requests that Teck describes the model validation for the wildlife health assessment models and develops a monitoring program to confirm model predictions on wildlife.	Industry
[22]	Wildlife Health Assessment	xiii) Fort McKay requests that Teck provides references for the weights of wildlife species used in the wildlife health assessment and confirms that they are representative of wildlife found in the LSA.	Industry
[23]	Wildlife Health Assessment	xiv) There is a discrepancy in the diets of the wolverine used in the Teck updated EIA (wildlife health and wildlife habitat assessments). This would change the predicted wolverine habitat use and chemical exposure through ingestion. The correct diet should be determined and the assessment predictions adjusted.	Industry
[24]	Mitigation and Monitoring	xv) Fort McKay requests that Teck summarizes the scientific support for the planned underpass dimensions for maintaining connectivity. In addition, Fort McKay requests that Teck discusses other options to allow wildlife passage and connectivity in the Athabasca River corridor such as additional underpasses, overpasses, and alternate bridge designs. The feasibility and costs of options should also be discussed.	Industry
[25]	Mitigation and Monitoring	xvi) Fort McKay requests that Teck provides additional detail on the monitoring methods that will be used to determine the passageway's effectiveness and maintenance of connectivity in the Athabasca River corridor. Teck's response should include a power analysis (e.g., to determine the number of required cameras) and a contingency plan if the underpass is not effective (e.g., installing overpasses and underpasses).	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[26]	Mitigation and Monitoring	xvii) Fort McKay requests that Teck develops a scientifically robust WMMP prior to project approval. Fort McKay restates its requests to be involved in the WMMP's development.	Industry
Noise			
[27]	Noise Complaint Process	Fort McKay requests that Teck supports establishing a Noise Complaint Process that will hear and respect Community complaints around audible noise.	Industry
[28]	Best Practice beyond Directive 038	Fort McKay requests that Teck will work with the Community of Fort McKay to mitigate impacts of audible noise, even though it might be in compliance with AER Directive 038.	Industry
Air Quality			
[29]	Acid Deposition and Effects	xviii) Fort McKay requests that Teck and AER acknowledge that fugitive-dust related base cation emissions cannot be used in offsite PAI calculations as the expectation is that there will be no or minimal offsite dust deposition.	Industry Government Agencies
[30]	Co-generation NOx Emission Limits	xix) Fort McKay requests that Teck and the regulators acknowledge that Fort McKay considers that BATEA for co-generation units is SCR and Fort McKay cannot support the NOx emission limits currently being proposed by Teck for its co-generation units.	Industry Government Agencies
[31]	Co-generation NOx Emission Limits	xx) Fort McKay requests that the regulators acknowledge that no NOx approval limits should be set for the co-gen units at this time and if an *EPEA* approval is issued for the project it should indicate that NOx emission limits will established for these units when design details for the unit are being finalized and equipment procurement is planned to occur within a year period.	Government Agencies
[32]	Compliance or Attribution Continuous Ambient Air Quality Monitoring Requirements	xxi) Fort McKay requests that Teck confirms that regardless of regulatory requirements Teck will install a continuous ambient air monitoring station between its central processing facility and Fort McKay and will consult with Fort McKay on the exact siting of this station.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[33]	Air Emission and Ambient Air Monitoring	xxii) Fort McKay requests that Teck confirms with Fort McKay its expectations regarding support for and participation on CEMA and WBEA and that this issue is addressed in any Environmental Agreement the Community enters into with Teck.	Industry
Groundwater			
[34]	Seepage Control System	Fort McKay requests that Teck provides the opportunity to review annually performance reports on the seepage control wells and estimates of the percent of process-affected seepage captured by the wells.	Industry
[35]	Seepage Control System	xxiii) Fort McKay requests that Teck consults with the Community on whether or not it is considered feasible to install the interceptor trench earlier, i.e., before operations cease, if there are indications of process-affected seepage flowing downgradient of the interceptor wells that might travel beyond the proposed location of the interceptor trench by the time of closure.	Industry
[36]	Seepage Control System	xxiv) Since far future seepage modelling suggests the potential for off-site migration to the southeast of the ETAs, Fort McKay requests that Teck considers the alternative of continuing to operate the active hydraulic control system (i.e., with pumping wells) for a longer period of time beyond operations.	Industry
Hydrology/Surface Water			
[37]	Athabasca River and Tributary Water Use	Fort McKay requests that Teck drops all plans for using tributary water as a fresh water source and obtains its entire fresh water supply from the Athabasca River.	Industry
[38]	Athabasca River and Tributary Water Use	Fort McKay requests that, should Teck not change its Water Act application, AER deny Teck's proposal to use pristine water from tributaries and diversion channels associated with the Frontier Project.	Government Agencies
[39]	Athabasca River and Tributary Water Use	Fort McKay requests that Teck ensures that all pristine water in the stream diversion system is diverted around the project and not through the OSSP situated in the Unnamed Creek 2 valley.	Industry
Water Quality, Fish and Fish Habitat			
[40]	Process Water Seepage	Fort McKay requests that Teck provides contingency plans and potential mitigation if the barrier walls and seepage capture of the External Tailings Areas do not perform as anticipated in preventing seepage from contaminating groundwater and surface waters.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[41]	Process Water Seepage	Fort McKay requests that Teck assesses the potential impacts of discharging up to 40 L/s (3500 m^3/d; Figure 7-13) of process-affected seepage to the fish habitat compensation lake.	Industry
[42]	Surface Water and Sediment Quality	Fort McKay requests that Teck adds dibenzothiophene in sediments to the list of monitored substances for any watercourses downstream of the project, plus sediments of pit lakes and the FHCL.	Industry
[43]	Surface Water and Sediment Quality	Fort McKay requests that Teck provides assurance that the analytical laboratories contracted for water and sediment analyses are capable of achieving detection limits at criteria intended to protect aquatic life.	Industry
[44]	Muskeg and Overburden Drainage - Mercury	Fort McKay requests that Teck models mercury and methylmercury loadings to the FHCL and any downstream waters, including the Athabasca River, considering uptake by piscivorous fish. Models should consider the potential methylmercury production and augmentation of mercury export by muskeg and overburden drainage activities under both the Application and Planned Development (cumulative impact) cases.	Industry
[45]	Pit Lake Residual Toxicity and Research	Fort McKay requests that Teck commits to ongoing participation in pit lake research, including studies of bottom sediments and possible contaminants transfer through the aquatic food chain, as well bioturbation and wind-induced sediments resuspension.	Industry
[46]	Pit Lake Residual Toxicity and Research	Fort McKay requests that Teck provides results and/or reports on any studies into pit lake sediments and transfer of contaminants to aquatic food webs.	Industry
[47]	Pit Lake Residual Toxicity and Research	Fort McKay requests that Teck provides further discussion about the fate and transport of napthenic acids and PAHs over time in its pit lakes, and discuss those substances that are expected to exceed effects benchments, notably in sediments.	Industry
[48]	Derivation of Site-Specific Guidelines	Fort McKay requests that Teck accepts published CCME guidelines for all substances for which they are available until such time as CCME or a provincial government agency evaluates and approves the newly-derived CEBs presented by the company.	Industry
[49]	Derivation of Site-Specific Guidelines	Fort McKay requests that Teck provides a tabulated comparison of CCME guidelines to its site-specific guidelines (CEBs) for those substances where guidelines exist.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[50]	Derivation of Site-Specific Guidelines	Fort McKay requests that Teck address the potential impact and toxicity of mixtures of contaminants that might all occur simultaneously.	Industry
[51]	Aerial Emissions and Snowmelt Concentrations	Fort McKay requests that Teck provides an update of the cumulative impacts of aerial emissions in surface waters, including any further snow survey results.	Industry
[52]	Aerial Emissions and Snowmelt Concentrations	Fort McKay requests that Teck commits to sharing with the Community snowmelt data that exceed water quality guidelines, as soon as possible, not just upon request.	Industry
[53]	Loss of Traditionally Significant Surface Waters	Fort McKay requests that Teck meets with Fort McKay to discuss how it might support the Community with access to and preservation of special places, including but not limited to, habitation sites in the Frontier Project lease and the Moose Lake area.	Industry
[54]	Fish Rescue from Destroyed or Diverted Streams and Lakes	Fort McKay requests that Teck confirms that it will rescue all fish species from all aquatic habitats that will be destroyed or diverted, that support fish during any season, and that it will not limit the rescue operations to only those waters that support large-bodied fish species.	Industry
[55]	Tissue Residue Guideline - Mercury	Fort McKay requests that Teck provides justification and further information about the source of information, species and size of fish that show a current concentration that is very low (0.058 mg/kg), and that presumably was used in the prediction of a future concentration that is correspondingly low.	Industry
[56]	Tissue Residue Guideline - Mercury	Given that Teck's calculation of future fish tissue residue for mercury under the application case is close to seven times higher than the current level, Fort McKay requests that Teck addresses impacts to wildlife consumers of fish that might be caused (the future predicted level is more than ten times higher than the TRG to protect wildlife consumers of aquatic biota).	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[57]	Accounting for Residual Impacts on Fish Abundance and Productivity	Fort McKay requests that Teck: i) clarifies statements that indicate effects on fish abundance are not anticipated in the aquatics LSA, when it is known that the compensation lake will not likely account for all losses in the LSA; ii) provides values and percent reduction of low flows (e.g., 7Q2, 7Q10) in addition to reduction in mean annual flows, including whether there might be occasions when there is no flow in these watercourses compared to the current scenario, since fish might occur in the lower reaches of Big and Redclay creeks during any open water season; iii) identifies which species will lose habitat in Big Creek and Redclay Creek that will not benefit from the compensation lake; iv) justifies ranking residual effects to fish as 'reversible' and 'medium duration' when the timespan to reversibility spans several generations of most species; and v) discusses possible mitigative solutions that might provide additional instream flow needs to these watercourses rather than gradually diminishing flows over the course of operations, given the cause of lost habitat in lower Big and Redclay creeks is lack of flow (due to withheld or re-directed water).	Industry
[58]	Pit Lakes as Fish Habitat	Fort McKay requests that Teck further explains the functionality as fish habitat and planned incorporation into local ecosystems of its large end pit lakes that will be located far from fish that might naturally colonize them.	Industry
[59]	Fish Habitat Offsetting Plans	Fort McKay requests that Teck summarizes how its calculations (HADD versus "serious harm to fish") related to fish habitat offsetting might have changed for the Updated project scenario as a result of recent amendments to the Fisheries Act (input values, not compensatory plans).	Industry
[60]	Access Management Plans	Fort McKay requests that Teck consults with the Community about access to lands and waters in the project area.	Industry
[61]	Climate Change Impacts to Project	Fort McKay requests that Teck specifically discusses how climate change in addition to industrial demand might reduce or impact water availability for its project and for fisheries in the Athabasca River mainstem and project-area tributaries.	Industry

*Request Categories:

Government Agencies – Fort McKay's request to the regulators, including information requests, regulatory requirements and approval conditions (if the project is ultimately approved).

Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[62]	Consultation – Bridge and Monitoring	Fort McKay requests that Teck consults with them about navigation and fisheries concerns and offsets related to the Athabasca Bridge.	Industry
[63]	Consultation – Bridge and Monitoring	Fort McKay requests that Teck consults with them about all project-specific aquatic monitoring plans, including community-based monitoring (CBM).	Industry
Vegetation and Wetlands			
[64]	Wetlands	Fort McKay requests that Teck develops and participates in research programs focused on wetland reclamation, with an emphasis on peat-forming wetlands (bogs and fens).	Industry
[65]	Wetlands	Fort McKay requests that Teck develops best management practices for peatlands in a multi-stakeholder group (in CEMA or in a group similar to CEMA) acceptable to Fort McKay that allows for participation by Fort McKay.	Industry
[66]	Wetlands	Fort McKay requests that Teck follows up-to-date wetland reclamation guidelines: the Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region, 2nd Edition (Alberta Environment 2010), and the Guideline for Wetland Establishment on Reclaimed Oil Sands Leases (Alberta Environment 2008).	Industry
[67]	Wetlands	Fort McKay requests that Teck includes Fort McKay in the development and review of wetland monitoring programs. These monitoring programs should focus on wetlands adjacent to the Planned Development Area (PDA) to assess the effects of potential hydrologic alterations to intact wetlands adjacent to the mine disturbance. In addition, a program should be designed and implemented to mitigate any wetland effects that occur.	Industry
[68]	Wetlands	Fort McKay requests that organic soils are salvaged where possible and that direct placement of these soils is implemented in locations that have a high potential for peatland reformation.	Industry
[69]	Traditional-use Plant Potential	Fort McKay requests that Teck engages Fort McKay in collecting Traditional Use plant seeds that Teck plans to collect from the surrounding project area for reclamation purposes. Fort McKay requests that Teck collects plant seeds, including fungi and lichen in addition to the tree and shrub seeds Teck already plans to collect.	Industry

*Request Categories:

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Industry – a deficiency or question on which Fort McKay requests that a response of additional information from Teck is provided to Fort McKay and the regulators, prior to the application being deemed complete by the regulators.

Number	Fort McKay Key Concern(s)	Requests	Category*
[70]	Traditional-use Plant Potential	Fort McKay requests that Teck provides support to Fort McKay to continue traditional plant research within the community. This would include: field verification of the traditional use plant list, including both scientific and traditional names; documentation of all ecosites in which the plant grows; and, documentation and field verification of preferred ecosites/habitats for harvesting the plant. This research would include all plants, including fungi and lichen.	Industry
[71]	Traditional-use Plant Potential	Fort McKay requests that Teck: vi) commits to engaging Fort McKay following established community protocols to ensure that appropriate and culturally relevant species are used in revegetation planning for reclamation of ecosystems that support traditional land uses – details on how this engagement/collaboration will occur should be outlined in an agreement; vii) provides a formal plan that describes how it will protect and reclaim traditional plant species in collaboration with the Fort McKay community and specifically defined traditional use end land-use targets in the reclamation plan; and, provides a formal plan that describes how research on traditional-plant species and other ecosystem elements will be developed and supported and/or synthesized to produce functional reclaimed landforms and landscapes with equivalent traditional-use capability.	Industry
[72]	Traditional-use Plant Potential	Fort McKay requests that Teck engages in an active on-site research and trial reclamation program to develop techniques for: viii) re-establishing native shrub and groundcover species identified as traditional-use plant species on reclaimed areas, and the reclamation and conservation of fen and bog land-cover classes that will be eliminated on the Frontier Project footprint.	Industry
[73]	Traditional-use Plant Potential	Fort McKay requests that Teck endeavours to reclaim the land so that the reclaimed soils and landforms are capable of supporting self-sustaining, locally common boreal forests, regardless of the end land use, and so that the maximum number of pre-disturbance ecosites is present.	Industry
[74]	Non-native and invasive species	Fort McKay requests that Teck implements a monitoring and control program for non-native and invasive species during the project's construction, operation, reclamation and closure phases to ensure that these species do not invade disturbed sites and compete with native species.	Industry

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Number	Fort McKay Key Concern(s)	Requests	Category*
[75]	Non-native and invasive species	Fort McKay requests that Teck avoids any seed mixes that include non-local and non-native species for erosion control, to reduce the potential for introducing persistent grass species and to ensure that the natural recovery of vegetation communities on site is returned to those of pre-disturbance conditions. Furthermore, BMP 15 in Alberta Environment and Water (2012) indicates that the use of seed mixes should be avoided to preserve propagule diversity and integrity (Alberta Environment and Water 2012). If a seed mix is used, Fort McKay requests that the seed mix contains only native species local to the project area.	Industry
[76]	Non-native and invasive species	Given the relative lack of opportunity for direct placement of surface soils in the Frontier reclamation plan, Fort McKay requests that Teck develops and implements a reclamation material stockpile revegetation specifically designed to re-establish a diversity of native vegetation species and to develop a propagule (seed, root) bank in these stockpiles. This bank might then aid in natural regeneration of vegetation upon placement of these materials. Stockpile configuration and use could be designed to optimize this strategy. Fort McKay requests that the results of this planning and implementation are reported to Fort McKay.	Industry
[77]	Non-native and invasive species	Fort McKay requests that excess slash and non-merchantable timber are saved, either in soil stockpiles, or in separate slash/non-merchantable timber stockpiles and replaced as coarse woody debris and slash on the reclaimed sites.	Industry
Biodiversity			
[78]	Biodiversity	Fort McKay requests that Teck commits to establishing a biodiversity research and monitoring program to better understand changes in biodiversity on reclaimed sites over time and assesses how to increase biodiversity on the post-reclamation landscape.	Industry
[79]	Biodiversity	Fort McKay requests that Teck defines goals for re-establishing biodiversity and appropriate reclamation techniques such that biodiversity in the post-reclamation landscape is equivalent to the pre-mining landscape. 'Equivalent' should be defined in terms of ecosite types and not equivalent land capability as measured by forest productivity.	Industry

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Number	Fort McKay Key Concern(s)	Requests	Category*
Human Health			
[80]	Chemical Mixtures and Synergism	Fort McKay requests that Teck presents clear justification for not including potential synergism in its HHRA and comments on whether potential synergism could occur within the identified CofC and other chemicals already present in the regional air and water sheds and further explains how the exclusion of synergism supports conservatism claimed throughout the HHRA approach.	Industry
[81]	Community Wellness	Fort McKay requests that Teck provides evidence whether or not the HHRA has taken into consideration community concerns on industrial impacts on health and wellness, e.g., issues related to drugs, alcohol or cultural integrity.	Industry
[82]	Community Wellness	Fort McKay requests that Teck undertakes a risk assessment on the likely health impacts on all determinants of health from the Project Update. Fort McKay also requests that Teck considers the value of a more holistic approach to human health risk assessment using an established Health Impact Assessment approach and adopts results of a HIA in evaluating the human health impacts of the proposed Frontier Mine Project.	Industry
[83]	Community Wellness	Fort McKay requests that Teck constructively discusses with Fort McKay strategies to effectively communicate health risks associated with the proposed Frontier Mine Project to mitigate health concerns and fear within the Community of Fort McKay.	Industry
[84]	Health Programs	Fort McKay requests that Teck constructively discusses with Fort McKay ways to explore what programs could be supported or devised to promote health so as to offset potential negative health impacts of the proposed project resulting from a more comprehensive HIA.	Industry
[85]	Regional Multi-stakeholder Groups	Fort McKay requests that Teck constructively participates in and supports existing and future environmental and health management and monitoring programs within the region including WBEA and CEMA.	Industry
[86]	Cancer	Fort McKay requests that Teck provides further details on the Alberta Cancer Board's assessment of rare cancers in the community of Fort Chipewyan, in particular, providing an numerical estimate of the observed versus expected rates of cholangiocarcinoma.	Industry
[87]	Cancer	Fort McKay requests that Teck provides a rationale to explain the excess cholangiocarcinoma in the region, and in particular if environmental causes are to be dismissed, provides an acceptable rationale and an acceptable alternative hypothesis.	Industry

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Number	Fort McKay Key Concern(s)	Requests	Category*
[88]	Cancer	Fort McKay requests that Teck provides support to investigate further the potential causes of cholangiocarcinoma in the region, with a specific focus on risks to the Community of Fort McKay.	Industry
[89]	Regional Multi-stakeholder for Human Health	Fort McKay requests that Teck constructively supports initiation or progression of a regional multi-stakeholder initiative to explore recognizing and managing indirect health impacts of industrial development on human health.	Industry
Tailings Management			
[90]	Fines Treatment	Fort McKay requests that Teck attends a technical meeting to discuss the revised tailings management program.	Industry
[91]	Tailings Management Program	Fort McKay requests that Teck attends a technical meeting to explain the revised tailings management program and why Teck considers it an improvement.	Industry
[92]	Cyclones	Fort McKay requests that Teck attends a technical meeting to explain how successful using cyclones has been during all seasons.	Industry
[93]	Water Use	Fort McKay requests that Teck provides evidence that water withdrawal requirements are similar to the 2011 Integrated Application plan.	Industry
[94]	Rehanding Tailings	Fort McKay requests that Teck attends a technical meeting to explain how it plans to avoid rehandling tailings from the ET Areas to the centrifuge.	Industry
[95]	Thin Lift Drying Area	Fort McKay requests that Teck clarifies its statement in relation to the possibility that there will be similar challenges with centrifuge discharge material.	Industry
[96]	ETA Surface Reclamation	Fort McKay requests that Teck attends a technical meeting to explain the overall reclamation pace.	Industry
[97]	In-pit CFT Placement	Fort McKay requests that Teck attends a technical meeting to explain how the revised plan could accomplish reducing or eliminating external tailings facilities.	Industry

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Number	Fort McKay Key Concern(s)	Requests	Category*
Conservation and Reclamation Plan			
[98]	Reclamation Schedule Pace	Fort McKay requests that Teck: ix) examines its mining and reclamation plans to identify all opportunities for progressive (accelerated) reclamation and direct soil placement; and consults with Fort McKay regarding any potential shifts in surface disturbances within the project footprint from the planned locations and that the appropriate regulatory bodies request assessment of direct and cumulative effects due to shifts in the planned locations and associated disturbances.	Industry
[99]	Adaptive Management Framework	Fort McKay requests that Teck participates in regional and local initiatives to develop key performance indicators to define and improve the adaptive management framework for the evaluation of regional reclamation success and pace in the Athabasca oil sands.	Industry
[100]	Adaptive Management Framework	Fort McKay requests that an adaptive management framework for progressive reclamation and closure plan integration for oil sands mines is developed on a priority basis.	Industry
[101]	Adaptive Management Framework	Fort McKay requests the opportunity to participate in development of an adaptive management framework as part of a regional initiative and that Teck is a leader in initiating this process with other mine operators in the region.	Industry
[102]	Equivalent Land Capability	Fort McKay requests that Teck expressly considers its Cultural Keystone Species and their habitat during reclamation planning and develop a more detailed reclamation plan in collaboration with Fort McKay that will include explicit planning and methods that focus on reclamation for traditional land uses, including targeting traditional plant species and wildlife habitat	Industry
[103]	Equivalent Land Capability	Fort McKay requests that Teck supports Fort McKay in funding research focusing on the development of criteria and indicators for determining reclamation certification and success for traditional land use objectives. Very little research is available on this topic, and Teck is in a unique position to partner with and support Fort McKay in moving forward this research for the region.	Industry
[104]	Closure Landform Design	Fort McKay requests that Teck provides a detailed explanation of how the current landscape design plan will shift if restoration of peat-forming wetlands becomes possible.	Industry

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Number	Fort McKay Key Concern(s)	Requests	Category*
[105]	Mine Reclamation Materials Balance	Fort McKay requests that Teck clarifies why it is reducing the amount of salvaged and stockpiled reclamation material and whether this corresponds to an increase in the volume of direct-placed (i.e., non-stored) reclamation material.	Industry
[106]	Mine Reclamation Materials Balance	Fort McKay requests that Teck: x) reduces the time gap between disturbance and reclamation; xi) makes every effort to maximize direct placement of soils during reclamation; and ensures that Fort McKay plays a meaningful role in closure and reclamation planning so as to minimize the cumulative disturbance and loss of access in its Traditional Territory caused by Frontier mining operations.	Industry
[107]	Reclamation Monitoring, Certification and Security	Fort McKay requests involvement in the reclamation monitoring program throughout all phases of continued development at the Frontier Project site. Specifically, Fort McKay requests that Teck commits to: xii) developing a reclamation monitoring program that incorporates traditional knowledge to identify and evaluate indicators representing key elements of traditional uses and cultural practices; and developing an indigenous research monitoring program to evaluate the re-establishment of land capability to support traditional land uses, and to assist the community in building capacity (e.g., training, providing contracts, communication of results).	Industry
[108]	Reclaimed Lands Certification	Fort McKay requests that Teck supports Fort McKay's participation in reclamation certification application reviews and site inspections, and obtains Fort McKay's consent to any reclamation certification within its Traditional Territory.	Industry
[109]	Reclaimed Lands Certification	Fort McKay requests that reclamation certification is not granted until such time as it can be conclusively demonstrated that ecosystem recovery is on a trajectory acceptable to Fort McKay, Teck and the regulators.	Industry
Cultural Impact Assessment			
[110]	Cultural Impact Assessment	Fort McKay requests support from Teck for a community-led Cultural Impact Assessment.	Industry

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Number	Fort McKay Key Concern(s)	Requests	Category*
Socio-Economic			
[111]	Economics and Workforce	Fort McKay requests that Teck works with Fort McKay to establish specific fiscal targets for business opportunities and Community-specific processes to enhance workforce and training.	Industry
[112]	Community-specific Socio-economic Information	Fort McKay requests that Teck consults with Fort McKay on socio-economic issues, identifying key information gaps, supporting a community-led collection of socio-economic information, as needed, and jointly developing with Fort McKay appropriate socio-economic mitigation measures and strategies.	Industry
[113]	Fly in/Fly out	Fort McKay requests that Teck considers the Community of Fort McKay when developing its flight patterns to avoid community overflight where feasible.	Industry
[114]	Traffic Volumes and Road Maintenance	Fort McKay requests that Teck affirms its commitment to consult with Fort McKay regarding traffic safety issues and concerns and the timing and specifics of Highway 63 maintenance and upgrading.	Industry
[115]	On-site Lodge	Fort McKay requests that Teck continues to consult with Fort McKay on social, cultural and traditional land use issues related to the presence of worker camps.	Industry
[116]	Population Change and Infrastructure Effects	Fort McKay requests that Teck works with Fort McKay to understand the specific community-level stressors regarding infrastructure and services and to develop, with Fort Mckay, appropriate social investments and initiatives to mitigate these impacts.	Industry
[117]	Community Sustainability	Fort McKay requests that Teck works with Fort McKay on developing mitigation measures and initiatives that focus on Community sustainability including social, health and cultural aspects of Community sustainability. A Cultural Impact Assessment is a key study needed to understand project impacts and cumulative development on social resiliency and culture and to develop appropriate mitigation to offset impacts (see Request [111]).	Industry

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Results and Conclusions of Fort McKay's TLU Study for the Frontier Project

Appendix B

1.0 Project Results

More than 164 site-specific traditional use values were identified within the TLUS Local Study Area (LSA), and multiple Community concerns of potential effects of the Frontier Project were documented. The Community-guided TLUS drew on the Community concerns recorded in TLUS interviews and workshops, along with the indicators and assessment results of the Fort McKay Specific Assessment (Fort McKay IRC 2010) to assess the potential effects of the Frontier Project. Interview respondents and other Community members discussed specific concerns with the potential effects of the Project as well as mitigation strategies to reduce or partially offset the loss to Fort McKay's traditional land use values and Treaty or Aboriginal rights. The potential effects of the Project were assessed based on the shared Community concerns as well as discussions with Fort McKay's technical consultants.

Key Community concerns for both the Project and cumulative effects include:

- **Water** - negative effects of development on water quantity and quality
- **Wildlife:** negative effects of development on wildlife (including changes in wildlife composition, loss of habitat)
- **Noise** - complaints about noise related to oil sands development (increased noise and its impacts on humans and wildlife)
- **Air** - negative effects of development on air (air quality, dust)
- **Vegetation** negative effects of development on vegetation (changes in composition)
- **Changes in Access -** changes in access due to oil sands development (increased non-Aboriginal access, vandalism, competition for resources, change in access routes, etc.)
- **Fish -** Negative effects of development on fish (changes in fish abundance, habitat)
- **Cultural Knowledge Transmission** - reduced cultural knowledge transmission due to socioeconomic changes , loss of access and land due to oil sands development (and changes in social structure) (lost opportunities to share knowledge, changes in Community values and other social effects)
- **Direct Loss of Land -** direct loss of land due to oil sands development (including key cultural sites – e.g., hunting areas, traplines, gravesites, traditional trails)
- **Community Health and Stress** -reduced Community health and increased stress due to socioeconomic and environmental changes brought on by oil sands development
- **Reclamation** - Community scepticism regarding the potential success of oil sands reclamation, concern about lack of current demonstrated reclamation and suggestions for improvement
- **Consultation and Community Involvement** – Community concerns with the inadequacy of government/industry consultation and Community involvement activities

In addition to the above concerns, a number of Community members were particularly concerned about the potential impacts to the Boucher family hunting area. This hunting area is 80,805 ha in size and described in Section 4.2.3.1 of the Fort McKay TLUS. Due to the geographic location of existing (CNRL Horizon Project) and proposed (Shell's Pierre River mine and Teck's Frontier mine) development taking place in the Boucher family[50] hunting area both Project-specific and cumulative effects affect the hunting area. The Boucher family is acutely aware of the potential impacts of all three projects to their hunting area. When considered individually, members of the Boucher Family believe each of the mines (including the Teck Frontier Project) negatively affects the hunting area. When the three mines are considered cumulatively, the impact increases. The area of the Frontier Project (plus 200m buffer[51]) that intersects the hunting area is 13,273 ha or approximately 16% of the hunting area. The resulting estimation of total area lost from the Boucher hunting area due to the CNRL, proposed Shell Pierre River mine and the Frontier Project, through both direct and indirect effects is 37,651 ha or approximately 47% of the hunting area.

1.1 Project Conclusions

The determination of the significance of Project-related effects has been conducted according to the criteria detailed in Section 5.1.1 of Fort McKay's TLUS. These criteria state that Project effects are considered *significant* if they meet three criteria: (1) are clearly distinguishable; (2) result in substantial changes in the overall use of lands or resources; and, (3) likely to result in strong concern in the Community. At this time, available evidence suggests that, on average the Project-related effects identified in this study are negative, local/regional, long-term/permanent, and high magnitude. Significance of these effects is considered according to these criteria as follows:

1. It is anticipated that Project effects *will* be clearly distinguishable;
2. Project-related changes to Fort McKay lands or resources of having an additional oil sands mine 38km and 51km from the hamlet of Fort McKay will be "substantial" for

[50] In this report the "Boucher Family" refers to Community members related to Jerry Boucher and does not necessarily include everyone in the Community with the last name Boucher or Bouchier.

[51] Research indicates that buffers for moose around oil sands development should be 200m wide to provide for security and allow avoidance of disturbance (Lorne Gould Pers. Comm. July 14, 2011).

the whole Community, and especially for the families who hunt, trap, and were born within the LSA;

3. The degree to which the FMFN Community has expressed strong concern about any additional oil sands developments in their Traditional Territory, the proximity of the Frontier Project to the hamlet of Fort McKay, the size of the Project footprint and Community perceptions of likely Project effects result in strong concern in the Community.

   Fort McKay does not consider Teck's proposed mitigation measures outlined in Section 6 of the EIA to be to be adequate mitigation to substantially reduce or ameliorate Project effects on Fort McKay's Treaty and Aboriginal rights. Therefore, as stated in the Fort McKay's TLUS: **In that absence of adequate mitigation and accommodation measures, the preliminary results of the assessment of the Frontier Project effects on the Treaty and Aboriginal rights of the Community of Fort McKay are considered *significant* by the Fort McKay Sustainability Department.**