December 15, 2021

Mining Authorizations – Oil Sands East
Alberta Energy Regulator
1000, 250 – 5th Street S.W.
Calgary, Alberta T2P 0R4
By email only: EPEA.WA.Plans.Authorizations@aer.ca

Attention: Paul Aguas, Manager Mining Authorizations - Oil Sands East

RE: **Fort Hills Oil Sands Project – McClelland Lake Wetland Complex Operational Plan**
**Water Act Approval No. 151636 (as amended), Conditions 3.11, 3.12, 3.13 and 3.14**
**Oil Sands Conservation Act Approval 9241I (as amended), Condition 8**

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Dear Mr. Aguas,

Suncor Energy Operating Inc., on behalf of Fort Hills Energy Corporation is pleased to provide the attached McClelland Lake Wetland Complex Operational Plan for the Fort Hills Oil Sands Project in accordance with Conditions 3.11, 3.12, 3.13 and 3.14 of *Water Act* Approval No. 151636 (as amended) as well as *Oil Sands Conservation Act Approval* 9241I (as amended), Condition 8.

Should you require any further information or clarification, please do not hesitate to contact Jennifer Holm at (587) 215-4277 or jenholm@suncor.com.

Yours truly,

SUNCOR ENERGY OPERATING INC.

Blair Penner
Director, Mining, Extraction, and Upgrading Approvals

cc: Ken Bullis (AER)
Mike Robinson (Suncor)
Jennifer Holm (Suncor)

**FORT HILLS ENERGY CORPORATION**
**FORT HILLS OIL SANDS PROJECT**

# McCLELLAND LAKE WETLAND COMPLEX OPERATIONAL PLAN

December 2021

Operated by SUNCOR ENERGY


# McClelland Lake Wetland Complex Operational Plan

Executive Summary / Introduction / Supporting Attachments

Objective 1 – Define Baseline Conditions

Objective 2 – Define Functionality

Objective 3 – Assess Potential Impacts of Mine Development

Objective 4 – Establish Necessary Design Features and Contingency Mitigation Measures

Objective 5 – Develop an Effects Monitoring Program

Objective 6 – Develop a Response Framework

Technical Appendices

**DISCLAIMER:**

1. The Indigenous Traditional Knowledge contained in this report should not be interpreted as complete documentation and analysis of the land use, history, and cultures of the participating Communities listed, (or a full accounting of the potential associated changes or impacts to Communities' traditional land use and knowledge, which may result from the activities of the approved project.)
2. The approval for the integration of Indigenous Traditional Knowledge in the report should not be used to define, constrain or limit the Aboriginal rights of the participating Communities or their members, as per section 35(1) of the *Canadian Constitution Act*, 1982.
3. The Indigenous Traditional Knowledge and land uses presented in this report are collectively held rights inherent in section 35(1) of *Canadian Constitution Act*, 1982, and are the intellectual and cultural property of the Communities from which they were shared.
4. The Indigenous Traditional Knowledge contained in this report is intended for the specific use solely by Suncor, and in the limited use in the Operational Plan and its implementation, in regard to the preservation of the functionality of the McClelland Lake Fen and Wetland Complex, and specific regulatory approval and obligations. It cannot be used by another party, or as secondary information for another project, without the written Consent, or Community guidance under another Indigenous Traditional Knowledge Use & Sharing Agreement, held with the relevant Communities

# "KIKIYOU KIKOY OMASKE ABADAK"

"Everything has a purpose – everything is connected"
E. Faichney June 2001

# Acknowledgement

We extend our thanks to the members, Elders, knowledge holders, land users, staff and leadership from Fort Chipewyan Métis, Fort McKay Métis Nation, Fort McKay First Nation, Athabasca Chipewyan First Nation and Mikisew Cree First Nation who have shared their time and expertise with us since the beginning of the Sustainability Committee in 2006. With great gratitude we extend our thanks to the Indigenous community members who shared their expert knowledge that shaped and improved the Operational Plan and particularly value the input and guidance from Elder Barb Faichney, Elder Bruce Faichney, Luella Woods, Jean L'Hommecourt, Felix Faichney, Elder Barb Hermansen, David Hermansen, Elder George Lepine, Elder Henry Antoine, Elder George Sloan Whiteknife, and ACFN Elders. We recognize that conversations around protecting this important area are sometimes tough and we appreciate how community members have continued to share with us their knowledge, experience, ideas and frustrations too.

We want to acknowledge other family members that lived at McClelland Lake, whose knowledge has been referenced in the Operational Plan. Francoise Boucher, Felix Beaver, Mary Anne Beaver, Edmund Ducharme, Annie Ducharme, Ian Faichney, Roger Faichney and Arnold Faichney were all respected land users, knowledge holders and mentors that have shared their skills and knowledge with their own families, and the many families of Fort McKay and Fort Chipewyan that came to hunt, fish and camp around McClelland Lake.

We also extend our thanks to the community staff and supporting consultants, including Bori Arrobo, Ryan Abel, Lisa Schaldemose, Kim Dertien-Loubert, Dan Stuckless, Benjamin Sey, Lindsay Wong, Thomas Dyck, Ann Garibaldi, Susan Leech and representatives of ACFN's Dene Lands & Resource Management office. We acknowledge the efforts and valuable contributions from members of the McClelland Lake Wetland Complex Sustainability Committee, including co-chairs Judy Smith, Carrie Oloriz, Doug McDonald (former chair) and Ken Shipley (former co-chair). The Committee chairs have developed processes and roads to guide us towards remarkable collaboration.

The Committee's Technical Advisory Group is comprised of Carl Mendoza, Kevin Devito, Line Rochefort, and Petr Komers. Their remarkable technical knowledge, expert recommendations, challenging questions, and instruction has vastly improved our understanding of the MLWC. We thank you for your tough questions and high standards.

Lastly and most importantly, we honour and remember our late Committee members who paved the way for this important work at the MLWC and especially treasure the knowledge, guidance and council of Emma Faichney, Glen Faichney, Pat Marcel, Charlie Voyageur, Doug McDonald and Brenda Miskimmin.

The submission of the Operational Plan is a significant milestone but does not imply the end of the work of the Sustainability Committee. Further work is needed to develop and initiate community monitoring programs, monitor the performance of the plan, develop detailed designs on components of the mitigations, and further understand and mitigate impacts to the usability of the area. We look forward to continued dialogue, input, guidance, and advice from the Sustainability Committee in the many years ahead.

# EXECUTIVE SUMMARY

Suncor Energy Operating Inc. on behalf of Fort Hills Energy Corporation, submits this Operational Plan to the Alberta Energy Regulator pursuant to Conditions 3.11, 3.12, 3.13, and 3.14 of *Water Act* Approval No. 151636-01-00 (as amended) and Condition 8 of *Oil Sands Conservation Act* Approval 9241I (as amended) for the Fort Hills Oil Sands Project.

The Fort Hills Oil Sands Project overlaps with a portion of the McClelland Lake Wetland Complex. The McClelland Lake Wetland Complex is a large, boreal wetland complex in northern Alberta that includes patterned and non-patterned fen, bogs, marshes and swamps and a lake. To progress with mining in the portion of the McClelland Lake Wetland Complex that overlaps with the Fort Hills Oil Sands Project, an Operational Plan is required to sustain a specific non-mined portion of the McClelland Lake Wetland Complex during operations through closure. Ditching and draining for mine pit preparations are planned to commence in the McClelland Lake Wetland Complex watershed in 2025, with planned overburden mining progressing into the watershed by 2028.

The Operational Plan has been under development since the Alberta Energy and Utilities Board approved the Fort Hills Oil Sands Project in 2002. Since 2005, a Sustainability Committee comprised of representatives from local Indigenous communities, Fort Hills, the Alberta Energy Regulator and Alberta Environment and Parks has provided feedback and recommendations on development of the Operational Plan. In recent years, the Sustainability Committee has been supported by an Aboriginal Advisory Group and a Technical Advisory Group as well as two independent co-chairs. First Nation and Métis communities with current and historical connections in the McClelland Lake Wetland Complex watershed participate in the Sustainability Committee including: Fort McKay First Nation, Fort McKay Métis Nation, Fort McMurray 468 First Nation, McMurray Métis Local 1935, Athabasca Chipewyan First Nation, Fort Chipewyan Métis Local #125 and Mikisew Cree First Nation.

The Fort Hills Oil Sands Project *Water Act* Approval No. 151636-01-00 (as amended) outlines several requirements for the Operational Plan in Condition 3.13. These requirements were used to establish six objectives to guide the development of the Operational Plan and described in the McClelland Lake Wetland Complex Operational Plan Proposal that was authorized by the Alberta Energy Regulator in 2018. Since 2018, the Fort Hills Oil Sands Project has worked with the Sustainability Committee to achieve these six objectives and progress has been reported through Annual Reports submitted to and authorized by the Alberta Energy Regulator.

The first objective is to define baseline conditions for the physical and biological conditions of the McClelland Lake Wetland Complex. Baseline conditions in the McClelland Lake Wetland Complex watershed have been monitored since 2000, including: levels and metrics relating to surface water, groundwater, water quality, vegetation, fish, amphibians, birds and wildlife. Three sources of information were considered including: Indigenous Traditional Knowledge, Paleo-Environmental Data, and Monitoring Data.

The second objective is to define how the wetland complex functions, which broadly refers to physical, hydrological, chemical, biological processes, social and cultural functions performed within the McClelland Lake Wetland Complex. A suite of indicators has been selected for monitoring and maintenance of the non-mined portion of the McClelland Lake Wetland Complex during operation and reclamation of the Fort Hills Oil Sands Project.

The third objective is to assess the potential impacts of mine development on the non-mined portion of the McClelland Lake Wetland Complex. Baseline conditions as set out in Objective 1 were used as inputs into conceptual and numerical models to simulate baseline, mine operations and closure scenarios. Additional iterations of models are anticipated as additional monitoring data is available and further work is conducted with the Sustainability Committee.

The fourth objective establishes necessary design features and contingency mitigation measures to ensure that effects of the Fort Hills Oil Sands Project do not adversely affect the functionality of the non-mined portion of the McClelland Lake Wetland Complex. The design features are focused on managing and controlling water quantity and quality in the non-mined portion of the McClelland Lake Wetland Complex during the operational and closure periods. The Sustainability Committee will continue to contribute to mitigation measure development including detailed designs, access, security and managing effects.

The fifth objective is to develop an effects monitoring program to detect Fort Hills Oil Sands Project effects in the non-mined portion of the McClelland Lake Wetland Complex. The effects monitoring program builds upon characterization of pre-mining baseline conditions in Objective 1 and identification of indicators in Objective 2. The program includes sampling locations within the McClelland Lake Wetland Complex as well as reference sites to allow comparison of potential changes to natural sites that are similar but are not expected to be significantly impacted by the Fort Hills Oil Sands Project.

Finally, the sixth objective is to develop a response framework as a systematic approach for responding to the results of the effects monitoring program described under Objective 5. Triggers and limits are defined, and potential management actions or responses are identified if outcomes or trends are detected that require response and these changes or trends are determined to be a result of the Fort Hills Oil Sands Project.

It is expected that the Operational Plan will continue to be refined as additional monitoring and modelling work is completed as well as further engagement with the Sustainability Committee. A summary of commitments to planned activities with the Sustainability Committee prior to implementation of the Operational Plan has been provided. Fort Hills Energy Corporation will continue to submit Annual Progress Reports to the Alberta Energy Regulator pursuant to *Water Act* Approval 151636-01 (as amended), Conditions 3.12 and 3.15 until the Operational Plan is authorized, following which, Fort Hills Energy Corporation anticipates comprehensive reporting to the Alberta Energy Regulator to continue through the mine life into closure.

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# 1. INTRODUCTION

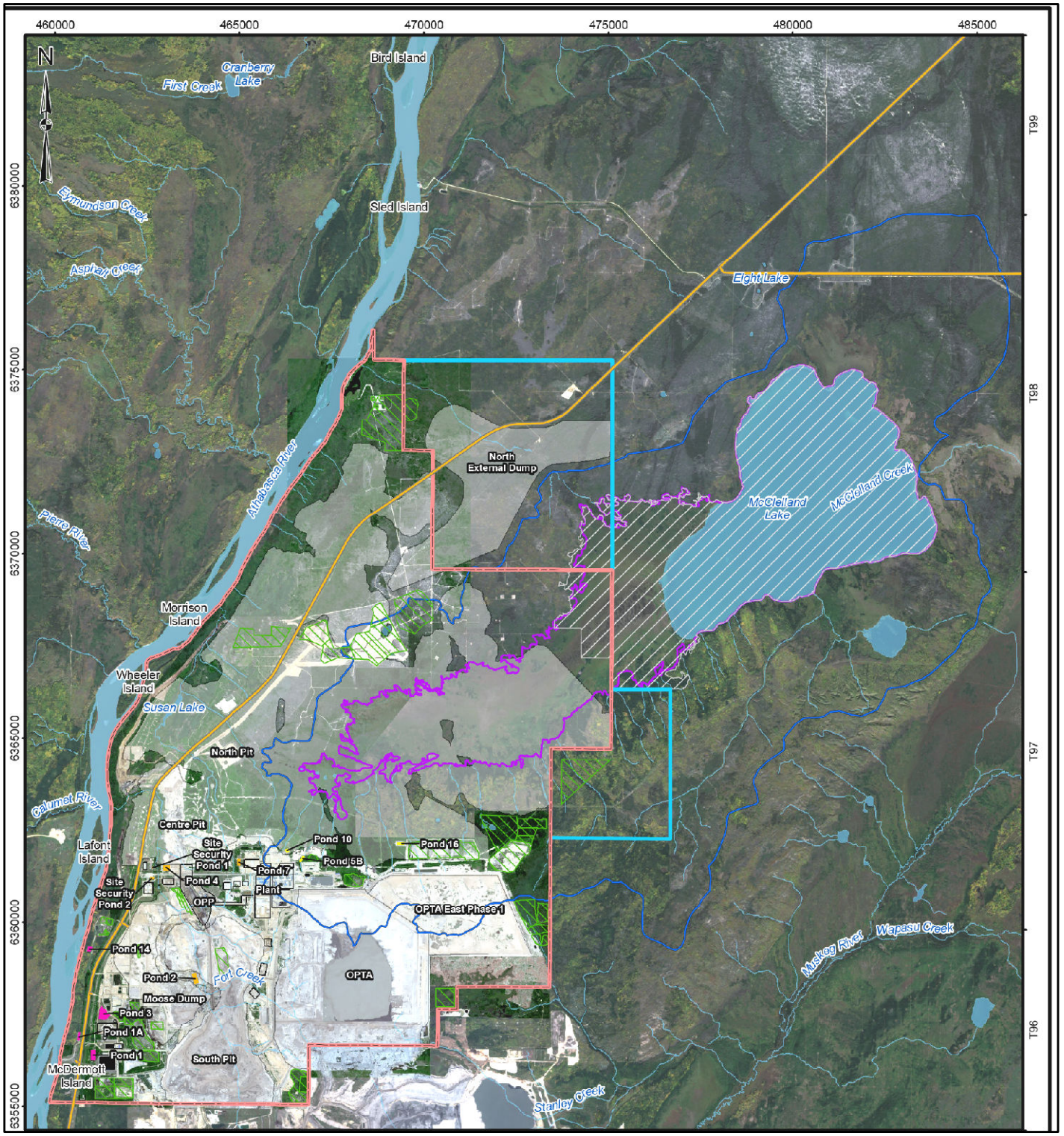
## 1.1. Project Background

Suncor Energy Operating Inc. (SEOI) on behalf of Fort Hills Energy Corporation (FHEC) submits this Operational Plan (OP) to the Alberta Energy Regulator (AER) pursuant to Conditions 3.11, 3.12, 3.13, and 3.14 of *Water Act* Approval No. 151636-01-00 (as amended) (the *Water Act* Approval) and Condition 8 of *Oil Sands Conservation Act* (OSCA) Approval 9241I (as amended) (the OSCA Approval).

The Fort Hills Oil Sands Project (Fort Hills Project) is located approximately 90 kilometres (km) north of Fort McMurray, Alberta, in the Athabasca Oil Sands Region (Figure 1.1-1). The McClelland Lake Wetland Complex (MLWC) is a large, boreal wetland complex in northern Alberta that includes patterned and non-patterned fen, bogs, marshes and swamps and McClelland Lake. A portion of the MLWC is located in the northeast corner of the approved boundary for the Fort Hills Project and another portion of the MLWC is located outside the approved boundary for the Fort Hills Project. To progress with mining in the portion of the MLWC that overlaps with the Fort Hills Project, FHEC is required to submit this OP to sustain a specific non-mined portion of the MLWC (outlined in Figure 1.1-1).

The Fort Hills Project is located in the traditional territories of Fort McKay First Nation (FMFN), Fort McKay Métis Nation (FMMN), Fort McMurray 468 First Nation (FM468FN), McMurray Métis Local 1935 (MM1935), Athabasca Chipewyan First Nation (ACFN), Fort Chipewyan Métis Local #125 (FCM) and Mikisew Cree First Nation (MCFN).

The Fort Hills Energy Limited Partnership (FHELP) consists of Suncor Energy Inc. (Suncor), Total Energies EP Canada Limited (Total), Teck Resources Limited (Teck), and FHEC. The Fort Hills Project is operated by SEOI, a wholly owned subsidiary of Suncor. For the purposes of this document, all references to Fort Hills are to be interpreted as referring to FHELP. All references to SEOI are to be interpreted as SEOI acting as the agent of FHEC, as general partner for FHELP. Additional key definitions are provided in Section 1.1.2.




**LEGEND**

- Roads
- Extension Areas as proposed in the Integrated Plan Amendment Application
- Watercourse
- Waterbody
- Approved Project Area
- McClelland Lake Surface Watershed
- Relevant Site Features
- Wetland Complex
- Non-mined Portion of MLWC
- Industrial Runoff Approved Outlet to Athabasca River
- Industrial Runoff Approved Outlet to Fort Creek
- Industrial Runoff Approved Outlet to McClelland Lake Watershed

CLIENT
FORT HILLS ENERGY CORPORATION

PROJECT
McCLELLAND LAKE WETLAND COMPLEX - OPERATIONAL PLAN

TITLE
**FORT HILLS OIL SANDS PROJECT 2021**

FORT HILLS
Operated by Suncor Energy

| | |
|---|---|
| YYYY-MM-DD | 2021-12-14 |
| DESIGNED | SUNCOR |
| PREPARED | SUNCOR |
| REVIEWED | ZG |
| APPROVED | JH |

| PROJECT NO. | CONTROL | REV. | FIGURE |
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### 1.1.1. McClelland Lake Wetland Complex Regulatory Timeline

In June of 2001, TrueNorth Energy L.P. (TrueNorth 2001) filed an application for the Fort Hills Project with the Alberta Energy and Utilities Board (EUB, the Board). On October 22, 2002, the Board approved the Fort Hills Project (the Approval Decision) and specifically approved mining in the MLWC, subject to development of an appropriate mitigation plan for a specific non-mined eastern portion of the MLWC (referred to by the Board as the "no-surface access zone"):

> *The Board understands that without mitigation, the combined effects of chemical contamination and water table changes associated with mining the southwest portion of the MLWC may destroy bryophyte communities to the northeast, interrupting peat production. The Board does, however, accept that Alberta is satisfied that mining in this portion of the MLWC can take place with adoption of the appropriate mitigative measures and is prepared to allow the project to proceed subject to their approval of a detailed mitigation plan.*
>
> *TrueNorth's MLWC Sustainability Plan does propose a process that should establish the feasibility of such mitigation. The Board is prepared to agree to the process, having regard for Alberta Environment's commitment to require TrueNorth to demonstrate its plans before any disturbance is allowed in the wetland complex. The Board notes that the onus to establish a workable and credible plan will be on TrueNorth. The Board supports Alberta's intention to condition its approval to require TrueNorth to provide an acceptable mitigation plan prior to mining in the MLWC.*
>
> *The Board recommends that Alberta direct TrueNorth to convene a committee of stakeholders and regulators, as proposed in the MLWC Sustainability Plan, to oversee the collection of baseline monitoring data, establish the natural variability of the wetland, establish criteria to protect the biotic diversity and function of the no-surface-access zone, critically evaluate proposed mitigation plans in relation to the protection criteria, and evaluate postconstruction monitoring data and adaptive management.*
>
> *The Board has assessed the bitumen underlying the wetland complex and has concluded that the estimated one billion barrels represents a significant resource that should be recovered as part of the FHOSP as long as it can be done in a manner that minimizes damage to the rest of the complex. The Board has weighed the benefit of recovering the bitumen underlying the MLWC against the direct environmental impacts and has concluded that in the broader context, it is in the public interest to approve mining within the MLWC, subject to establishing the appropriate mitigation plan. (EUB 2002)*

Pursuant to the Approval Decision, the Board directed that a Sustainability Committee (SC) be formed to develop a management strategy to sustain the non-mined eastern portion of the MLWC. The management strategy satisfies the requirements of the amended Fort McMurray-Athabasca Oil Sands Subregional Integrated Resource Plan (IRP, ASRD 2002). The IRP was approved by the Alberta Government in 1996 and amended in June of 2002. The IRP includes objectives and guidelines for the Alberta Government's management of certain lands in the province, including the MLWC. Specifically, the IRP states that surface mining is not permitted in parts of the eastern portion of the MLWC (the "No-Surface Access Zone") and that surface mining in the MLWC shall maintain the water table, water chemistry, and water flow within limits as indicated by natural fluctuations to maintain ecosystem diversity and function of the No Surface Access Zone within the MLWC.

Subsequent to the Approval Decision, FHEC applied for and received the *Water Act* Approval. Conditions 3.11 to 3.14 of this approval include terms that originated from the Approval Decision related to the development of the MLWC, as reproduced below:

> *3.11 The Approval Holder shall submit to the Director for authorization, at least six years prior to ditching or draining for mine pit preparations in the McClelland Lake watershed, a proposal to develop an operational plan for the sustainability of the non-mined portion of the MLWC in accordance with the IRP* [Integrated Resource Plan].
>
> *3.12 Beginning on January 31 of the year after the proposal referred to in condition 3.11 has been submitted, and each year thereafter until the operational plan is authorized by the Director, the approval holder shall submit to the Director, for written authorization, a report summarizing the progress on the preparation of the operational plan for sustainability of the MLWC and the proposed work for the subsequent year.*
>
> *3.13 The operational plan referred to in condition 3.11 and 3.12 shall contain, at a minimum:*
>
> *a) physical and biological conditions in the MLWC*
>
> *b) design features or measures, and other as required for the protection of the non-mined portions of the MLWC*
>
> *c) a wetland monitoring program containing as a minimum a yearly survey of vegetation species distribution, abundance, health, and string and flark configuration as compared to baseline studies*
>
> *d) a monitoring program to study groundwater and surface water levels and water quality in overburden and muskeg; flow measurements of polishing ponds, and level monitoring in McClelland Lake*
>
> *e) proposed investigation and monitoring necessary to verify the model prediction that the MLWC will not drain towards the dewatering area through the groundwater flow system*
>
> *f) indicators to evaluate the tolerance of the MLWC to project effects*
>
> *g) the necessary contingency mitigation measures to maintain the water table, water chemistry and water flow within limits as indicated by natural fluctuations to maintain ecosystem diversity and function of the non-mined portions of the MLWC during operation and reclamation of the project*
>
> *h) a detailed schedule for the implementation of each component of the plan*
>
> *3.14 The Approval Holder shall implement the operational plan as authorized in writing by the Director two years prior to any ditching or drainage for mine pit preparations in the McClelland Lake watershed.*

As required under Condition 3.11, FHEC submitted a proposal on December 10, 2018, and received authorization from the AER on October 16, 2019.

Progress reports, as required under Condition 3.12, have been submitted and subsequently authorized by the AER on an annual basis for 2018 through 2020 and will continue to be submitted until the OP is authorized.

The schedule for submission of the OP supports planned ditching and draining for mine pit preparations in the MLWC watershed in 2025, with planned overburden mining progressing into the watershed by 2028.

No amendments have been made to the *Water Act* Approval for conditions related to the MLWC since the original approval in 2002, with the exception of renumbering the conditions.

The OSCA Approval includes a condition that the OP be submitted by September 30, 2021, or such other date that the AER may stipulate in writing. On August 4, 2021, FHEC submitted a request for an extension of the September 30, 2021 deadline to December 15, 2021. This request was subsequently authorized by the AER on August 10, 2021. Condition 8 of the OSCA Approval was updated to reflect the change submission deadline in the most recent amendment of the OSCA Approval (9241I).

### 1.1.2. Key Definitions

**McClelland Lake Wetland Complex or MLWC** – McClelland Lake, the fen, and an adjacent upland drainage basin (as defined by the 2002 Fort McMurray-Athabasca Oil Sands Subregional Integrated Resource Plan). This area is labelled on Figure 1.1-1 as "wetland complex". The watershed that contributes to the MLWC is referred to as the MLWC watershed (Figure 1.1-1).

**Non-Mined Portion of the MLWC** – the portion of the MLWC that the Fort Hills Project is required to develop an OP for the sustainability of, as per Condition 3.11 of the Fort Hills *Water Act* Approval No. 151636-01-00 (as amended). It includes portions of the MLWC within, and outside, of the Fort Hills Project approved boundary; and McClelland Lake (Figure 1.1-1).

**Functionality or wetland functionality** – the individual and collective physical, hydrological, chemical, and biological processes performed by the MLWC that relate directly to the characteristics of the ecosystem and its capacity to interact with the adjacent landscape (ICF Jones and Stokes 2009). The MLWC also performs social and cultural functions that go beyond the ecological functions that are also viewed as critical to the overall function of the MLWC (IEG 2021).

**Wetland value** – the measure of the relative social, ecological, or economic importance of a wetland function being performed by the MLWC to individuals or groups of human beings (ICF Jones and Stokes 2009) and the capacity of the MLWC to do so (IEG 2021).

**Sustainability** – the maintenance of the physical, hydrological, biological, and chemical processes for the sustainability of the non-mined portion of the MLWC. The dynamic nature of land and the intrinsic obligation of people to sustain land is a core philosophy of Cree, Dene and Métis people in the region (Garibaldi 2021).

**Baseline Conditions** – conditions that exist before an activity takes place, and that may be used as a point of reference in the future. For the OP, a distinction is drawn between **pre-development baseline conditions** (i.e., conditions occurring before the influence of oil sands development, defined temporally as 1960 or earlier) and **pre-mining baseline conditions** (i.e., conditions including existing anthropogenic disturbances and effects on the natural environment, prior to mining in the MLWC watershed, defined temporally by the timelines captured in monitoring or modelling data). Pre-mining baseline conditions are informed by Indigenous Traditional Knowledge (ITK), and include MLWC monitoring program data, historical imagery, and model predictions prior to mining in the MLWC watershed.

**Natural Range of Variability or NRV** – A definition of the natural range of variability (NRV) was assembled by the SC, adapted from the Ecological Restoration Guidelines for British Columbia

(BCMWLAP 2002): The NRV refers to the spectrum of ecosystem states and processes encountered over a long time period. The "natural" range of variability usually refers to the full range of ecosystem structures and processes encountered before major changes brought by non-aboriginal humans. It is also surmised from knowledge of natural disturbance regimes. The NRV is often used to describe disturbance processes, and the ecosystem variability that these disturbances create. Ecosystems are thought to be more sustainable if they are managed so that their current disturbance regime falls within the NRV.

**Measured Range of Variation or MRV** – For the purposes of the OP, the measured range of variability (MRV) is defined as the variability observed in the pre-mining baseline conditions for the chosen indicators.

**Indicator** – a measurable or observable characteristic that can be correlated with, but not necessarily causally linked to, a specific physical, hydrological, biological, or chemical process that is occurring in the MLWC (ICF Jones and Stokes 2009).

**Fort Hills Upland Complex** – an elevated topographic feature located south of the MLWC, formed as a thrust moraine.

**North Outwash Plain** – a relatively flat area extending north from the Fort Hills Uplands Complex. The area consists of a broad deposit of fine to medium-grained surficial sands, at times covered by a veneer of fine-grained topsoil or organic deposits.

**Reclamation of the Project** – reclamation of the portions of the Fort Hills Project lease disturbed by mining activities. The objective of the Fort Hills Project reclamation program is that developed lands shall be reclaimed to a self-sustaining, locally common boreal forest ecosystem, compatible with pre-development, including forested areas, wetlands, and streams. The reclaimed lands will provide a range of end uses, including forestry, wildlife habitat, traditional use, and recreation.

**Indigenous Traditional Knowledge or ITK** – any and all cultural past, present and future knowledge including about the MLWC, McClelland Lake and connected adjacent areas, developed and held by members of Indigenous communities, over which members and communities have collective rights, which includes but is not limited to:

- scientific knowledge
- technical knowledge
- environmental and ecological knowledge, including knowledge related to biodiversity
- medicinal knowledge, including related medicines and remedies
- knowledge and oral transmissions of history, literature, customary law and genealogy
- expressions of legends, stories, history, and other cultural knowledge and material in the form of music; dance, song, handicrafts, designs, stories and artwork
- languages, including names, geographical indications and symbols
- knowledge of the evolving traditional economy
- moveable cultural properties and objects

ITK may take the form of:

- oral or written data or information

- oral stories and histories
- existing community reports
- films
- maps, drawings or pictures
- shape files or other electronic geospatial data layers or files

**ITK Holder** means a Member who develops and holds ITK.

**Integration** with reference to knowledge integration means the process of synthesizing multiple ways of knowing, focusing on synthesizing the understanding of a given subject from different perspectives, without the loss or subjugation of one over the other.

**Western Science** is the system of knowledge which relies on certain laws that have been established through the application of the scientific method to understand phenomena in the world around us. For the OP, it is an objective and quantitative approach to understand and describe the MLWC. Note that "western" refers to roots of modern science in Ancient Greek and Renaissance philosophy and is not intended to misappropriate science being done globally.

## 1.2. Overview of the McClelland Lake Wetland Complex Watershed

### 1.2.1. Ecological Context

The MLWC watershed is located in the Boreal Plains of the Western Boreal Forest. This region is characterized by a climate with a net precipitation deficit, pronounced seasonal and decadal wet and dry cycles, and heterogeneous geology with high capacity to store water (Devito et al. 2012). The MLWC watershed covers an area of approximately 203 square kilometres ($km^2$) and consists of: the MLWC, which includes McClelland Lake (15% of watershed) and the wetland complex (14% of watershed); the North Outwash Plains, which is located to the north and west of the fen and McClelland Lake; and, the Fort Hills Upland Complex, which is located to the south and east of the fen and McClelland Lake. Wetlands outside the complex boundary include wetlands north and south of McClelland Lake, and a wooded coniferous swamp peripheral to the wetland complex.

The MLWC formed as the glaciers retreated and deposited sediments at the conclusion of the last ice age approximately 11,700 years ago. Carbon dating of peat cores collected within the wetland complex has shown that peat accumulation began during the Holocene period, approximately 11,000 years ago. Carbon dating of sediments collected from the bottom of McClelland Lake shows that sediment deposition in the lake, and the lake itself, started to form between 700 and 1100 years before present.

The MLWC is a large boreal wetland complex dominated by a rich fen with a well-developed patterned fen component. The IRP recognizes the MLWC as one of the largest wetlands in the province, with well-developed patterning (ASRD 2002). The IRP also identified the patterned fen component of the MLWC as provincially significant (ASRD 2002) and designated the eastern part of the wetland complex including McClelland Lake, as a "no-surface access zone" (NSAZ – referred to in the OP as the "non-mined" portion of the MLWC) in which surface mining was not permitted (ASRD 2002).

The surface area of the MLWC (including the wetland complex and McClelland Lake) is approximately 60 $km^2$ and the portion of this area within which the Fort Hills Project is required to maintain the

function of (non-mined portion of the MLWC) is approximately 44 km$^2$. The wetland complex and non-mined portion are depicted in the IRP and are the same as those shown in Figure 1.1-1.

### 1.2.2. Cultural Context

Community members and ITK holders from each of the regional Indigenous communities have emphasized the importance of the land and the significance of the MLWC as locations for connection, teaching, sharing stories, harvesting resources and cultural practices. Beginning from a very early age, people's lives are anchored in the land and shape the cultural underpinnings of all aspects of life.

> *"I've been on this land since 1955, as I had said before. I was born in Fort Chip, but not raised there. I was raised by my uncle Edmund Ducharme and my Auntie Annie, but they're like my mom because they raised me. They brought me over here when I was eight months old. So I've walked back and forth from the Athabasca River to the Firebag from the time I could walk, and stopping here at McClelland Lake. Because in the old days you didn't have a store next door to you. You would go where the food is. There's an abundance of food here at McClelland Lake, McClelland Creek, Moose Creek, Firebag, Eight Lake, and right down to the Athabasca River." (FCM ITK holder, September 10, 2019 on the land workshop)*

All participating Indigenous communities have knowledge and experience of the MLWC, but some families have spent and continue to spend more time at the heart of the MWLC raising children. They have developed their own deep sense of connection to the lake, the fen and the adjacent area.

> *"This is my home. This is my land. This is where we were raised. My mom and dad raised lots of kids and fed them off of this land. There were 14 of us altogether, and there are still seven of us around that are honoring our parents teaching. Our parents taught us that we had to respect one another, and then the adults, they always got the most respect." (FMFN ITK holder, September 10, 2019 on the land workshop)*

Many generations of Dene, Cree and Métis community members have thrived in the MLWC. A seasonal cycle of hunting, trapping and gathering medicinal and food plants influence movement patterns as people sought out resources for the year. The colder winter months in the area required harvesting staples such as moose, fish, ducks, geese and berries when resources were available. Annual summer gatherings afforded opportunities for small family groups to gather, socialize, exchange resources, and discuss insights and knowledge about the land. More than just a location for resource harvesting, however, the MLWC and was home to many. One knowledge holder expressed her childhood experience of connecting to the MLWC on foot and dog team:

> *"Our legs were our transportation for everything we had to do. We'd walk. And the dogs they would pull mom and the small babies in the wintertime. And in the summertime, it was different. We'd just walk everywhere. But we learned that this was our home, we were born here, and when you're at your home you respect it. This is your home, you respect it." (FMFN ITK holder, September 10, 2019 on the land workshop)*

Other ITK holders situate their history in the context of familial relations and movement throughout the broader area. This personal history of observation, knowledge sharing, and living on the land is the source of ITK holder's deep connection and worldview that is not possible to separate into the dichotomy of "people" as distinct from "the land." The intertwined nature of culture and the environment involves a responsibility and reciprocity on behalf of ITK holders. The nature of peoples' relationship with the land and the intrinsic obligation that comes with that, to steward the health and

respectful use of the land for cultural continuance, is a core value and belief in the worldviews of Cree, Dene and Métis people in the region.

> *"You know, we are—people who grow up and are raised in the bush, they're land keepers. We have to protect our land as much as we could, not knowing that so much is being taken away." (FMFN ITK holder, September 10, 2019 on the land workshop)*

This responsibility extends beyond the lifetime of one individual or one family. It is a sentiment that refers to current and future generations of people.

> *"This land is here for our grandchildren. It's our duty to protect it for them." (FMMN ITK holder, September 10, 2019 on the land workshop)*

While community members and ITK holders have been participating in the SC and advising the Fort Hills Project in the development of the OP, it is noted that many individuals do not feel that it is possible for the MLWC to support their values if development continues and mining of the MLWC occurs.

> *"everything that belongs to the fen there, like what you're gonna do with the fen, you're gonna destroy that, that's all gonna go" (MCFN ITK holder, MCFN 2019)*

> *"They would never be able to put that reclaimed area into the same state that it was before, there's no way…it's not possible, cause it's taking away mother nature's filter. And mother nature must have spent thousands of years creating that fen, that filter" (MCFN ITK holder, MCFN 2019).*

## 1.3. Sustainability Committee

During the hearing for the Fort Hills Project, TrueNorth, in conjunction with the Fort McKay community, developed a Sustainability Plan to address stakeholder concerns in relation to the MLWC. This plan called for the formation of a committee of stakeholders to help the proponent develop an OP by providing comments, advice, and recommendations on the development of the plan. In the Approval Decision, the Board placed a condition that the Alberta Government direct TrueNorth to convene a committee of stakeholders and regulators as proposed in the MLWC Sustainability Plan (EUB 2002).

In December of 2005, the SC was convened by Petro-Canada Oil Sands Inc. (Petro Canada) after purchase of the Fort Hills Project from TrueNorth. Between 2006 and 2008, two technical working groups were established (water and biodiversity) to work with the SC and baseline monitoring programs were established with SC input. In 2009, Suncor purchased Petro-Canada and subsequently, SEOI assumed operatorship of the Fort Hills Project.

In accordance with the Board's direction, the purpose of the SC is to oversee the collection of baseline monitoring data, establish the natural variability of the MLWC, establish criteria to protect the biotic diversity and function of the no-surface-access zone, critically evaluate proposed mitigation plans in relation to the protection criteria, and evaluate postconstruction monitoring data and adaptive management (EUB 2002).

The SC includes local Indigenous communities, SEOI on behalf of FHEC, the AER and Alberta Environment and Parks (AEP). Five Indigenous communities with current and historical connections in the MLWC watershed participate in the SC. These communities include: FMFN, FMMN, ACFN, FCM, and MCFN.

The SC has independent co-chairs who oversee the work of the committee. Recognizing that the SC requires specific technical guidance and ITK, the SC also formed two advisory groups to support and assist the work: the Aboriginal Advisory Group (AAG) and the Technical Advisory Group (TAG). All communities represented at the SC (ACFN, MCFN, FCM, FMFN, and FMMN) participate in the AAG and have contributed to the AAG recommendations and work products. TAG member expertise includes physical hydrogeology, contaminant hydrogeology, wetland hydrology, water management, climate, biogeochemistry, vegetation, peatland ecology, peatland restoration, wildlife movements, regional habitat use and population ecology. Each advisory group is responsible for providing expert review and recommendations to the SC in their respective areas of expertise. The recommendations from the advisory groups are provided to the SC to review to provide recommendations to SEOI on the programs that may be required to support the development of the OP.

A visual representation of the SC communication structure is included in Figure 1.3-1.

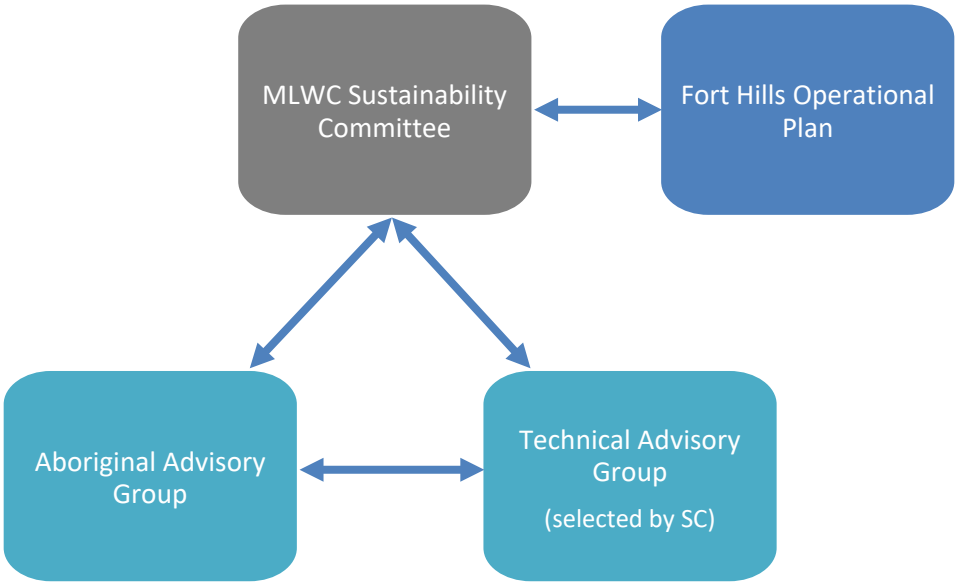



***Figure 1.3-1: Illustration of the Sustainability Committee and Advisory Group Lines of Communication***

### 1.3.1. Two Roads Approach

The work of the SC is based on the principles of the Two Roads Approach. As identified in the Traditional Knowledge Research Guidelines published by the Cumulative Environmental Management Association (Donald et al. 2012), the Two Roads Approach focuses on engagement and dialogue between interested parties, often with divergent cultural backgrounds. The purpose of the Two Roads Approach is to reach a common understanding of what is important and build a relationship based on trust and mutual respect that allows the parties to move forward toward a common goal.

The Two Roads Approach is described as an Indigenous methodology that identifies a distinct space for Indigenous questions, objectives and ways of knowing (Campbell et al. 2011). Indigenous Traditional Knowledge is one of two separate but parallel knowledge systems or 'roads'; Western Science is the other road in the Two Roads Approach. The Two Roads can come together at certain decision points and provide 'a bridge' for discussion, sharing, or equitable integration of knowledge to provide a more collaborative and complete understanding of the ecological, cultural, social and economic environment.

The SC and their supporting groups (AAG and TAG) are applying the Two Roads Approach with the goal of integrating information and findings at the "bridges" of the knowledge systems (see Figure 1.3-2). Doing so has resulted in multiple opportunities for the SC, together with its advisory groups, to exchange information, learn from each other, and engage in the development of recommendations. The SC anticipates that through considering all "best available knowledge" to make decisions, strong indicators will be identified to monitor the MLWC that are informed by ITK and western scientific knowledge systems.

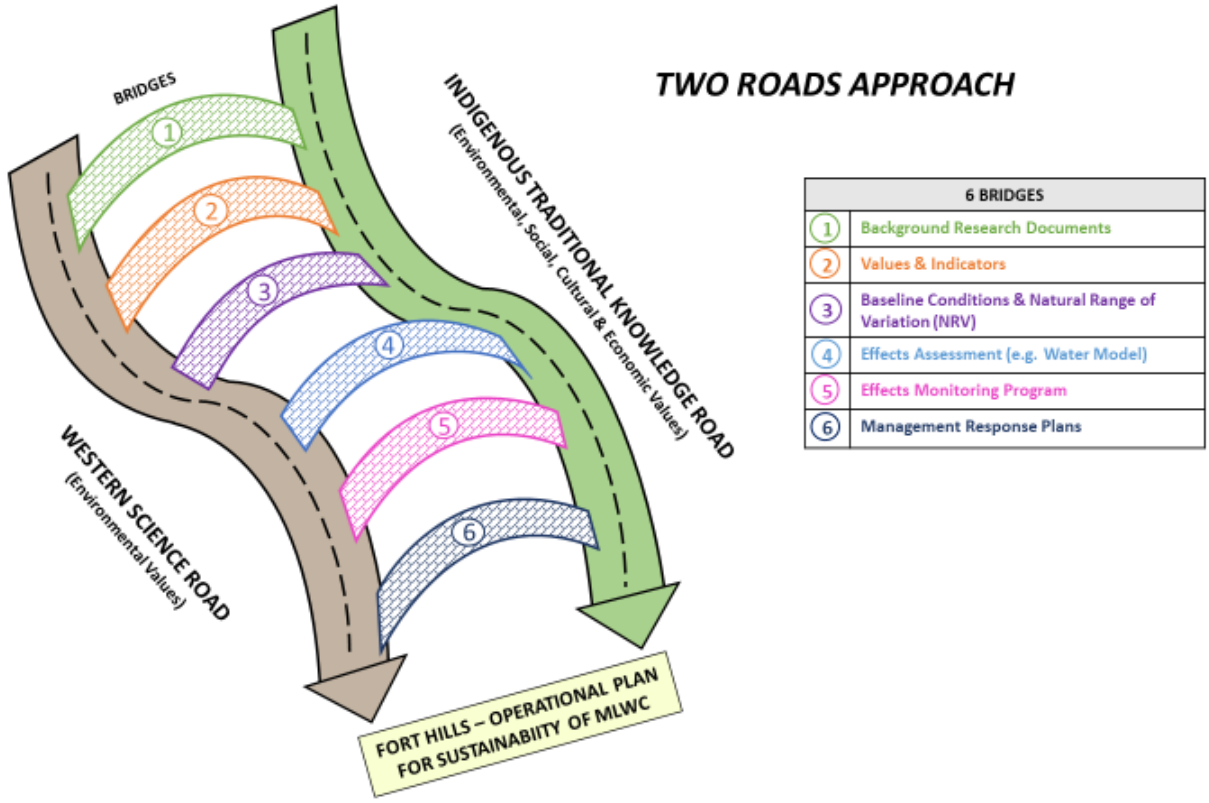



***Figure 1.3-2: Diagram of the Two Roads Approach to Support the Development of the Operational Plan***

## 1.3.2. Integration of Indigenous Traditional Knowledge

Indigenous communities have shared ITK information with the Fort Hills Project related to the nature, functionality, sustainability, and importance of the MLWC. The Fort Hills Project continues to build on its understanding of not only the biophysical but also the bio-cultural and socio-cultural values tied to the functionality and biodiversity of the MLWC, including how the area contributes to traditional uses, cultural practices, lifestyles and knowledge transfer. Traditional knowledge has informed and improved collective biophysical understanding of the MLWC, such as:

- holistic approach to understanding the connectivity of the ecosystem (everything is connected)
- historical water level and climate impacts (lake levels and ice)
- surface and groundwater flow system (inflows, outflows, springs)

- vegetation types and patterns
- landforms (small lakes, wetland formation, permafrost, soil types, beaver impacts)
- wildlife activity (mammal, bird and amphibian use)
- lake ecology (aquatic ecosystem and fish activity)

This significant collection of ITK highlights the importance of understanding the holistic function and connectivity of the land and waters with health, wellness, culture and livelihoods of the community.

*"Everything has Specific a purpose – everything is connected" E. Faichney 2001*

The Fort Hills Project recognizes the value of incorporating and integrating ITK into the OP to build a robust monitoring program, develop strong environmental mitigations and inclusion of mitigations for social, cultural, and traditional economic impacts of the project. Together with the SC, FHEC continues to build its understanding of the bio-physical, bio-cultural, and socio-cultural values of the MLWC to sustain its functionality and hence the use of the MLWC by Indigenous communities.

### 1.3.3. Sustainability Committee Collaboration on the Operational Plan

Working with the SC, a number of baseline monitoring programs were established in 2008 that continue today. Input from the SC in 2012 expressed concern related to how FHEC was planning to address ITK in submissions, and the extent to which planned baseline and future effects monitoring programs addressed community concerns, cultural values, and cumulative regional impacts.

Over the course of 2014 and 2015, SC members and FHEC met several times to jointly develop revised Terms of Reference for the SC and for the creation of technical advisory groups. An Aboriginal Advisory Group was proposed to address challenges in identifying ITK, and incorporating this knowledge into baseline programs, and in the development and execution of baseline monitoring programs. Those discussions and the associated work arising from them led to the revised SC and advisory group structure in 2015 (as detailed in Figure 1.3-1). The supporting advisory groups were stood up and established from 2015-2017.

Additional ITK gathering studies for the participating communities were initiated in 2017 and some communities continue to progress this effort. The SC has collaborated on numerous technical reviews, on the land gatherings, and meetings and workshops to gather input and traditional knowledge on baseline information, values, and indicators. FHEC continued to work with the SC and advisory groups and in December of 2018, submitted to the AER a proposal to develop an OP for the sustainability of the non-mined portion of the MLWC in accordance with the IRP, as required by the *Water Act* Approval. Since 2018, the SC and advisory groups have reviewed and provided feedback on the annual progress reports.

The SC has provided input to many aspects of the OP in line with the bridges of the Two Roads Approach, including:

- Background research, baseline conditions and natural ranges of variability (Objective 1):
  - Review of baseline monitoring reports, ITK gathering by Indigenous Communities, compilation of baseline and NRV information from ITK studies, validation of studies and reports
  - Work continues to gather ITK

- Values and indicators (Objective 2):
  - On the land gatherings, workshops on values and functions of MLWC, values and indicator workshops (including environmental, social, cultural and traditional economic aspects), workshops on methodology and metrics to assess social, cultural and traditional economic use, validation of studies and reports
- Effects assessment and mitigation (Objectives 3 and 4):
  - Workshops to review mine plans, engineering mitigations and reclamation plans, review of water modelling reports, workshops on water modelling including integration of ITK into water models
  - Work continues on mitigations appropriate for socio-cultural and traditional use impacts
- Effects monitoring program (Objective 5):
  - Review of progress reports, TAG and AAG review and recommendations to the Environmental Effects Monitoring program
  - Work continues to develop monitoring program for environmental, social, cultural, traditional economy indicators informed by traditional knowledge
- Management response plan (Objective 6)
  - Discussion at SC meetings
  - Work continues on management response to social, cultural, traditional economy indicators and integration with other indicators

The materials shared and produced through these meetings, workshops and reports have been used and the feedback received has been considered and integrated throughout the OP in the appropriate Objective. FHEC is grateful for the feedback provided and collaborative nature of the SC and would like to acknowledge that the sharing of knowledge and participation in meetings is not to be construed as all community members or technical advisors endorsing or supporting mining operations in the MLWC, nor full endorsement for the materials presented during the meetings.

In the summer of 2021, the SC reviewed early draft sections of this OP, met to discuss each Objective and provided FHEC with detailed technical and community feedback. FHEC acknowledges that review of the draft Objectives out of sequence was challenging to review. FHEC gathered the feedback on the early drafts, incorporated revisions, provided responses to the feedback and shared a second draft of the OP (as a complete document) with the SC to gather additional feedback, validate ITK integration and solicit support for the OP. The comments provided by the SC and FHEC's responses to those comments, on both the early drafts and the compiled draft, are provided in Attachment 2.

## 1.4. Operational Plan Organization

This OP describes how the function of the non-mined portion of the MLWC will be maintained during mine operations and closure for the Fort Hills Project.

The *Water Act* Approval outlines several requirements for the OP in Condition 3.13. These requirements have been used to outline six objectives to guide the development of the OP. These objectives are shown visually in Figure 1.4-1.

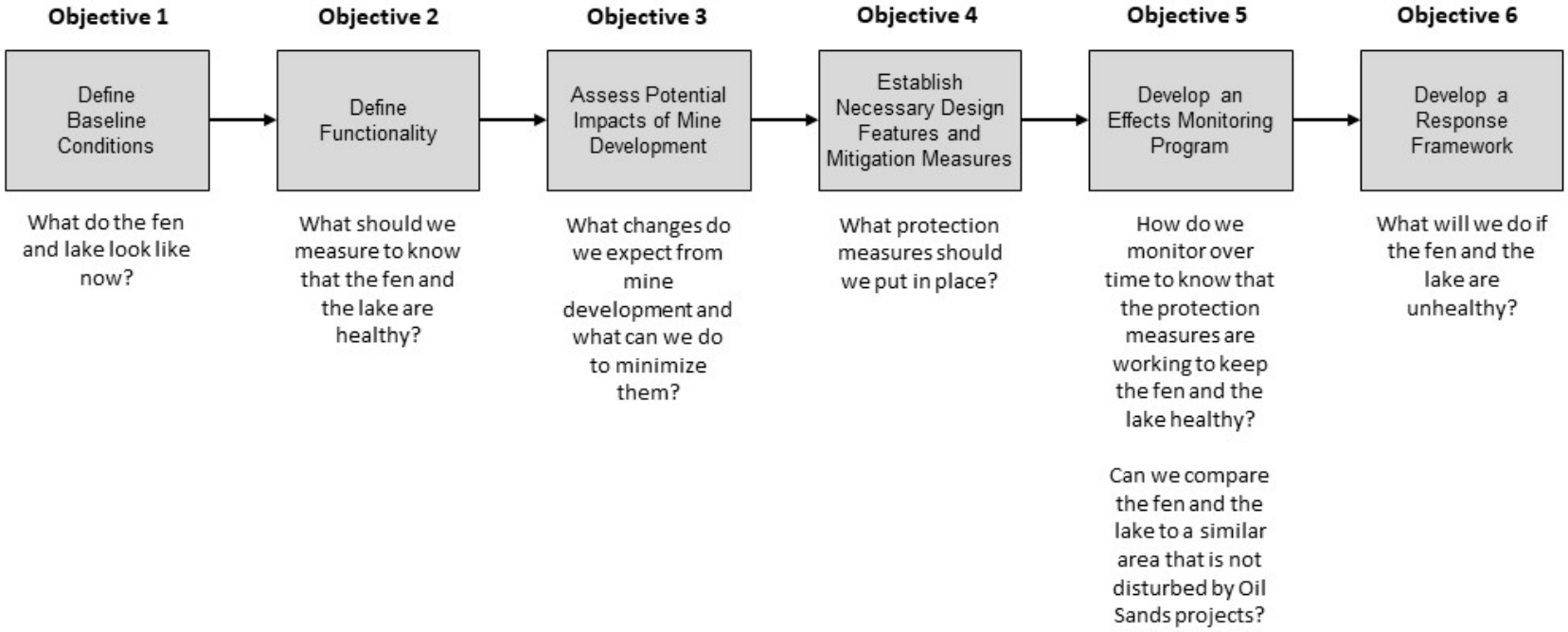



***Figure 1.4-1: Operational Plan Objectives***

The first objective defines baseline conditions for the physical and biological conditions of the MLWC. Objective 1 can be found in Section 2. Baseline conditions in the MLWC watershed have been monitored since 2000, prior to filing of the initial Fort Hills Project application. This baseline monitoring has included levels and metrics relating to surface water, groundwater, water quality, vegetation, fish, amphibians, birds and wildlife. Understanding baseline conditions in the MLWC was the critical first step in the development of the OP, as it set the stage for the completion of the other five objectives. The Fort Hills Project considered three sources of information to define baseline conditions for the MLWC: ITK, Paleo-Environmental Data, and Monitoring Data. Objective 1 is considered complete for the purposes of the OP submission. Baseline monitoring will continue until ditching and draining for mine pit preparations commences in the watershed. Additional work will be conducted with the SC to establish baseline conditions for the community-led Environmental, Social, Cultural and Traditional Economy (ESCT) indicators.

The second objective defines functionality, which, broadly speaking, refers to the individual and collective physical, hydrological, chemical, and biological processes performed by the MLWC that relate directly to the characteristics of the ecosystem and its capacity to interact with the adjacent landscape. Objective 2 can be found in Section 3, and its purpose is to develop a suite of indicators that "evaluate the tolerance of the MLWC to Project effects" and "maintain ecosystem diversity and function of the non-mined portions of the MLWC during operation and reclamation of the Project" (*Water Act* Approval Conditions 3.13 [f] and [g]). The MLWC also performs social and cultural functions that go beyond the ecological functions and are viewed as critical to the overall function of the MLWC. Functionality is linked to the baseline conditions described under Objective 1. Objective 2 is considered complete for the purposes of the OP submission. FHEC will continue to collaborate with the SC, TAG and AAG on the suite of indicators used to measure functionality. Additional work will be conducted with the SC to develop functionality metrics for the community-led ESCT indicators.

The third objective is to assess potential impacts of mine development on the non-mined portion of the MLWC. Objective 3 can be found in Section 4. Understanding the potential impacts on the non-mined portion of the MLWC due to continued development of the Fort Hills Project is critical to determining the design features and contingency mitigation measures that will be required to maintain the functionality of the MLWC (Objective 4) and will also guide aspects of the monitoring program to be set out under Objective 5. To assess the potential impacts of mine development, baseline conditions as set out in Objective 1 were used as inputs into numerical models that have been used to simulate both mine operations and closure. Objective 3 is considered complete for the purposes of the OP submission. Additional iterations of the numerical model and the conceptual model will be completed as future baseline monitoring is collected. Additional work will be conducted with the AAG and the SC to use ITK to guide the ongoing progression of the conceptual and numerical models. The models will be used to assess and/or predict the effectiveness of mitigations.

The fourth objective establishes necessary design features and contingency mitigation measures for the Fort Hills Project that are intended to ensure that effects of the Fort Hills Project do not adversely affect the functionality of the non-mined portions of the MLWC. Objective 4 can be found in Section 5. The design features will aid in managing and controlling future changes to the water quantity and quality in the non-mined portion of the MLWC that may result from the Fort Hills Project during the operational and reclamation periods, as well as post-closure (i.e., after reclamation is complete and when runoff from the reclaimed areas starts to release to the receiving environment). The design features also consider the operational need to hydrologically isolate the active mining areas from the non-mined portion of the MLWC. Objective 4 considers conceptual options for the system components to be

constructed throughout the life of the mine; progression of further design development prior to implementation of the design features is required. The SC will continue to contribute to mitigation measure development including detailed designs and will further develop mitigations around access and security management and avoidance or minimization of the effects detected through the ESCT indicators.

The fifth objective develops an effects monitoring program and can be found in Section 6. The effects monitoring program is designed to detect Fort Hills Project effects in the non-mined portion of the MLWC. The effects monitoring program builds upon Objectives 1 and 2, and is informed by Objectives 3 and 4. The response framework associated with the effects monitoring program is described under Objective 6. The effects monitoring program is designed to meet *Water Act* Approval Conditions 3.13 (c), (d) and (e). The monitoring of reference site(s) (or ecosystems) will allow comparison of potential changes to the MLWC to natural sites that are similar in nature but are not disturbed by the Fort Hills Project. Objective 5 is considered complete for the purposes of the OP Submission; the effects monitoring program will continue to be refined as needed based on continued data collection and as engineering matures on the design features, and to that affect, FHEC will continue to work with the SC and supporting advisory groups.

The sixth objective develops a response framework and can be found in Section 7. The response framework provides a systematic approach for responding to the results of the effects monitoring program described under Objective 5. Triggers (i.e., threshold values) and limits (i.e., clear boundaries in the system not to be exceeded) are defined, and potential management actions or responses are identified if unacceptable changes or trends are detected, and these changes or trends are determined to be a result of the Fort Hills Project. The response framework builds upon information provided in the previous five objectives. Objective 6 is considered complete for the purposes of the OP submission and provides a framework. FHEC will continue to work with the SC to refine the framework as required.

Concordance tables of the content of the OP, with both the OP Proposal and Conditions 3.11, 3.12, 3.13, and 3.14 of *Water Act* Approval, are provided in Attachment 3.

## 1.5. Operational Plan Progression

This OP has been developed over the course of many years. FHEC's understanding of the MLWC is based on the collection, interpretation and assessment of numerous sources of data (such as ITK and western science collected data) using currently accepted models (both developed specifically for the OP as well as standard modelling software) and approaches. FHEC recognizes that as additional data is gathered and the OP is implemented, the understanding of the MLWC may continue to evolve. FHEC will have the opportunity to provide updated understanding through ongoing monitoring and submissions that support implementation of the design features. The OP may be updated over time to reflect updated understanding.

In addition, the OP is expected to be in place throughout the operational and active closure phases of the Fort Hills Project, which is several decades in length. During this time period, it is expected that technology will continue to advance and approaches will continue to be evaluated and updated, which could lead to improved technology or processes to continue to help protect the non-mined portion of the MLWC.

Some aspects of the OP include conceptual levels of design (i.e., the design features in Objective 4) that will be influenced through collection of additional information prior to design finalization and construction. In addition, some of the selected indicators that will be used to measure outcomes of

operations and the applied mitigation will become better defined in terms of seasonal and annual variability as data is collected prior to development of the components of the project that will affect the MLWC. This on-going collection of data increases the certainty that the measured range of variation expected for the indicators is known before potential effects can occur.

## 1.6. Project Schedule

Condition 3.14 of the Fort Hills Project *Water Act* Approval states that "The Approval Holder shall implement the OP as authorized in writing by the Director two years prior to any ditching or drainage for mine pit preparations in the McClelland Lake Watershed." With an OP submission filing date of December 15, 2021 and current plans to commence ditching and draining in the watershed as part of mine pit preparation activities in 2025, FHEC is planning for regulatory authorization of the OP by 2023. Following authorization, FHEC will begin to implement the OP in accordance with the schedule for implementing each component of the OP, as shown in Table 1.6-1.

The mine progression of the Fort Hills Project is shown on Figure 1.6-1. The mining progression shows the mine pit boundaries in relation to the MLWC watershed boundary as well as structures external to the mine pit such as tailings areas, plant site, and reclamation material stockpiles. Overburden mining is planned to progress into the MLWC watershed by 2028, as part of the North Pit mine and if the OP is authorized.

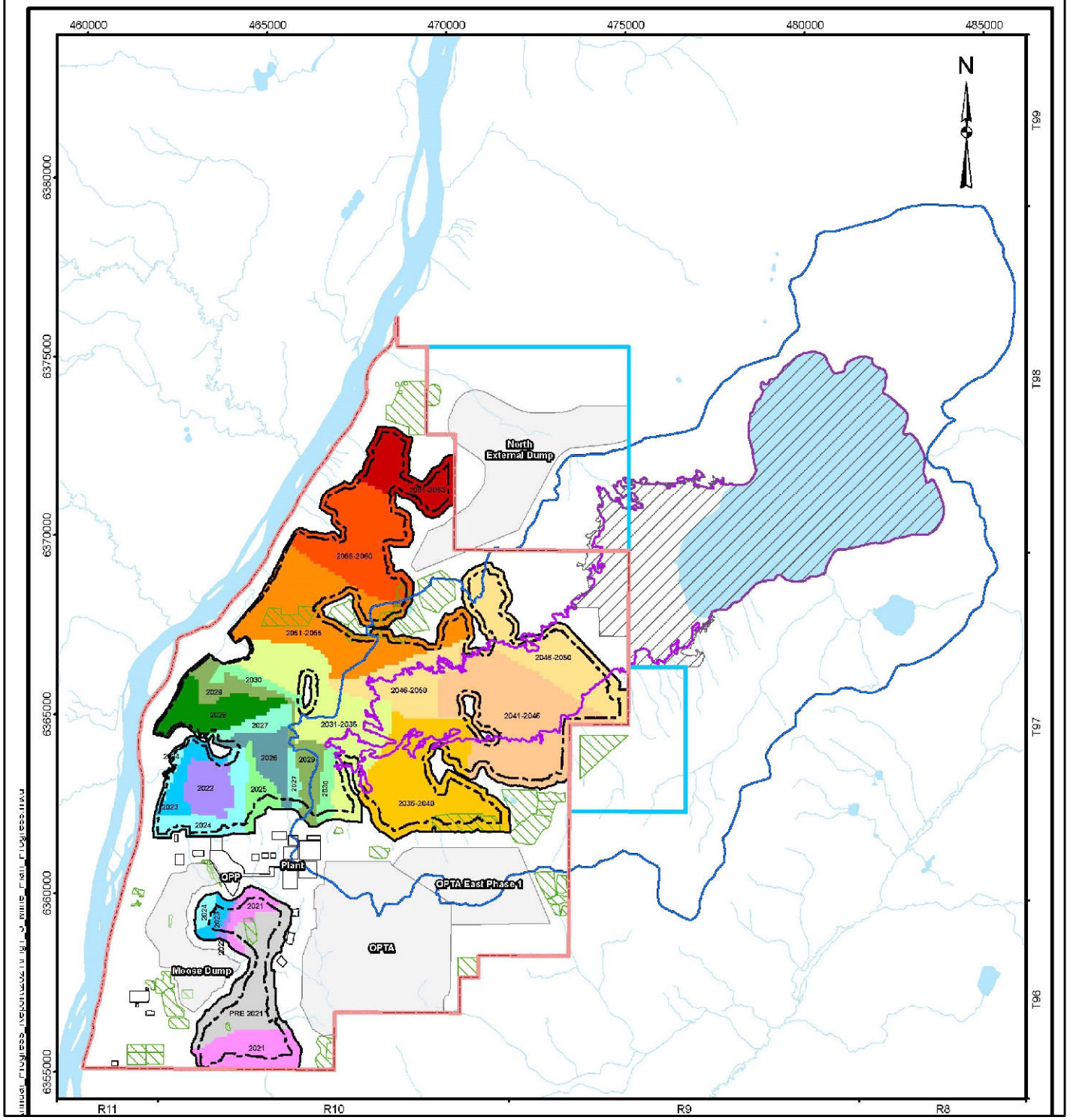
Following authorization, the baseline tier of effects monitoring would continue until ditching and draining in the watershed begins, followed by a staged approach of construction of the design features. Early modelling indicates that substantive design features (such as a cutoff wall) may not be required to be in place to sustain the non-mined portion of the MLWC until the late 2030s. Further details on this phased approach can be found in Objective 4 (Section 5)

Table 1.6-1 provides a high-level overview of the major construction and operational milestones from 2023 to 2031, taking in to account an assumed OP authorization in 2023. FHEC plans to use further detailed modelling to best optimize the implementation timeline to ensure that the Fort Hills Project does not adversely affect the functionality of the non-mined portion of the MLWC. Further information and more details on these milestones and the schedule are included in further sections of the OP (Objectives 4, 5 and 6).

Annual Progress Reports, as required by the *Water Act* Approval, will continue to be provided to the AER by January 31st of each year until the OP is authorized, which is assumed to occur in 2023. Progress Reports are expected to be filed in January 2022, January 2023 and January 2024.

FHEC proposes that a comprehensive report describing monitoring activities and outcomes for both the integrated monitoring and the ESCT program, as well as updates on other activities, including mitigation design, occurring under the OP, will be provided to the AER and shared with the SC annually starting in 2025. Summary updates can be shared with the SC during meetings, workshops or on-the-land gatherings, preferably coordinated with the ESCT program.

Additionally, in accordance with its *Water Act* Approval, FHEC will submit detailed engineering designs at least six months prior to the start of associated construction activities for a design feature. Further work with the SC will be conducted to develop and initiate ESCT monitoring programs, monitor the performance of the OP, develop detailed designs on components of the mitigations, and further understand and mitigate impacts to the usability of the area. Continued engagement with the SC and supporting advisory committees is an important component of the OP. Further details are provided in the next section.




**LEGEND**

- Pit Toe
- Pit Crest
- Extension Areas as proposed in the Integrated Plan Amendment Application
- Watercourse
- Waterbody
- Approved Project Area
- Stockpiles
- External Dumps
- Non-mined Portion of MLWC
- Wetland Complex
- McClelland Lake Surface Watershed
- PRE 2021
- 2021
- 2022
- 2023
- 2024
- 2025
- 2026
- 2027
- 2028
- 2029
- 2030
- 2031-2035
- 2036-2040
- 2041-2045
- 2046-2050
- 2051-2055
- 2056-2060
- 2061-2063

CLIENT
FORT HILLS ENERGY CORPORATION

PROJECT
McCLELLAND LAKE WETLAND COMPLEX - OPERATIONAL PLAN

TITLE
**MINE PLAN PROGRESS**

FORT HILLS
Operated by Suncor Energy

| | |
|---|---|
| YYYY-MM-DD | 2021-12-14 |
| DESIGNED | SUNCOR |
| PREPARED | SUNCOR |
| REVIEWED | ZG |
| APPROVED | JH |

| PROJECT NO. | CONTROL | REV. | FIGURE |
|---|---|---|---|
| 20140450 | | 0 | 1.6-1 |

***Table 1.6-1: Milestone Timeline for Implementation of the Operational Plan***

| Activities | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Authorization of OP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Implementation of the OP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ditching & Draining in MLWC Watershed | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Overburden Mining in MLWC Watershed | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Surface Water Management Facilities | | | | Phase 1 | | | | Phase 2 | | | | | Phase 3 | | | | | | | | | | | | | | | | | |
| Groundwater Management Facilities | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Working Platform | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| North Outwash Plains Injection Wells | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cutoff Wall | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fort Hills Groundwater Pumping Wells | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Effects Monitoring Program | Baseline Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Response Framework | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Design Feature Operations | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Progress Report | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Annual OP reporting | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

## 1.7. Commitments to Future Work with the Sustainability Committee

There are a number of commitments made throughout the OP on future work with the SC. To be clear and transparent on those commitments, they have been included in Table 1.7-1.

***Table 1.7-1: Table of Commitments to Future Work with the Sustainability Committee***

| | |
|---|---|
| **Meetings and Workshops to be held in 2022** | **Vegetation monitoring workshop** - gather input on monitoring program, field logistics |
| | **Wildlife workshop (part of site-wide program specific to MLWC)** - gather input on monitoring program, share findings, gather input on mitigations |
| | **Water monitoring workshop** - gather input on monitoring program, field logistics |
| | **Reference sites workshop(s)** - discuss reference sites, gather input on reference site monitoring program |
| | **Cultural ceremony** at McClelland Lake with community members and Fort Hills Project team (pending COVID restrictions) |
| | **ESCT program** - support for further discussions and workshops with the intention to initiate the program in 2022. |
| **Future and Continued Work** | Commitment to continue to work with SC and AAG on non-engineered mitigations (access management, security, cultural, spiritual, education and wellness practice) to further develop and implement appropriate mitigations for the Fort Hills Project. |
| | Continue to seek opportunities for community member involvement in monitoring programs. |
| | ESCT program - support initiation of the program in 2022, share plans and results in annual submissions to AER. |
| | Commitment to work staged engineering mitigation plans (e.g., water source, cutoff wall, resupply system) in collaboration with the SC and its Advisory Groups to share information, review and gather input. |
| | Operating philosophy workshop – to gather input on the overall operating philosophy for the water management system. |
| | Water modelling workshops – further refinement of conceptual, water quality and water quantity models. Commitment to update the numerical and conceptual models for water quantity. Commitment to update the numerical and conceptual models for water quality as described in the roadmap included in Objective 3. It is also hoped that the AAG and others can assist in incorporating ITK into the MLWC models (observational data and model validation). FHEC encourages ACFN and MCFN to share their work on Indigenous Water Quality Criteria; while these criteria would not be used directly for MLWC they would be a useful reference. |
| **General Commitments** | Commitment to SC work continuing through operation and reclamation including ongoing SC engagement on the reclamation and closure plans for the MLWC watershed. |
| | Commitment to ongoing SC engagement on the EEM program - sharing findings and results of EEM with the SC. |
| | Commitment to ongoing SC engagement on the Response Framework. This could include workshops and discussion on the response framework details and how the framework can be updated as additional information becomes available. |
| | Commitment to incorporate additional ITK as it becomes available and is authorized for use. |
| | Annual reports describing monitoring activities and outcomes for both the integrated monitoring and the ESCT program, as well as updates on other activities (including mitigation design) occurring under the OP, will be provided to the AER and shared with the SC annually starting in 2025. Summary updates can be shared with the SC during meetings, workshops or on-the-land gatherings, preferably coordinated with the ESCT program. |

AAG = Aboriginal Advisory Group; ACFN = Athabasca Chipewyan First Nation; AER = Alberta Energy Regulator; EEM = Environmental Effects Monitoring; ESCT = Environmental, social, cultural, and traditional economic values and land use; FHEC = Fort Hills Energy Corporation; ITK = Indigenous Traditional Knowledge; MCFN = Mikisew Cree First Nation; MLWC = McClelland Lake Wetland Complex; OP = Operational Plan; SC = Sustainability Committee.

# REFERENCES

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# ABBREVIATIONS, ACRONYMS, AND UNITS

## Abbreviations and Acronyms

| Abbreviation/Acronym | Definition |
|---|---|
| AAG | Aboriginal Advisory Group |
| ACFN | Athabasca Chipewyan First Nation |
| AER | Alberta Energy Regulator |
| ASRD | Alberta Sustainable Resource Development |
| e.g., | for example |
| EEM | Environmental Effects Monitoring |
| FCM | Fort Chipewyan Métis Local #125 |
| FHELP | Fort Hills Energy Limited Partnership |
| Fort Hills Project | Fort Hills Oil Sands Project |
| FHEC | Fort Hills Energy Corporation |
| FHUC | Fort Hills Uplands Complex |
| FMFN | Fort McKay First Nation |
| FMMN | Fort McKay Métis Nation |
| i.e., | that is |
| IEG | Internal Ecology Group |
| ITK | Indigenous Traditional Knowledge |
| MCFN | Mikisew Cree First Nation |
| MLWC | McClelland Lake Wetland Complex |
| MRV | measured range of variability |
| NRV | natural range of variability |
| OP | Operational Plan |
| OSCA | Oil Sands Conservation Act |
| SC | Sustainability Committee |
| SEOI | Suncor Energy Operating Inc. |
| Suncor | Suncor Energy Inc. |
| ESCT | Environmental, social, cultural, and traditional economic values and land use |
| TAG | Technical Advisory Group |
| TrueNorth | TrueNorth Energy Limited Partnership |

## Units

| Units | Definition |
|---|---|
| % | percent |
| km | kilometre |
| $km^2$ | square kilometre |

# Attachment 1 McClelland Lake Wetland Complex - Agreement for Use and Sharing of Indigenous Traditional Knowledge and FHELP Confidential Information

This Agreement is made effective this 6th day of November, 2020 (the "**Effective Date**").

**MCCLELLAND LAKE WETLAND COMPLEX**

**AGREEMENT FOR USE AND SHARING OF INDIGENOUS TRADITIONAL KNOWLEDGE AND FHELP CONFIDENTIAL INFORMATION**

among:

**Athabasca Chipewyan First Nation** herein referred to as "**ACFN**" or "**Kài Tailé**"

- and -

**Fort Chipewyan Métis Local #125** herein referred to as "**FCML 125**"

- and -

**Fort McKay First Nation** herein referred to as "**FMFN**"

- and -

**Fort McKay Métis Nation** herein referred to as "**FMMN**"

- and -

**Mikisew Cree First Nation** herein referred to as "**MCFN**"

(collectively referred to as "**Communities**")

- and -

**Fort Hills Energy L.P.** by its Operator, Suncor Energy Operating Inc.
herein referred to as "**FHELP**"

**WHEREAS:**

A. Athabasca Chipewyan First Nation, the Mikisew Cree First Nation, and the Fort McKay First Nation adhere to Treaty 8 and assert Aboriginal rights within their traditional territories under section 35 of the *Constitution Act*, 1982, and the Fort Chipewyan Metis Local 125 and the Fort McKay Metis Nation assert unextinguished Aboriginal rights within their traditional territories under section 35 of the *Constitution Act*, 1982 ("**Aboriginal and Treaty Rights**");

B. Fort Hills Energy L.P., by its general partner, Fort Hills Energy Corporation ("**FHELP**") is the owner of the Fort Hills Project, within which a portion of the McClelland Lake Wetland Complex ("**MLWC**") is located, and is subject to an approval #00151636-01 under the *Water Act* (Alberta) (the "**Approval**") which requires FHELP to protect the non-mined portion of the MLWC (further defined below as the "**Operational Plan**");

C. The Communities and their Members wish to participate in the protection of the environment, their Community and culture and to engage in the Traditional Stewardship of their Traditional

Lands, including to use Indigenous Traditional Knowledge in such stewardship, in a manner which is consistent with their values and beliefs;

D. In respect of Indigenous Traditional Knowledge, or ITK, the Communities and their Members believe that:

   a. ITK is unique expertise that is transmitted by Indigenous Knowledge Holders (or ITK Holder(s)) and held collectively by Indigenous Communities, which encourages the responsible use and care of the Traditional Lands for generations. ITK Holders and their Communities' have formed world views, beliefs, customs, and values emergent from, and in obligation to, their special spiritual, social, cultural, and economic relationship with the Traditional Lands;

   b. ITK, by virtue of its origin, broad and fluid temporal nature of past, and generationally passed knowledge informing current and future knowledge, and custody of that knowledge is a living, cumulative, and often place-based phenomenon;

   c. ITK is shared by the Communities' ITK Holder(s) within its epistemological (world views, beliefs, informing knowledge), relational, and broad and fluid temporal context, with the understanding that it is not provided for extraction out of that context, or interpretation or application outside of this ownership and understanding. This includes inherent and inextricable stewardship ethics and reciprocal responsibilities for Indigenous management and sustainability of Traditional Lands that inform, and are informed by, that knowledge. Use or application of ITK outside of its context is unethical, compromises its integrity, and robs it of its inherent value and meaning; and

   d. Each Community inherently has custody over their collectively held ITK. This includes ownership, control, access and protection of ITK, including the right to teach ITK informed practices, customs, and traditions to future generations. As such, for the purposes of sharing ITK and permission for its subsequent use by FHELP, the Communities expect:

      i. to understand the purpose for which ITK may be used by those to whom it is disclosed, to freely agree to the disclosure to others for that limited purpose, or to refuse disclosure altogether;

      ii. to apply, interpret, validate, use and approve the use of ITK shared with others; and

      iii. to access (physically and intellectually) any work in which the ITK is used, referenced or incorporated;

E. To facilitate the participation and engagement of the Communities and their Members and to meet the requirements of the Approval, Suncor Energy Operating Inc. ("**Suncor**"), as operator and on behalf of FHELP, continues the stewardship of a Sustainability Committee, to inform the development of the Operational Plan as originally proposed by the then-owner of the Fort Hills Project, TrueNorth Energy Corporation in EUB Decision Report 2002-089. To facilitate the work of the Sustainability Committee, the Sustainability Committee has decided to form an Aboriginal Advisory Group and a Technical Advisory Group;

F. To fully participate in and engage in the work of in the Sustainability Committee, Aboriginal Advisory Group and Technical Advisory Group, the Communities have agreed to share Indigenous Traditional Knowledge with Suncor and FHELP for the purposes of the environmental stewardship of MLWC, including the Operational Plan, and FHELP has also

agreed to share certain of its Confidential Information pertaining to MLWC and the Operational Plan with the Communities and its Members;

G. As part of FHELP's stewardship and pursuant to the requirements of the Approval, including the Operational Plan, FHELP is also required to provide reports and submissions to the Alberta Energy Regulator summarizing certain environmental studies completed and technical information compiled by FHELP; and

H. Therefore, FHELP and the Communities also wish to agree on the terms and conditions upon which FHELP's Confidential Information and the Communities' Indigenous Traditional Knowledge will be shared and protected, as well as the framework and principles within which Indigenous Traditional Knowledge shared by the Communities with FHELP pursuant to this Agreement may be used or referred to in the Operational Plan and any Work Product.

**NOW THEREFORE,** in consideration of the terms and mutual promises set out in this Agreement, the Parties agree as follows:

## ARTICLE 1 DEFINITIONS

1.1 **Defined Terms**. In this Agreement, capitalized terms have the meaning set out below:

(a) **"Aboriginal Advisory Group"** or "**AAG"** means the Aboriginal Advisory Group of MLWC, a sub-committee of the MLWC Sustainability Committee, governed by the Terms of Reference dated January 24, 2020 (as amended or restated by the Parties from time to time).

(b) **"Aboriginal and Treaty Rights"** has the meaning given to it in the recitals.

(c) "**AER**" means the Alberta Energy Regulator, and its successor organization(s).

(d) **"Affiliate"** means, with respect to any Party, any other Person that is affiliated with such Party, and for the purposes hereof: (i) two Persons will be considered to be affiliated with one another if one of them controls the other, or if both of them are controlled by a common third party; and (ii) one Person will be considered to control another Person if it has the power to direct or cause the direction of the management and policies of the other Person, whether directly or indirectly, through one or more intermediaries or otherwise, and whether by virtue of the ownership of shares or other equity interests, the holding of voting rights or contractual rights, or otherwise. For the purposes of this Agreement, Suncor shall be deemed an Affiliate of FHELP.

(e) "**Agreement**" means this Agreement for Use and Sharing of Indigenous Traditional Knowledge and Data and FHELP Confidential Information.

(f) "**Approval**" has the meaning given to it in the recitals.

(g) "**Co-Chairs**" means the co-chairs of the Sustainability Committee.

(h) **"Communities"** means those Communities listed in the recitals, and "**Community**" means any of one of them.

(i) **"Community Representatives"** means the representative of each of the Communities that sit on the Sustainability Committee or AAG pursuant to the Terms of Reference.

(j) **"Confidential Information"** means all information of a confidential nature (including information in writing or transmitted or acquired orally, electronically, visually or by other

means) which a Party, directly or indirectly, acquires from another Party including Indigenous Traditional Knowledge, Work Product and any information concerning or relating to the Communities, Fort Hills Project, FHELP's business, MLWC, Cultural Heritage Resources, Sacred Sites, the Approval, Operational Plan or the Work, together with all raw data, analyses, evaluations, compilations, notes, meeting minutes, reports, studies or other documents prepared by any Party and their respective Personnel and, in the case of FHELP or Suncor, by their Consultants and their respective Personnel, containing or based upon such information.

(k) **"Consultants"** means those third party technical or other consultants contracted by FHELP or Suncor to provide technical and other services to support the Approval and the Operational Plan, and includes the Co-Chairs and members of Technical Advisory Group (TAG).

(l) "**Contract Representatives**" means those representatives identified for contract notices as listed in Section 7.1 Contract Representatives.

(m) **"Crown"** means either provincial or federal governments having jurisdiction and includes any ministries, departments, agencies or other organizations that act on behalf of such governments, including the AER.

(n) **"Cultural Heritage Resource"** means an object, a site or the location of a traditional societal practice that is of historical, cultural, spiritual or archaeological significance to the Community. It can also be any work of nature or of humans that is primarily of value to the Community for its paleontological, archaeological, prehistoric, historic, cultural, natural, scientific, economic, religious or aesthetic interest and including sites, structures or objects and historical and cultural records.

(o) **"Indigenous Traditional Knowledge"** or "**ITK"** means any and all cultural past, present and future knowledge including about the MLWC, McClelland Lake and connected adjacent areas, developed and held by Members, over which Members and Communities have collective rights, which includes but is not limited to:

(i) scientific knowledge;

(ii) technical knowledge;

(iii) environmental and ecological knowledge, including knowledge related to biodiversity;

(iv) medicinal knowledge, including related medicines and remedies;

(v) knowledge and oral transmissions of history, literature, customary law and genealogy;

(vi) expressions of legends, stories, history, and other cultural knowledge and material in the form of music; dance, song, handicrafts, designs, stories and artwork;

(vii) languages, including names, geographical indications and symbols;

(viii) knowledge of the evolving traditional economy; and

(ix) moveable cultural properties and objects.

ITK may take the form of:

(x) oral or written data or information;

(xi) oral stories and histories;

(xii) existing community reports;

(xiii) films;

(xiv) maps, drawings or pictures; and

(xv) shape files or other electronic geospatial data layers or files.

(p) **"ITK Holder"** means a Member who develops and holds ITK.

(q) "**Fort Hills Project**" means FHELP's oil sands project.

(r) "**FHEC**" means Fort Hills Energy Corporation, the general partner of FHELP.

(s) "**FHELP**" means Fort Hills Energy L.P.

(t) "**FHELP Confidential Information**" means the Confidential Information of FHELP, FHEC or Suncor as operator for FHELP.

(u) "**FHELP Contract Representative**" means FHELP's Contract Representative as set out in Section 7.1 Contract Representatives.

(v) **"Law" or "Laws"** means collectively all applicable common law, federal, provincial, state and municipal and other local laws, orders, rules, regulations and decisions of regulatory bodies, including, but not limited to, environmental protection legislation and other governmental requirements, work practices and procedures prescribed by law and related to a Party or MLWC, the Approval or the Operational Plan.

(w) **"Member"** means a Métis and/or First Nation individual who is a member of the Communities.

(x) **"McClelland Lake Wetland Complex"** or "**MLWC"** means the watershed that includes collectively McClelland Lake, the fen, and the adjacent upland drainage basin. The non-mined portion of the McClelland Lake Wetland Complex refers to the portion that is located outside of the planned mining area. It includes portions of the McClelland Lake Wetland Complex within, and outside, of the Fort Hills Project.

(y) **"Operational Plan"** means a required regulatory submission under OSCA Approval 9241 H Condition 8 and *Water Act* 00151636-01 (as may be renewed or amended), that outlines the impacts and mitigations measures proposed by FHELP for the sustainability of the non-mined portion of the MLWC through mining in the watershed. The Operational Plan requires AER approval prior to the performance of ditching and draining activities by FHELP for the purpose of mining in the MLWC.

(z) **"Party"** means each of the Communities and FHELP, and "**Parties**" means all of them.

(aa) "**Person**" means any individual, corporation, joint venture, partnership, governmental body or agency, association, cooperative, trust or unincorporated organization.

(bb) **"Personnel"** means the directors, officers, employees, secondees, agents, professional advisors and affiliates of a Party, as well as the directors, officers, employees, secondees, agents or professional advisors of each Affiliate.

(cc) **"Sacred Site"** means a site used or identified by the Communities or members of the Communities for sacred purposes including but not limited to, burial sites and sites of ceremonial, social, archaeological or cultural significance.

(dd) **"Suncor"** means Suncor Energy Operating Inc., the operator for FHELP.

(ee) **"Sustainability Committee"** or "**SC"** means that Sustainability Committee created pursuant to the regulatory requirements for the Fort Hills Project, governed by the Terms of Reference dated July 6, 2010 (as amended or restated by the Parties from time to time).

(ff) **"Technical Advisory Group"** or "**TAG"** means the Technical Advisory Group of MLWC, a sub-committee of the MLWC Sustainability Committee, governed by the Terms of Reference dated January 24, 2020 (as amended or restated by the Parties from time to time).

(gg) **"Traditional Lands"** means those lands identified by each Community as historically and/or presently used by the Members, and upon which they lived and/or currently live, and on which they exercise their held or asserted Aboriginal and Treaty Rights and sustain their cultural heritage and livelihoods.

(hh) **"Traditional Stewardship"** means the holistic interconnectedness between Communities and/or Community members and the ecosystems within their Traditional Territory and individuals' cultural obligation and responsibility to preserve and maintain the health and balance of those lands and resources in their role as stewards, as taught and observed through their culture, practices, beliefs, and customary law.

(ii) "**Work**" means all consulting, technical services, studies, testing, analysis and such other work to be performed by FHELP, Suncor or the Consultants, or by the SC, AAG or TAG, in relation to the Approval and the Operational Plan.

(jj) "**Work Product**" means any and all physical products (including any final reports and all supporting documentation) prepared by FHELP or its Consultants, the SC, AAG or TAG in relation to the Approval and the Operational Plan.

## ARTICLE 2 INDIGENOUS TRADITIONAL KNOWLEDGE

2.1 **General Understanding of Sharing and Use**. ITK is provided by the ITK Holder(s) to FHELP pursuant to this Agreement on the understanding that the Community and individual ITK Holder will be validating the interpretation and application of that ITK by FHELP throughout committees processes in furtherance of the Work and as part of the Work Product, through the framework set out in Article 4 Implementation. The purpose of the Agreement is to facilitate the respectful use, sharing, preservation and protection of ITK, having regard to the needs of the Parties as they work together in the spirit of mutual respect and understanding.

2.2 **Not Compelled**. Notwithstanding anything in this Agreement or the fact of this Agreement, neither the ITK Holder(s) nor the Communities are required or compelled to share ITK, Confidential Information, or any other information with FHELP, Suncor, the Consultants or any other Person for the purposes of the Work or for any other purpose.

2.3 **Scope of Use and Confidentiality**. Any and all ITK of a Community received by FHELP and other Communities under this Agreement (including any and all ITK received prior to the Effective Date

which is directly or indirectly concerning MLWC, the Work, the Approval or the Operational Plan) shall be held by FHELP and the other Communities in the strictest confidence as "Confidential Information" under this Agreement, whereby FHELP and the other Communities will make best efforts to safeguard ITK from unauthorized access, use, disclosure, modification, loss or theft. Subject to the terms of this Agreement, FHELP and Suncor may use ITK for the performance of the Work and incorporate the ITK into any Work Product, in accordance with this Agreement, supporting the Work so that ITK combined with western science informs such Work Product, including the Operational Plan, with the best available knowledge. FHELP may disclose ITK to the extent necessary to its Personnel or the Consultants (and its Personnel) who have a need to know the ITK in connection with the Work and who have been informed of the confidential nature of such ITK as set out in this Agreement. Unless written consent is obtained from the Community Representative of the Community of which that ITK Holder is a Member, ITK shared pursuant to this Agreement shall not be used by FHELP or other Communities for any other purpose than as set out in this Agreement.

2.4 **Designated Personnel**. FHELP shall maintain a list of Consultants to whom ITK has been disclosed pursuant to this Agreement and such list shall be made available to the Communities upon request.

2.5 **No Disclosure to Third Parties**. Subject to Section 2.3 Scope of Use and Confidentiality and Section 2.6 Work Product submitted to the Crown, no ITK shared pursuant to this Agreement will be shared with any other Person, including the Crown, unless written consent is obtained from the Community Representative of the Community of which that ITK Holder is a Member. If written consent is provided to such disclosure, that Person receiving the ITK must execute an agreement in form and substance acceptable to the ITK Holder and their Community and consistent with the terms of this Agreement, respecting the confidential nature of the ITK.

2.6 **Work Product submitted to the Crown**. Notwithstanding Section 2.5 No Disclosure to Third Parties but subject to obtaining the ITK Holder and their Community's input on the use, integration and representation of the ITK in any Work Product to be submitted to the Crown pursuant to the framework set out in Article 4 Implementation, any ITK shared pursuant to this Agreement that is used, integrated or represented in any Work Product, including the Operational Plan, which is required to be submitted to the Crown may be disclosed to the Crown as part of, and only as part of, that Work Product and only for the purposes of the Work.

2.7 **Reference to this Agreement in Crown Submissions**. FHELP will reference this Agreement in any Work Product required to be submitted to the Crown, including the Operational Plan, as disclosure of the ethical protocols and processes followed in collection and use of ITK solely for the Work and not for any other use or purposes.

2.8 **Disclosure Required by Law**. If any of FHELP, Suncor or their Consultants is required by Law to disclose any ITK, they shall provide the ITK Holder who provided the ITK and their Community with a prompt notice so that the ITK Holder and their Community may seek either a protective order or other appropriate remedy from a court or tribunal of competent jurisdiction. FHELP, Suncor or their Consultants, as the case may be, shall furnish only that portion of the ITK, which in the reasonable opinion of their legal counsel, is legally required.

2.9 **No Alteration of Aboriginal and Treaty Rights**. Nothing in this Agreement does or will abrogate, derogate, prejudice, alter, augment or supplement a Community's Aboriginal and Treaty Rights and interests in the Traditional Lands.

## ARTICLE 3 FHELP CONFIDENTIAL INFORMATION

3.1 **FHELP and Suncor Confidential Information**. Any and all FHELP Confidential Information that is received by the Communities under this Agreement (including any FHELP Confidential Information received prior to the Effective Date which is directly or indirectly concerning MLWC, the

Work, the Approval or the Operational Plan) shall be held by the Communities in the strictest confidence as "Confidential Information" under this Agreement, and the Communities will make reasonable efforts to safeguard the FHELP Confidential Information from unauthorized access, use, disclosure, modification, loss or theft.

3.2 **No Disclosure to Third Parties**. FHELP Confidential Information shall not be disclosed by the Communities to any Person who is not a Party to this Agreement or for purposes other than to further the Work, unless written consent is obtained from the FHELP Contract Representative. If written consent is provided to such disclosure, that Person receiving the FHELP Confidential Information must execute an agreement in form and substance acceptable to FHELP consistent with the terms of this Agreement.

3.3 **Disclosure Required by Law**. If any of the Communities are required by Law to disclose any FHELP Confidential Information, it shall provide the FHELP Contract Representative with a prompt notice so that FHELP may seek either a protective order or other appropriate remedy from a court or tribunal of competent jurisdiction. In the event such protective order or other appropriate remedy is not obtained, the Communities shall furnish only that portion of the FHELP Confidential Information which, in the reasonable opinion of their legal counsel, is legally required.

3.4 **Not Compelled**. Notwithstanding anything in this Agreement or the fact of this Agreement, FHELP is not required or compelled to share FHELP Confidential Information with the Communities for the purposes of the Work, or for any other purpose. However, FHELP and the Communities will work together reasonably and in good faith within the mandate of the Sustainability Committee to determine what FHELP Confidential Information may be shared with the Communities and for what purpose.

## ARTICLE 4 IMPLEMENTATION

4.1 **Implementation by the Communities**. The Communities may implement best practices, guidelines, principles, processes and protocols that are suitable to each of them, in each of their own discretions, for the ethical collection, use and preservation of ITK from their respective Members and ITK Holders. Such guidelines, principles, processes and protocols may govern the following activities:

(a) identification and engagement of ITK Holders who may have ITK relevant to the Work, including any support needed to allow ITK Holders to understand the request for sharing;

(b) documentation requirements, including records of the ITK collected and consents to disclosure from ITK Holders; and

(c) approvals from Community leadership, where necessary.

Regarding sharing and use of such ITK with FHELP pursuant to this Agreement. FHELP will support and respect the Communities' expectations of best and ethical practices, guidelines, principles, processes and protocols for sharing and use of their ITK.

4.2 **Control and Access of ITK**. The Parties acknowledges that each ITK Holder and their Community may:

(a) determine who may approach ITK Holders to obtain ITK (for the avoidance of doubt, FHELP and its Consultants may not approach ITK Holders directly without the engagement of Community Representatives);

(b) determine what ITK may be shared;

(c) determine when, how, with whom, and for what purpose ITK may be shared, and obtain the necessary information that allows for such determination may be made;

(d) as an ITK Holder, choose to remain an anonymous source of ITK;

(e) require and verify that the ITK shared with FHELP is accurately and respectfully communicated, interpreted, documented, accredited, preserved, and protected, including to seek restrictions regarding its use; and

(f) work collaboratively to understand how the ITK is used for development and implementation of the Operational Plan, including access to data, Work or Work Products produced.

4.3 **Framework for Use of ITK in the Work Product**. The Parties agree on the following framework for the review of FHELP's use of ITK in the performance of the Work and for integration of the ITK into any Work Product:

(a) FHELP and the Community Representatives will identify any Work or Work Product that may rely or consider ITK well in advance of the need to collect and use that ITK, so that ITK Holders have the opportunity to consider the request for sharing prior to any engagement through interviews or meetings;

(b) in order to ensure that the Communities and ITK Holders have all of the necessary information upon which to consent to the disclosure of specific ITK, FHELP and the Community Representatives will provide sufficient details as to:

(i) the purposes for which the ITK is intended to be used as part of the Work;

(ii) the manner in which the ITK will be recorded in the Work Product; and

(iii) the content of and manner in which any ITK will be disclosed as part of the Work or Work Product.

(c) Subject to Section 2.2 of this Agreement, FHELP and its Consultants will work with the Community Representative(s) to advance the understanding of, and ensure the appropriate and agreed upon integration of ITK into any Work Product, including by:

(i) respecting and presenting the information provided by the ITK Holders(s) accurately in the Work Product, supported by the contextual guidance provided by the ITK Holder and the Community Representative(s);

(ii) providing draft Work Product containing ITK in a timely manner to the Community Representative(s) who shall have the right to review the information to ensure its accuracy;

(iii) providing all data, information, records and reports collected with ITK or incorporating or referencing ITK; and

(iv) upon completion of the Work, ensure that any ITK shared (to the extent not embedded in Work Product that is submitted to the Crown as permitted by this Agreement) is returned to the Communities;

and

(d) before the Parties provide any Work Product containing ITK to a third party, including the Crown, they shall:

(i) ensure that the specific location of Sacred Sites and Cultural Heritage Resources are not disclosed;

(ii) comply with any restrictions on the dissemination or use of transmitted ITK as reasonably requested by the Community and the ITK Holder;

(iii) provide a copy of the Work Product to the Community and the ITK Holder, and inform their Community Representative;

(iv) provide the Community and the ITK Holder a reasonable opportunity to review and verify the accuracy and appropriateness of the Work Product, including any interpretation or analysis of the ITK; and

(v) the Parties shall discuss, address and resolve any concerns of the Community and the ITK Holder, represented by the Community Representatives.

The Parties may agree on such other measures as may be desirable from time to time to achieve the general objectives of the framework set out in this Article.

**ARTICLE 5 DISPUTE RESOLUTION**

5.1 **Good Faith Resolution.** To the extent that there are any concerns, disagreements or disputes that arise in connection with this Agreement, the Parties agree to bring forward to the Sustainability Committee all such matters or issues of concern for discussion and resolution, on a timely basis. The Parties agree to work together, reasonably and in good faith, to resolve any concerns, disagreements or disputes wherever possible.

5.2 **Unresolved Disputes**. To the extent that the Parties are unable to resolve any disputes pursuant to Section 5.1 Good Faith Resolution, the Parties may proceed to formal dispute resolution processes before a court or tribunal of competent jurisdiction, as may be necessary to enforce the terms of this Agreement and as may be required by Law.

5.3 **Injunctive Relief**. Notwithstanding Section 5.1 Good Faith Resolution, due to the nature of ITK and Confidential Information and the seriousness of the breach of any of the Parties' breach of their confidentiality obligations under this Agreement, the Parties agree that each Party may seek injunctive relief to prevent breaches of this Agreement and in order to protect the ITK and the Confidential Information, and to specifically enforce this Agreement, in addition to any other remedy to which the particular Party may be entitled at Law or in equity.

**ARTICLE 6 TERM, WITHDRAWAL OF ITK AND TERMINATION**

6.1 **Term**. This Agreement shall be effective as of the Effective Date and continue until such time as the Work is completed, unless terminated in whole or in part in accordance with this Article.

6.2 **Survival of Obligations.** The expiry or termination of this Agreement, in whole or in part, does not relieve a Party of the confidentiality obligations imposed by this Agreement with respect to the Confidential Information including ITK received by that Party pursuant to this Agreement.

6.3 **Withdrawal of ITK**. At any time, the Communities or ITK Holder may, through their Community Representatives, withdraw any ITK disclosed to FHELP pursuant to this Agreement upon written notice to the FHELP representative on the Sustainability Committee. Once withdrawn, no Party shall use such withdrawn ITK for any purpose whatsoever. Notwithstanding the foregoing, the

Communities and each ITK Holder understand and agree that once any Work Product, including any progress reports and the Operational Plan, is submitted by FHELP to the Crown, that Work Product may become a public record, including ITK contained within.

6.4 **Termination by a Party**. At any time upon reasonable written notice to the other Parties to the Contract Representatives identified in Section 7.1 Contract Representatives, any Party may terminate this Agreement, in which case:

(a) this Agreement shall terminate only with respect to that Party, on the date specified in the written notice;

(b) any ITK or Confidential Information shared by the terminating Party shall not be used by any of the remaining Parties after the specified date of the termination; and

(c) this Agreement shall continue with full force and effect with respect to all other Parties.

6.5 **Return of ITK**. Upon the expiry or termination of this Agreement pursuant to Section 6.1 Term or 6.4 Termination by a Party, the withdrawal of ITK pursuant to Section 6.3 Withdrawal of ITK, or upon the written request of the Community which provided that ITK, the Parties in receipt of another Party's ITK shall:

(a) return to the Community all of that Community's ITK; and

(b) use best efforts and to the extent practically possible, destroy or render unusable all ITK in the possession of or stored electronically by the Parties.

Notwithstanding the foregoing, FHELP may retain any Work Product containing ITK that have been accepted and verified by the Community or has been submitted to the Crown, for operational and archival purposes, and at all times such retained Work Product and ITK shall continue to be subject to the confidentiality obligations under this Agreement.

6.6 **Return of FHELP Confidential Information**. Upon the expiry or termination of this Agreement pursuant to Section 6.1 Term or 6.4 Termination by a Party or upon the written request of FHELP, the Communities shall:

(a) return to FHELP all FHELP Confidential Information, and all written or electronic records, recordings, data, notes, transcriptions, and working documents containing or referencing FHELP Confidential Information; and

(b) use best efforts and to the extent practically possible, destroy or render unusable all remaining FHELP Confidential Information in their possession of or stored electronically by the Parties.

## ARTICLE 7 MISCELLANEOUS

7.1 **Contract Representatives.** Where notice is required to be given to a Contract Representative under this Agreement, it shall be given in writing and shall be electronically mailed, faxed, mailed or delivered to the intended Party at the address specified below for such Party. All notices delivered under this Section shall be deemed to have been duly given when transmitted by electronic mail, facsimile or personally delivered or, in the case of a mailed notice, upon receipt.

**TO: FHELP Contract Representative**

Fort Hills Energy Limited Partnership
by its Operator, Suncor Energy Operating Inc.

P.O. Box 2844
150 – 6th Avenue S.W.
Calgary, AB T2P 3E3

Attention: Director, Legal Affairs, Oil Sands, In-Situ & Fort Hills
Fax: (403) 724-3475

Copy to: FHELP Representative on the Sustainability Committee

**TO: ATHABASCA CHIPEWYAN FIRST NATION also known as KÀI TAILÉ**

[●]
[●]
[●]

Attention: [●]
Fax: [●]

**TO: FORT CHIPEWYAN MÉTIS LOCAL #125**

[●]
[●]
[●]

Attention: [●]
Fax: [●]

**TO: FORT MCKAY FIRST NATION**

[●]
[●]
[●]

Attention: [●]
Fax: [●]

**TO: FORT MCKAY MÉTIS NATION**

[●]
[●]
[●]

Attention: [●]
Fax: [●]

**TO: MIKISEW CREE FIRST NATION**

[●]
[●]
[●]

Attention: [●]
Fax: [●]

7.2 **Amendments**. No modification of, or amendment to, this Agreement shall be valid or binding unless made in writing and duly executed by all Parties. No waiver of any breach of any term or provision of this Agreement shall be effective or binding unless made in writing and signed by the Party purporting to give the same and unless otherwise provided, shall be limited to the specific breach which is waived.

7.3 **No Waiver**. It is understood and agreed that no failure or delay by a particular Party in exercising any right under this Agreement shall operate as a waiver, nor shall any single or partial exercise of that right preclude any other or future exercise of a right provided under this Agreement.

7.4 **Assignment**. This Agreement may not be assigned by any Party to any other Person unless the consent of all the Parties is obtained. Notwithstanding the foregoing, FHELP may, upon written notice to the Communities, assign this Agreement to any Affiliate who has an ownership or operational interest in the Fort Hills Project and the execution of the Work. This Agreement shall be binding upon and shall enure to the benefit of the Parties, and in the case of FHELP, its successors and permitted assigns.

7.5 **Governing Law**. This Agreement shall be governed by and construed in accordance with the Laws of the Province of Alberta and the Laws of Canada, as applicable, and shall be treated in all respects as an Alberta contract. The Parties irrevocably consent and submit to the exclusive jurisdiction of the superior courts of the Province of Alberta, or of the Federal Courts of Canada, as the case may require.

7.6 **Entire Agreement**. This Agreement represents the entire agreement between the Parties as to the subject matter described herein and supercedes all previous oral or written agreements regarding the same.

7.7 **Severability**. In the event that any provision of this Agreement is, or becomes, illegal, invalid or unenforceable in any jurisdiction, that shall not affect the validity or enforceability in that jurisdiction of any other provision of this Agreement or the validity or enforceability in any other jurisdiction of that or any other provision of this Agreement.

7.8 **Counterpart Execution**. This Agreement may be executed in one or more parts (including facsimile), each of which shall be deemed to be an original instrument, and when all Parties have executed a part hereof, all such parts shall constitute one and the same agreement. Signatures delivered by electronic means shall be deemed for all purposes to be original counterparts of this Agreement.

**TO EVIDENCE THEIR AGREEMENT** each of the Parties has executed this Agreement as follows:

**ATHABASCA CHIPEWYAN FIRST NATION also known as KÀI TAILÉ**

Name: Lisa Tssessaze
Title: Director

Name:
Title:

Name: Meghan Dalrymple
Title: Manager - Regulatory and Industry Relations

Name:
Title:

**FORT MCKAY FIRST NATION**

Name:
Title:

Name:
Title:

**FORT MCKAY MÉTIS NATION**

Name:
Title:

Name:
Title:

**MIKISEW CREE FIRST NATION**

Name:
Title:

Name:
Title:

**FORT HILLS ENERGY L.P. by its Operator, SUNCOR ENERGY OPERATING INC.**

Name:
Title:

Name:
Title:

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**TO EVIDENCE THEIR AGREEMENT** each of the Parties has executed this Agreement as follows:

**ATHABASCA CHIPEWYAN FIRST NATION also known as KÀI TAILÉ**

Name:
Title:

Name:
Title:

**FORT CHIPEWYAN MÉTIS LOCAL #125**

President

Name:
Title:

Name:
Title:

**FORT MCKAY FIRST NATION**

Name:
Title:

Name:
Title:

**FORT MCKAY MÉTIS NATION**

Name:
Title:

Name:
Title:

**MIKISEW CREE FIRST NATION**

Name:
Title:

Name:
Title:

**FORT HILLS ENERGY L.P. by its Operator, SUNCOR ENERGY OPERATING INC.**

Name:
Title:

Name:
Title:

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**TO EVIDENCE THEIR AGREEMENT** each of the Parties has executed this Agreement as follows:

**ATHABASCA CHIPEWYAN FIRST NATION also known as KÀI TAILÉ**

Name:
Title:

Name:
Title:

**FORT CHIPEWYAN MÉTIS LOCAL #125**

Name:
Title:

Name:
Title:

**FORT MCKAY FIRST NATION**

Name: Bori Arrobo
Title: Director, Sustainability

Name: Ryan Abel
Title: Senior Manager - Environmental & Regulatory Affairs

**FORT MCKAY MÉTIS NATION**

Name:
Title:

Name:
Title:

**MIKISEW CREE FIRST NATION**

Name:
Title:

Name:
Title:

**FORT HILLS ENERGY L.P. by its Operator, SUNCOR ENERGY OPERATING INC.**

Name:
Title:

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Title:

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**TO EVIDENCE THEIR AGREEMENT** each of the Parties has executed this Agreement as follows:

**ATHABASCA CHIPEWYAN FIRST NATION also known as KÀI TAILÉ**

Name:
Title:

Name:
Title:

**FORT CHIPEWYAN MÉTIS LOCAL #125**

Name:
Title:

Name:
Title:

**FORT MCKAY FIRST NATION**

Name:
Title:

Name:
Title:

**FORT MCKAY MÉTIS NATION**

Name: Margaret Luker
Title: Agreement Relations Manager, Fort McKay Métis Sustainability Centre

Name: Dan Stuckless
Title: Director, Fort McKay Métis Sustainability Centre

**MIKISEW CREE FIRST NATION**

Name:
Title:

Name:
Title:

**FORT HILLS ENERGY L.P. by its Operator, SUNCOR ENERGY OPERATING INC.**

Name:
Title:

Name:
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**TO EVIDENCE THEIR AGREEMENT** each of the Parties has executed this Agreement as follows:

**ATHABASCA CHIPEWYAN FIRST NATION also known as KÀI TAILÉ**

Name:
Title:

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Title:

**FORT CHIPEWYAN MÉTIS LOCAL #125**

Name:
Title:

Name:
Title:

**FORT MCKAY FIRST NATION**

Name:
Title:

Name:
Title:

**FORT MCKAY MÉTIS NATION**

Name:
Title:

Name:
Title:

**MIKISEW CREE FIRST NATION**

Melody Lepine

Name: Melody Lepine
Title: Director

Name:
Title:

**FORT HILLS ENERGY L.P. by its Operator, SUNCOR ENERGY OPERATING INC.**

Name:
Title:

Name:
Title:

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**TO EVIDENCE THEIR AGREEMENT** each of the Parties has executed this Agreement as follows:

**ATHABASCA CHIPEWYAN FIRST NATION also known as KÀI TAILÉ**

Name:
Title:

Name:
Title:

**FORT CHIPEWYAN MÉTIS LOCAL #125**

Name:
Title:

Name:
Title:

**FORT MCKAY FIRST NATION**

Name:
Title:

Name:
Title:

**FORT MCKAY MÉTIS NATION**

Name:
Title:

Name:
Title:

**MIKISEW CREE FIRST NATION**

Name:
Title:

Name:
Title:

**FORT HILLS ENERGY L.P. by its Operator, SUNCOR ENERGY OPERATING INC.**

Name: Mike Agnew
Title: VP Fort Hills

Name:
Title:

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# Attachment 2 Concordance of the Operational Plan to the McClelland Lake Wetland Complex *Water Act* Approval No. 151636-01 Condition 3.11 Proposal and Condition 3.13 Plan Requirements

**Attachment 2** **Concordance of the Operational Plan to the McClelland Lake Wetland Complex *Water Act* Approval No. 151636-01 Condition 3.11 Proposal and Condition 3.13 Plan Requirements**

| Proposal Section # | Section | OP Objective | OP Section # | Condition 3.13 Requirements |
|---|---|---|---|---|
| 2.1 | The purpose of Objective 1 is to define baseline conditions in the McClelland Lake Wetland Complex. Objective 1 is intended to address the requirements of *Water Act* Approval No. 151636-01-00 (as amended) Condition 3.13 a, c, and d. | 1 | 2.0 | (a) physical and biological conditions in the MLWC<br><br>(c) a wetland monitoring program containing as a minimum a yearly survey of vegetation species distribution, abundance, health, and string and flark configuration as compared to baseline studies<br><br>(d) a monitoring program to study groundwater and surface water levels and water quality in overburden and muskeg; flow measurements of polishing ponds, and level monitoring in McClelland Lake |
| | Objective 1 sets the path for continued data collection and modelling to fill baseline gaps associated with the McClelland Lake Wetland Complex. This objective will be met through: | | - | |
| | characterization of groundwater regimes (water levels, flows) and quality within the McClelland Lake Wetland Complex | | 2.4, 2.5.4, 2.5.6.2.2, Appendix F | |
| | establishment of an integrated surface water and groundwater model to characterize water balance and groundwater/surface water interaction within the McClelland Lake Wetland Complex | | 2.4, 2.5.5.2.3, 4.3.1, Appendix D | |
| | characterization of potential biological indicators within the McClelland Lake Wetland Complex and potential reference locations, including vegetation, aquatic invertebrates, periphyton, and amphibians | | 2.5.7, 2.5.9, 2.5.10, 2.5.11, 2.6.2 | |
| | characterization of surface water hydrology (water levels and water flows) and surface water quality within the McClelland Lake Wetland Complex | | 2.5.5, 2.5.6, Appendix D | |
| | characterization of soil and terrain (type and distribution) surrounding and underlying the McClelland Lake Wetland Complex and the lake | | 2.5.8, 2.5.3 | |
| | characterization of wildlife activity within the McClelland Lake Wetland Complex and potential reference locations | | 2.5.10, 2.6.2 | |
| | understanding the regional setting and its impact on the physical and biological regimes within the McClelland Lake Wetland Complex | | 2.6.2, Appendix F | |
| | The baseline conditions defined as part of Objective 1 will include integration of Traditional Knowledge information. Examples of baseline conditions that Traditional Knowledge is used to inform and validate include: | | - | |
| | Characterization of surface water hydrology (information on water levels and lake ice) | | 2.5.5 | |
| | Characterization of soil and terrain (references to poor access due to soft ground and better/sandier access routes) | | 2.5.3, 2.5.8 | |
| | Biological indicators (such as vegetation types and distribution) | | 2.5.9, 2.5.10 | |
| | Characterization of wildlife activity (such as wildlife camera program, fish studies) | | 2.5.10 | |
| | Understanding the regional setting | | 2.6 | |
| 2.2 | The purpose of Objective 2 is to develop a suite of indicators that reflect the functionality of the MLWC. Objective 2 is intended to address the requirements of *Water Act* Conditon 3.13f | 2 | 3.0 | (f) indicators to evaluate potential Project effects on the MLWC |
| | The development of indicators that reflect this functionality will be accomplished through: | | - | |
| | a) Characterizing and evaluating ecosystem diversity and function in the McClelland Lake Wetland Complex. | | 2.0 | |
| | b) Selecting indicators for ecosystem diversity and function, including indicators that represent traditional land use. | | 3.3, 3.4 | |
| | c) Understanding the natural variability in the indicators, considering weather and climate variability. | | 2.0 | |
| | d) Defining limits and thresholds for each indicator that would initiate mitigation response plans. | | 7.2 | |
| 2.3 | A model reflecting baseline conditions will be completed prior to assessing any potential impacts of mine development in the MLWC watershed. | 3 | 4.3.1, Appendix D | (e) proposed investigation and monitoring necessary to verify the model prediction that the MLWC will not drain towards the dewatering area through the groundwater flow system |
| | Following completion of the baseline conditions model, an operational and closure model will be developed | | 4.3.1, Appendix D | |
| 2.3.1 | The baseline information (including Traditional Knowledge) collected as part of Objective 1 will be used to develop and calibrate the surface water and groundwater model. | | Appendices F and G | |
| 2.4 | The purpose of Objective 4 is to establish necessary design measures and contingency mitigation plans that will be used to maintain functionality of the non-mined portion of the McClelland Lake Wetland Complex during operation and closure of the mine project. | 4 | 5.0 | (b) design features or measures, and other as required for the protection of the non-mined portions of the MLWC<br><br>(g) the necessary contingency mitigation measures to maintain the water table, water chemistry, and water flow within limits as indicated by natural fluctuations to maintain ecosystem diversity and function of the nonmined portions of the MLWC during operation and reclamation of the project<br><br>(h) a detailed schedule for the implementation of each component of the plan |
| 2.5 | The effects monitoring program will be designed to detect changes in the non-mined portion of the McClelland Lake Wetland Complex and to determine whether these changes are a result of activities associated with the Fort Hills Project. | 5 | 6.0 | (e) proposed investigation and monitoring necessary to verify the model prediction that the MLWC will not drain towards the dewatering area through the groundwater flow system<br><br>(c) and (d) above |
| 2.6 | A Response Framework will be developed to clearly communicate what Fort Hills will do if indicators start to deviate from natural variability or model predictions. | 6 | 7.0 | (g) the necessary contingency mitigation measures to maintain the water table, water chemistry, and water flow within limits as indicated by natural fluctuations to maintain ecosystem diversity and function of the nonmined portions of the MLWC during operation and reclamation of the project |
| | The development of the response framework include actions that would stop further development until cause of a given change has been identified and an appropriate mitigation solution is developed and implemented. | | 7.2.4.3 | |
| | Triggers for action will be developed according to thresholds of change established for the indicators | | 7.3 | |

# Attachment 3 Responses to Sustainability Committee Feedback on Draft Objectives

**Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)**

## Table 1 - Compiled Recommendations of Sustainability Committee and Technical Advisory Group on Revised MLWC Operational Plan (October 19, 2021): INTRODUCTION, OBJECTIVES 1 to 6 and APPENDICES

*This version of the Table does include all Pre-ambles and Recommendations or Questions from FMCA/FMMN, MCFN, FMFN, TAG Vegetation (all but Obj 3) and Co-chairs based on their review of the Operational Plan. Hence the Documents from each organization have not been included.*
*This table does not include comments on from ACFN (due Monday Nov 15); TAG Hydrology (due Tuesday Nov 16), TAG Vegetation (Objective 3) (due date unknown) and TAG Wildlife (no comments are being provided).*

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| **1.0 Introduction - 1.1 General Comments** | | | | |
| 1 | Introduction General Comments - i | The acknowledgement on page (i) was beautifully done. | **FMCA/FMMN** | Acknowledged, thank you. |
| 2 | Introduction General Comments - 1-15 | Section 1.5 on page 1-15 is well written and does reflect conversations at the SC | **FMCA/FMMN** | Acknowledged, thank you. |
| 3 | Introduction General Comments -NA | The introduction is very clear and does a good job of setting the context, respectfully acknowledging the contributions of Communities, community members, technical advisors, and the SC. | **FMFN** | Acknowledged, thank you. |
| 4 | Introduction General Comments - i | **Recommendation:** Please add:<br>We want to acknowledge other family members that lived at McClelland Lake, whose knowledge has been referenced in the Operational Plan. Francoise Boucher, Felix Beaver, Mary Anne Beaver, Edmund Ducharm, Annie Ducharm, Ian Faichney, Roger Faichney and Arnold Faichney were all respected land users, knowledge holders and mentors that have shared their skills and knowledge with their own families, and the many families of Fort McKay and Fort Chipewyan that came to hunt, fish and camp around McClelland Lake. | **CO-CHAIRS** | Accepted and added. |
| 5 | Introduction General Comments - 1-1 to 1-6 | *The Conditions of the Water Act and Key Definitions in this section need to lay out the approach taken throughout the Operational Plan.*<br>• *Conditions of the Water Act Approval No. 15163636-01-00 (as amended) g) the necessary contingency mitigation measures to maintain the water table, water chemistry and water flow within limits as indicated by natural fluctuations to* ***maintain ecosystem diversity and function of the non-mined portions of the MLWC during operation and reclamation of the project.***<br>• Suncor definition of the Non-mined Portion of the McClelland Lake Wetland Complex (shown in Figure 1.1-1) clearly includes the portions of the MLWC within and outside of the Fort Hills Lease, and McClelland Lake.<br>**Recommendation:**<br>For the purposes of the Operational Plan, based on information laid out in the Introduction, **ecosystem diversity and function** need to be **maintained and hence monitored during operations and reclamation** in the non-mined portion of the **fen and in McClelland Lake** *that should at a minimum include the* ***littoral and riparian zones (Italicized words added from co-chairs)*** | **CO-CHAIRS** | The spatial definitions of the MLWC and the non-mined portion of MLWC are shown in Figure 1.1-1 and align with the spatial definitions provided in figures in the IRP (Appendix 5), the 2002 decision report (Figure 2) and the authorized proposal (Figure 1-1). It is Fort Hill's position that the monitoring that is currently proposed for McClelland Lake, including water level, water quality, and chlorophyll a; and the mitigation measures proposed in the OP as per Condition 3.11 g) of *Water Act* Approval No. 15163636-01-00 (as amended) are sufficient to ensure the sustainability of the non-mined portion of the MLWC. |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | Conditions set in the Water Act clearly note that both ecosystem diversity as well as function need to be maintained in the non-mined portions of the MLWC.<br>Suncor definition of the Non-mined Portion of the McClelland Lake Wetland Complex (shown in Figure 1.1-1) clearly includes the portions of the MLWC within and outside of the Fort Hills Lease, and McClelland Lake.<br>Note from Co-chairs: A lake needs to include the littoral and riparian zones, to be functional. | | |
| 6 | Introduction<br>General Comments - i | Within each group that is acknowledged, I would list the person in alphabetical order. | **TAG - VEGETATION** | Thank you for this suggestion. We have arranged the TAG group in alphabetical order. |
| **1.0 Introduction – 1.1 Specific Comments** | | | | |
| 7 | Introduction – Specific Comments - NA | We recommend that the Operational Plan have a disclaimer for the use of Indigenous Knowledge following the cover page and before the Acknowledgement in keeping with the *McClelland Lake Wetland Complex Agreement for Use and Sharing of Indigenous Traditional Knowledge and Data* and that the Agreement be an appendix to the plan. We can offer wording for the disclaimer in the days to come.<br><br>DISCLAIMER:<br>*The Indigenous knowledge contained in this report should not be interpreted as complete documentation and analysis of the land use, history, and cultures of the participating Communities listed, (or a full accounting of the potential associated changes or impacts to Communities' traditional land use and knowledge, which may result from the activities of the approved project.)*<br>*2. The approval for the integration of Indigenous knowledge in the report should not be used to define, constrain or limit the Aboriginal rights of the participating Communities or their members, as per section 35(1) of the Canadian Constitution Act, 1982.*<br>*3. The Indigenous Knowledge and land uses presented in this report are collectively held rights inherent in section 35(1) of Canada's Constitution Act, 1982, and are the intellectual and cultural property of the Communities from which they were shared.*<br>*4. The Indigenous knowledge contained in this report is intended for the specific use solely by Suncor, and in the limited use in the Operational Plan and its implementation, in regard to the preservation of the functionality of the McClelland Lake Fen and Wetland Complex, and specific regulatory approval and obligations. It cannot be used by another party, or as secondary information for another project, without the written Consent, or Community guidance under another IK Use & Sharing Agreement, held with the relevant Communities* | **FMCA/FMMN** | Accepted and added. |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| 8 | Introduction – Specific Comments - 1-1 | In the geographical description of the Fort Hills Project and MLWC we recommend adding an additional sentence also important to geography, namely:<br><br>*The Fort Hills Project is located approximately 90 kilometres (km) north of Fort McMurray, Alberta, in the Athabasca Oil Sands Region (Figure 1.1-1). The McClelland Lake Wetland Complex (MLWC) is located in the northeast corner of the mine project and includes patterned and non-patterned fen, bogs, marshes and swamps.* **The Project is located in the traditional territories of Fort McKay First Nation (FMFN), Fort McKay Métis Nation (FMMN), Athabasca Chipewyan First Nation (ACFN), Fort Chipewyan Métis Association (FCMA) and Mikisew Cree First Nation (MCFN) and the MLWC is a place of high value and cultural significance to its members.** *Key definitions, including the definition of the MLWC, are provided in Section 1.1.2.* | **FMCA/FMMN** | Accepted and added (with inclusion of other Indigenous Communities). |
| 9 | Introduction – Specific Comments - 1-4 to 1-6 | The following are suggested edits and additions to Section 1.1.2 (Key Definitions):<br><br>**Functionality or wetland functionality**—the individual and collective physical, hydrological, chemical, and biological processes performed by the MLWC that relate directly to the characteristics of the ecosystem and its capacity to interact with the adjacent landscape (ICF Jones and Stokes 2009). The MLWC also performs social and cultural functions that go beyond the ecological functions **and are viewed as critical to the overall function of the MLWC** (IEG 2020).<br>*see page v in IEG 2020<br><br>**Wetland value**—the measure of the relative social, ecological, or economic importance of a wetland function being performed by the MLWC to individuals or groups of human beings (ICF Jones and Stokes 2009) **and the capacity of the MLWC to do so (IEG, 2020).**<br><br>**Sustainability**—the maintenance of the physical, hydrological, biological, and chemical processes for of ~~the sustainability of~~ the non-mined portion of the MLWC **to protect its functionality and biodiversity. The dynamic nature of land and the intrinsic obligation of people to sustain land is a core philosophy of Cree, Dene and Métis people in the region (Garibaldi 2021).**<br><br>**Baseline Conditions**- Baseline conditions are the conditions that exist before an activity takes place, and that may be used as a point of reference in the future. For the OP, a distinction is drawn between pre development baseline conditions (i.e., conditions occurring before the influence of oil sands development, defined temporally as 1960 or earlier) and pre-mining baseline conditions (i.e., conditions including existing anthropogenic disturbances and effects on the natural environment, prior to mining in the MLWC watershed, defined temporally by the timelines captured in monitoring or modelling data). **Pre-development baseline conditions are informed by Indigenous knowledge, historical records and imagery where they exist and can be represented through paleontological studies and the study of undisturbed reference sites.** Pre-mining baseline conditions are informed by ~~traditional knowledge, and include~~ MLWC monitoring program data, historical imagery, and model | **FMCA/FMMN** | This recommendation has been partially accepted.<br>The edits to the definition of functionality, and wetland value are accepted as well as the addition to the sustainability definition. The edits to the definitions of baseline conditions and indicators is not accepted, this definition was worked extensively with the SC. MRV is not defined as including simulated conditions in the OP. |

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | predictions prior to mining in the MLWC watershed **and Indigenous knowledge with respect to changes in condition from the pre-development reference**.<br><br>**Measured Range of Variation** - For the purposes of the OP, the measured range of variability (MRV) is defined as the variability observed in the pre-mining baseline conditions **or simulated through modeling** for the chosen indicators.<br><br>**Indicator**—a measurable or observable characteristic that can be correlated with, but not necessarily causally linked to, a specific physical, hydrological, biological, or chemical process that is occurring in the MLWC (ICF Jones and Stokes 2009). **For the purposes of the OP, indicators were defined for environmental, social, cultural and traditional economic values for the Fort Hills Project in order to monitor the functionality of the MLWC (Garibaldi, 2021).** | | |
| 10 | Introduction – Specific Comments - 1-7 | The use of the term 'environmental baseline information' in reference to the TrueNorth application is confusing as the definitions only define baseline as pre-development or pre-mining. Suggest rewording to say 'Pre-mining' baseline information collection.<br><br>As well, in reference to the information collected at the time of the TrueNorth application, shortly thereafter IK information was starting to be documented by FMA Heritage Resources. It would be appropriate to acknowledge that pre-development baseline was also being collected (e.g. TEK and Family History from RFMA 2137). Also, the collection of IK to support the pre-development baseline continued as the Fort Hills project took on subsequent operators (e.g. Métis Local 125 Use and Occupancy Report [Petro-Canada]). | **FMCA/FMMN** | The baseline information presented in the original TrueNorth application would be considered a combination of pre-mining and pre-development conditions and includes the IK collected during the project development stages. We have revised text to "baseline information". The IK studies used to inform the plan are described in more detail in Objective 1 (Section 2.0). The Petro-Canada FCM study was not used in the development of the Operational Plan – by either the community reps or Suncor. |
| 11 | Introduction – Specific Comments - 1-7<br>Figure 1.3-1 | Figure 1.3-1 is adapted from the AAG ToR and includes the lines of communication from that original figure. Please correct the Figure title to "Lines of Communication of the MLWC Sustainability Committee". If the intent is to have an organizational structure then it would be Fort Hills Energy Corporation not Fort Hills Operational Plan and the two headed arrow between the SC and FHEC should be two arrows to denote that FHEC is making the final decisions with respect to the Plan's contents and SC is providing recommendations on what the contents should be. | **FMCA/FMMN** | Accepted and revised. |
| 12 | Introduction – Specific Comments - 1-8 to 1-9 | The Last full sentence bottom of page 1-8 and first sentence top of 1-9 are stated poorly. A revision is required for clarity and accuracy. We recommend deleting: *People's body of knowledge to shape and manage the land for sustainable use grew as they moved on the land.* This statement confuses concepts and the entire paragraph has better clarity without it.<br><br>We recommend revision to the following sentence to read instead: *The* **nature of peoples' relationship with the land** *and the intrinsic obligation* **that comes with that, to steward the health and respectful use of the land for cultural continuance,** *is a core* ~~*philosophy*~~ **value and belief in the worldviews of**... | **FMCA/FMMN** | Accepted and revised. Thank you for providing specific wording! |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
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| 13 | Introduction – Specific Comments - 1-9 | Suggested re-wording to describe the opportunities offered by the two roads approach taken:<br>*The MLWC SC and their supporting groups (AAG and TAG) are applying the Two Roads Approach with the goal of integrating information and findings at the "bridges" of the knowledge systems (see Figure 1.3-2).* ~~*There are*~~ **Doing so has resulted in** *multiple opportunities for the SC***, together with its advisory groups,** *to exchange information, learn from each other, and engage in the development of recommendations.* | **FMCA/FMMN** | Accepted and revised. Thank you for providing specific wording! |
| 14 | Introduction – Specific Comments<br>1-10 to 1-11 | Suggested re-write for the first paragraph of Section 1.3.3 (Integration of Indigenous Traditional Knowledge):<br>**Indigenous communities have shared Traditional Knowledge information with Fort Hills related to the nature, functionality, sustainability and importance of the MLWC. Fort Hills continues to build a more thorough understanding of not only the biophysical but also the bio-cultural and socio-cultural values tied to the functionality and biodiversity of the MLWC including how the area contributes to traditional uses, cultural practices, lifestyles and knowledge transfer. Traditional knowledge has informed and improved our collective biophysical understanding of the MLWC, such as:**<br>*note that the bulleted list needs to be reviewed with AAG members. | **FMCA/FMMN** | Accepted and revised. Thank you! |
| 15 | Introduction – Specific Comments<br>1-10 to 1-11 | Before the quote from Emma, after the bullet list, the sentence should be revised to read: *This significant collection of Indigenous Traditional Knowledge highlights the importance of understanding the holistic function and connectivity of the land and waters with health, wellness, culture and livelihoods of the community.*<br>After the quote from Emma there also needs to be a linkage to the other understandings from the IK that has been shared, namely the bio-cultural values that speak to functionality and biodiversity required to support related socio-cultural values. This should be linked to the values and functions figure in Objective 2 and have a similar list for supporting bio-cultural understandings (e.g. bio-physical resource condition and health viewed through cultural requirements to support traditional and cultural uses) and social-cultural understandings to support knowledge transfer and community wellness). For example, the function of water quality (biophysical) supports land user expectations and ability for water use (bio-cultural) supports community wellness values (socio-cultural). | **FMCA/FMMN** | Accepted and revised. Thank you! |
| 16 | Introduction – Specific Comments<br>1-10 to 1-11 | In keeping with the language of how IK has helped inform the Plan the last paragraph of Section 1.3.3 should read: fulsome understanding of the bio-physical, bio-cultural and socio-cultural values of the MLWC to sustain its functionality and hence the use of the MLWC by Indigenous communities. | **FMCA/FMMN** | Accepted and revised. Thank you! |
| 17 | Introduction – Specific Comments<br>1-11 to 1-12 | The first paragraph of Section 1.3.4 mischaracterized what is in the EUB Decision report (2002-089). Based on the excerpts from both True North and in the decision of the EUB, there was no plan at the time of the hearing -it was a plan for a plan that proposed a multi-stakeholder group that would:<br>1. Agree on a set of indictors and objectives;<br>2. Design a baseline monitoring program;<br>3. Oversee the collection of the data;<br>4. Establish the natural variability of the wetland;<br>5. Establish criteria to protect the biotic diversity and function of the non-mined portion of the MLWC; | **FMCA/FMMN** | FHEC disagrees that there is a mischaracterization of the 2002 EUB decision report. As stated in the Recommendations to Alberta from the Board:<br><br>*"The Board recommends that Alberta direct TrueNorth to convene a committee of stakeholders and regulators,* ***as proposed in the MLWC Sustainability Plan****, to oversee the collection of baseline monitoring data, establish the natural variability of the wetland, establish criteria to protect the biotic diversity and function of the no-surface-access zone, critically* |

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| | | 6. Assess/evaluate proposed mitigation plans in relation to the protection criteria; and<br>7. Monitor the mitigation effectiveness/evaluate post-construction monitoring data and adaptive management.<br>The McClelland Lake Wetland Complex Sustainability Plan called for the creation of a committee of regulators and stakeholders to develop a management strategy to sustain the unmined eastern portion of the wetland and thereby satisfy the requirements of the amended IRP. The proposed committee would agree on a set of indicators and objectives that would then be used to design baseline monitoring, assess potential mitigation plans, and eventually monitor their effectiveness. (view of True North page 31 EUB Decision 2002-089)<br><br>The Board recommends that Alberta direct TrueNorth to convene a committee of stakeholders and regulators, as proposed in the MLWC Sustainability Plan, to oversee the collection of baseline monitoring data, establish the natural variability of the wetland, establish criteria to protect the biotic diversity and function of the no-surface-access zone, critically evaluate proposed mitigation plans in relation to the protection criteria, and evaluate postconstruction monitoring data and adaptive management. (page 38 EUB Decision 2002-089)<br><br>Please change the first paragraph to read:<br>During the hearing for the Fort Hills Project, the applicant withdrew its assessment of the non-mined portion of the MLWC, and in conjunction with the Fort McKay community, instead proposed a plan for a multi-stakeholder committee to develop an MLWC Sustainability Plan to sustain the biodiversity and functionality of the non-mined portion of the MLWC. The responsibilities of this Committee were to: agree on a set of indictors and objectives; design a baseline monitoring program and oversee the collection of the data; establish the natural variability of the wetland as well as criteria to protect the biotic diversity and function of the non-mined portion of the MLWC; assess/evaluate proposed mitigation plans in relation to the protection criteria; and monitor the mitigation effectiveness/evaluate post-construction monitoring data and adaptive management.<br><br>In the fourth paragraph please revise the wording to say: to gather input and traditional knowledge on baseline information **and conditions as well as functionality**, values and indicators.<br><br>The second to last paragraph reads:<br>*The materials shared and produced through these meetings, workshops and reports have been used and the feedback received has been embedded throughout the OP in the appropriate Objective.*<br>This sentence cannot be commented on until the final draft plan is completed. If this sentence was true, there would be no reason for the addressed/partially addressed/not addressed exercise we will be undertaking as next steps. As well, the hope is that this sentence can read that the input received was not only embedded in the OP but that it was integrated into and informed the OP. Until the final review and workshops have been completed, this sentence at best can read: *have been* **received** *and the feedback has been* **considered**. | | *evaluate proposed mitigation plans in relation to the protection criteria, and evaluate postconstruction monitoring data and adaptive management. "*<br><br>Last comment regarding feedback and embedded – revised "embedded" to say "considered and integrated". We feel we have made best efforts to use the work of the SC to inform the plan. |

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| 18 | Introduction – Specific Comments<br>1-13 to 1-15 | The use of the terms 'healthy' and 'unhealthy' are too subjective to be left up to interpretation, particularly because those terms are not defined in the definitions section. They should be clearly explained, as indicated in the Baseline and Indicators Reports, that expectations for health are informed by biophysical health indicators as well as cultural health indicators informed by IK (Dyck 2020; Garibaldi, 2020).The questions in Figure 1.4-1 should instead, adopt the language of the 2002 decision report that speaks to protecting the unmined portion of the fen. As well, the question in Objective 3 is bringing in, and therefore, causing confusion with, Objective 4. Assuming these questions are posed as to be 'plain language' Please consider rephrasing the questions as follows:<br>Objective 1: What do the fen and lake look like and how do they act naturally, in the absence mining activity?<br>Objective 2: What should we measure to know that the fen and lake will be protected once mining activity starts?<br>Objective 3: What negative effects do we expect once mine activity starts with and without protection measures in place?<br>Objective 4: What protection measures are needed to avoid or minimize the effects of mining activity to ensure the fen and lake are protected?<br>Objective 5: How and what do we monitor over time to know that the protection measures are working? Can we compare the fen and the lake to a similar area that is not disturbed by oils sands development to help us understand changes if they are occurring?<br>Objective 6: What will we do if the protection measures are not working to make sure that the fen and lake remain protected? | **FMCA/FMMN** | FHEC disagrees with this recommendation. These questions are meant to be plain language and FHEC believes they adequately capture the intent of the objectives from that perspective. Additional content on those objectives are provided in the Introduction as well in the respective objective sections. |
| 19 | Introduction – Specific Comments<br>1-13 to 1-14 | In keeping with our discussions at the October 19th, 2021 SC meeting, please add the following to the end of the last sentence for Objective 1: **and this is expected to start as early as 2022**. | **FMCA/FMMN** | The commitment to start as early as 2022 is made in the commitments table that is now included in the Introduction (Table 1.7-1). |
| 20 | Introduction – Specific Comments<br>1-13 to 1-14 | In keeping with the definition provided for functionality in the Introduction (as amended – see above comments on definitions) please include **The MLWC also performs social and cultural functions that go beyond the ecological functions and are viewed as critical to the overall function of the MLWC** after the sentence that starts *Functionality refers broadly to…..* for the description of Objective 2. Please also add the following to the end of the last sentence for Objective 2: **and this is expected to start in early 2022 to support baseline and effects monitoring programs.** | **FMCA/FMMN** | The first edit has been accepted and the changes made.<br>The commitment to start as early as 2022 is made in the commitments table that is now included in the Introduction (Table 1.7-1). |
| 21 | Introduction – Specific Comments<br>1-13 to 1-14 | Please amend the last two sentences describing Objective 3 to include the conceptual model and add a sentence at the end about its future use as follows:<br>*Objective 3 is considered complete for the purposes of the OP submission; additional iterations of the numerical model will be completed* **and the conceptual model updated** *as future baseline monitoring is collected. FHEC will continue to work with the AAG and the SC to use ITK to guide the ongoing progression of the* **conceptual and** *numerical models* **as understanding of the MLWC increases. The models will be used to validate mitigation predictions and effectiveness based on the outcomes from the effects monitoring program.** | **FMCA/FMMN** | This recommendation has been partially accepted. All changes were accepted up to the last sentence, this sentence was changed to read "The models will be used to assess and/or predict the effectiveness of mitigations." |

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| 22 | Introduction – Specific Comments<br>1-13 to 1-14 | As discussed at the October 19th, 2021 SC meeting, and in keeping with the responsibilities of the SC and laid out by the EUB decision report (see above comments), the SC and its advisory groups would like to continue their involvement in all future applications and reporting including those pertaining to detailed design. Please amend the last sentence describing Objective 4 to read: **The SC will continue its work to contribute to mitigation measure development including detailed designs and to further develop mitigations around access and security management as well as mitigations to avoid or minimize the effects detected through the ESCT indicators.** | **FMCA/FMMN** | Accepted, thank you. |
| 23 | Introduction – Specific Comments<br>1-13 to 1-14 | As discussed at the October 19th, 2021 SC meeting, and in keeping with the responsibilities of the SC and laid out by the EUB decision report (see above comments), the SC and its advisory groups would like to continue their involvement in the effects monitoring program and reporting including those pertaining to indicators, data collection and data evaluation. Please amend the last two sentences to read: Objective 5 is considered complete for the purposes of **identifying data and information in the form of indicators including those identified in sitewide monitoring programs, the ESCT monitoring program and through complimentary data in support** of the OP Submission. The effects monitoring program will continue to be refined as needed based on continued data collection and as engineering matures on the design features. FHEC is committed to work with the SC and supporting advisory groups **with respect to the effects monitoring program and reporting including those pertaining to indicators, data collection and data evaluation. Methodologies for monitoring, assessing, and reporting ESCT indicators is expected to start in early 2022 to support the effects monitoring program** | **FMCA/FMMN** | This recommendation has been partially accepted. This is section is in the Introduction and as such, details on all of the programs in the first suggested edit haven't been provided yet. This would likely make this addition confusing and this has not been included.<br>As for the second recommended edit, the commitment to continue collaboration on the effects monitoring program with the SC, and to start work on the ESCT program as early as 2022 is made in the commitments table that is now included in the Introduction (Table 1.7-1). |
| 24 | Introduction – Specific Comments<br>1-13 to 1-14 | A management response, as discussed at the September 15th, 2021 SC meeting, will need to include responses to exceedances of triggers and limits of ESCT indicators. Please amend the last sentence describing Objective 6 to include not only primary effects indicators but **ESCT indicators** as well. | **FMCA/FMMN** | The ESCT program is still in development but if it is demonstrated and agreed to that ESCT indicators are able to detect early change in the non-mined portion of the MLWC that is caused by mining in the MLWC watershed, triggers will be considered. |
| 25 | Introduction – Specific Comments<br>1-15 to 1-17 | Please amend the first sentence on page 1-17 to read: Following authorization, **post-baseline** effects monitoring would commence. It is expected that continued monitoring to contribute to baseline will be occurring in 2022 and 2023 at a minimum and may continue until draining and ditching activity occurs. | **FMCA/FMMN** | The baseline tier of monitoring will continue until ditching and draining in the watershed begins in 2025, when the surveillance tier would then be initiated. The text has been updated to reflect this. |
| 26 | Introduction – Specific Comments<br>1-15 to 1-17 | Please amend the first sentence on page 1-17 to read: Following authorization, **post-baseline** effects monitoring would commence. It is expected that continued monitoring to contribute to baseline will be occurring in 2022 and 2023 at a minimum and may continue until draining and ditching activity occurs. | **FMCA/FMMN** | Repeat of item #25 |
| 27 | Introduction – Specific Comments<br>1-15 to 1-17 | As discussed above, as well as in our comments with respect to Section 7.4 (Reporting) for Objective 6, the SC and its advisory groups need to be involved in the development of reports, updates and all other related submissions. Sharing annual updates with the SC does not reflect the EUB decision report nor the role of the SC and its advisory groups in supporting Fort Hills in the successful implementation of the Operational Plan. Further work of the SC is more that just working on the ESCT monitoring program as stated in the very last sentence of Section 1.6. This needs to be clarified throughout this section. | **FMCA/FMMN** | FHEC believes the last sentence in Section 1.6 addresses this concern: "Further work with the SC is needed to develop and initiate ESCT monitoring programs, monitor the performance of the plan, develop detailed designs on components of the mitigations, and further understand and mitigate impacts to the usability of the area. Continued engagement with the SC and supporting advisory committees is an important component of the OP." |

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| 28 | Introduction – Specific Comments<br>Appendix A | In our comments for Objective 1 through 6 we had asked for the tasks identified in the 2018 proposal to be reconciled in the Operational Plan. This remains outstanding and it is not clear if the identified tasks were completed as identified in our comments. Please include the tasks identified specifically for the Operation Plan, or to be developed through the SC in Appendix A.<br>These include:<br>Objective 1: development/calculation of natural ranges of variability<br>provision of SC input to baseline monitoring<br>Objective 2: incorporation of traditional ecological knowledge and traditional land use to understand expectations, value statements, and significant thresholds with a final decision on indicators, endpoints and methodology<br>benchmarks, Natural Range of Variability and predictions finalized<br>Objective 3: model results (see comments provided for Objective 3 with regards to Objective 4 and 5)<br>Objective 4: evaluation and selection of final option(s) for incorporation into Operational Plan (see comments in Objective 4 with respect to SC not see assessment results of options considered)<br>Objective 5: final effects monitoring program design that aligns with assessment endpoints and response framework<br>Objective 6: final response framework and action plans | **FMCA/FMMN** | FHEC has provided a concordance table in the introduction that reconciles the framework of the Operational Plan, as laid out in section 2.0 of the 2018 Proposal, with the material in the OP.<br><br>A progress update against Table 2-1 from the 2018 Proposal has been added to Attachment 2. FHEC believes the concordance table previously provided addresses "the what" of requirements for OP submission. This task-oriented view addresses "the how" of meeting those requirements. |
| 29 | Introduction – Specific Comments<br>1 to 10 | In the OP it is fairly clear how the two roads approach (discussed on page 1-9 and shown in the figure on page 1-10) is being used and the points where there are bridges between the two roads connect – at least for the bridges 1(background) and 3 (baseline and NRV). On page 1-17 FHEC identifies describes how ITK is being used in bridging the two paths. However, based on our review of the initial drafts of the OP it seems there is more work to be done to formally bridge the two paths for bridges 2 (Values and indicators), 4 (effects assessment), 5 (effects monitoring program) and 6 (management response plan). FHEC acknowledges this in its bullet points on page 1-17 -- that work continues to develop a monitoring program for environmental, social, cultural, traditional economy indicators informed by traditional knowledge (ESCT indicators). However, it is important that these indicators be clearly linked/bridged to the effects assessment, effects monitoring program and management response.<br><br>***Recommendation:***<br>FHEC work with the SC, AAG and TAC to more clearly develop bridges 2 (Values and indicators), 4 (effects assessment), 5 (effects monitoring program) and 6 (management response plan) between the ITK Road (including specifically the ESCT Indicators) and Western Science Road. We note that FHEC has committed to this in its responses to the SC. | **FMFN** | Acknowledged. We have identified commitments around further work in these areas. |
| 30 | Introduction – Specific Comments - 1-1 to 1-6 | Figure 1.1-1 is very small and very difficult to read yet it provides very important information. Please put this document in as a 11 x 17 figure. | **CO-CHAIRS** | Apologies but the shape of this map isn't conducive to providing in 11x17. That said, the zoom feature in the digital version is enabled so the reader can zoom in on any detail necessary. |

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| 31 | Introduction – Specific Comments<br>11-1 to 1-6 | Section 1.1.2. Key Definitions. The IRP definition of the MLWC as containing: "McClelland Lake, the fen and an adjacent upland drainage basin" doesn't match the purple boundary line for the MLWC shown on Figure 1.1-1. | **CO-CHAIRS** | The spatial definition of the MLWC provided (The purple line in Figure 1.1-1) aligns with the spatial definition as shown in figures in the IRP (Appendix 5), the 2002 decision report (Figure 2) and subsequently, the authorized OP proposal (Figure 1-1). |
| 32 | Introduction – Specific Comments - 1-1 to 1-6 | Add the definition for **Integration** to the Key Definitions, as this in an important term and concept used throughout the Operational Plan.<br>With reference to Knowledge, integration means the process of synthesizing multiple ways of knowing, focusing on synthesizing the understanding of a given subject from different perspectives, without loss of subjugation of one over the other (from AAG TOR). | **CO-CHAIRS** | Accepted and added. |
| 33 | Introduction – Specific Comments - 1-6 | Page 1-6 …Paragraph 3 under Section 1.2<br>Is the statement supposed to say ….designated the **western part** of the wetland complex including McClelland Lake as a no-surface access zone **(rather than eastern part?)** | **CO-CHAIRS** | No, the eastern part of the wetland complex is correct. |
| 34 | Introduction – Specific Comments - 1-6 | **Section 1.2 Overview of the McClelland Lake Wetland Complex**<br>This section should introduce the ecological and cultural significance of McClelland Lake Wetland Complex to provide context for the work presented in the OP. For example, "The McClelland Lake Wetland Complex contains the oldest and largest patterned fen complex in Alberta. This ecologically significant area is known for clean water, diverse and abundant wildlife and plant life, and has supported indigenous people for over 8,000 years. The MLWC continues to be a critically important cultural and subsistence harvesting area for indigenous people in the region.<br><br>Section 1.2.1 Cultural Context<br>Move up the content from Section 1.3.1 (pages 1-8 to 1-9)<br><br>Section 1.2.2 Ecological context<br>Use the content from page 1-6 to 1-7, Section 1.2<br><br>Section 1.3 Sustainability Committee<br>Use content from page 1-7<br><br>Section 1.3.1 Two-Roads Approach<br><br>Section 1.3.4 Sustainability Committee Collaboration on the Operational Plan | **CO-CHAIRS** | **The sections 1.2 and 1.3 have been reorganized to reflect most of the comments shared. We disagree with the accuracy of some of the suggested added text.**<br>According to the 2001 landform study by Halsey et al., the peatland complex at MLWC is the **325**th largest out of the 3,774 peatland complexes in Alberta. The patterned fen element at MLWC is ranked **76th** out of the 881 patterned fens in Alberta.<br><br>Additionally, the age of most patterned fens in Alberta has not been determined – making it difficult to rank the relative age. |
| 35 | Introduction – Specific Comments<br>1-7-and 1-11 | *Page 1-7 under Section 1.3 Sustainability Committee*<br>*Add the areas of expertise of the TAG members.*<br><br>Add a **table that summarizes all the meetings held by the MLWC SC, AAG and TAG,** to show the level effort put in the by Indigenous Communities and by Suncor to integrate Indigenous Knowledge and develop a collaborative Operational Plan, and by TAG in providing a western science review and best technical knowledge to develop a comprehensive Operational Plan. | **CO-CHAIRS** | A sentence describing the expertise of the TAG has been added.<br><br>FHEC does not accept the recommendation to add a table documenting the long list of SC, AAG, and TAG meetings since 2005. The high level of collaboration and effort by the communities and FHEC has been demonstrated throughout the plan. The AER is aware of the value the SC, AAG, and TAG have brought to the OP through its participation as an observer on the SC. |

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| 36 | Introduction – Specific Comments<br>1-13-to 1-17 | The organization of the Operational Plan (Section 1.4) clearly shows the inclusion of McClelland Lake throughout all aspects of the plan including the Effects Monitoring Program and Response Framework. | **CO-CHAIRS** | Yes agreed. |
| 37 | Introduction – Specific Comments<br>1-13-to 1-17 | **Comment and Recommendation: It is admirable that Suncor has listed future commitments and collaboration to complete unfinished work on the Operational Plan with the MLWC SC, AAG and TAG. These placeholders are scattered in the text. Three recommendations:**<br><br>**Re-label Section 1.4 as "Operational Plan Organization and Commitments for Future Work with the MLWC SC OR Create a new section that summarizes Future Commitments with the MLWC SC, TAG and AAG.**<br>**Compile and add to the OP a summary table of the ALL commitments** made throughout the introduction, the rest of the Operation Plan and throughout the Response Table. This will provide stakeholders a clear summary of the future work to be completed and can be used as a tracking tool to complete the work. A DRAFT Summary Table of Commitments will be provided by Suncor to the SC in early November 2021.<br><br>A few additional commitments or addition to commitment should be added to this section:<br><br>Hold a workshop om 2022 to evaluate, and modify as needed, the site-wide regional wildlife program to ensure appropriate approaches and indicators are used to detect changes in wildlife due to the FHEC Project in the non-mined portion of the MLWC, beginning as early as the construction phase in the MLWC.<br>Expand the Statement on page 1-14 (para 4) to say: FHEC is committed to work with the SC and supporting advisory group to develop a methodology for monitoring and assessing ESCT indicators. **These ESCT programs will encourage participation by Community Members in monitoring potential effects on their traditional lands in the MLWC.**<br>Expand the state on page 1-14 (para 5): Further work in collaboration with the SC is anticipated to continue to develop triggers and limits for each of the primary effect indicators, and **outline approaches for inclusion of information from monitoring complimentary indicators and, where applicable, from relevant site-wide regional monitoring programs.**<br>**Add commitment to ask AAG members to provide information on climate change (e.g., temperature, precipitation, snow). This information is relevant to Section 2.5.5 Surface Hydrology Objective 1 Baseline.** | **CO-CHAIRS** | A table of commitments has been added to the Introduction (Table 1.7-1) in a new section as suggested (Section 1.7). Relevant commitments include a wildlife workshop, ESCT workshop, support for initiation of the ESCT program in 2022, and incorporation of additional ITK as it becomes available and is authorized for use.<br><br>The specific agenda and tasks at each workshop will need to be worked through the SC, and ITK that is shared at these workshops can help inform the programs. |
| 38 | Introduction – Specific Comments - 1-4 | What is (where is) an adjacent upland drainage basin? | **TAG-Vegetation** | This is contained within the text definition of the MLWC within the IRP. The spatial definition of the MLWC provided in Figure 1.1-1 aligns with the spatial definition as shown in figures in the IRP (Appendix 5), the 2002 decision report (Figure 2) and subsequently, the authorized OP proposal (Figure 1-1). |

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| 39 | Introduction – Specific Comments -1-6 and 1-7 | There is discrepancy in the wetland area reported by a considerable difference.<br>Page 1-6 it is said that the wetland is 16% of the 204 km2 watershed which is equivalent to 38,4 km2.<br>Later on page 1-7 it is said that the surface area of the wetland complex is 32 km2 : a difference of 6,4 km2 or 6400 ha is enormous.<br>**Recommendation:** Report the real surface area occupied by the wetland withing the watershed. | **TAG-Vegetation** | FHEC has reviewed the numbers in this section and identified a rounding error. The unrounded watershed area is 202.889460 $km^2$; this has been corrected to a rounded area of 203 $km^2$ in the document. FHEC has also updated this section to more clearly report the area and proportion of the wetland complex and McClelland Lake as shown in Figure 1.1-1. |
| 40 | Introduction – Specific Comments - 1-9; 1-15 | I know we all have the habit to use the terminology Western Science but the Eastern and really everywhere in the world there are scientist doing excellent scientific studies. I feel the term Western Science is really a white man appropriation of all science being done globally. Even though it is a well understood term in relation to ITK, I think the understanding of the text will be as good as the examples given in the recommendation.<br><br>**Recommendation:**<br>Whenever it makes sense use the word scientifically instead of western science such as in scientifically collected data or as analysed by a scientific approach. Or scientifically based knowledge. | **TAG-Vegetation** | While FHEC agrees with this suggestion, western science is a term used by members of the SC and was included based on their feedback. |
| 41 | Introduction – Specific Comments - 1-17 | Table 1-3 below : should it be Table 1.6-1, is there a mistake? | **TAG-Vegetation** | Thank you, yes there was a mistake and the edit has made. |
| **2.0 Objective 1: Baseline Conditions – 2.1 General Comments** | | | | |
| 42 | Objective 1 General Comments - NA | **PLEASE NOTE THAT A NUMBER OF PARTIALLY ADDRESSED RECOMMENDATIONS ARE PENDING REVIEW FOR APPLICATION, CONTEXT AND VALIDATION OF INDIGENOUS KNOWLEDGE WITH RESPECT TO OBJECTIVES 1 TO 6.** | **FMCA/FMMN** | Noted thank you. |
| 43 | Objective 1 General Comments - NA | The significance of socio-cultural values, and information related to the state of these values (i.e. Pre-development vs Pre-mining baselines) have been discussed at many meetings and workshops and has been documented in workshop materials and meeting minutes (See Attachment 1, and Attachment 2). Socio-cultural baseline information, and perspectives on the current state of these indicators is important because it provides the basis for recommendations related to indicators (Objective 2), Potential Impacts (Objective 3), monitoring (Objective 5) and Management Responses (Objective 6).<br><br>As described in the FHOP 2018 proposal, "...*The baseline conditions will also integrate Traditional Ecological Knowledge and Traditional Land use information. The baseline conditions will be used to describe the functionality of the McClelland Lake Wetland Complex (Objective 2) and establish a benchmark from which to measure functionality within the non-mined portion of the MLWC.... Objective 1 sets the path for continued data collection and modelling to fill baseline gaps associated with the MLWC*" (FHOP 2018 page 30 of 94). "<br><br>Objective 1 should not be considered complete until there is Pre-Development Baseline and Pre-Mining Baseline information presented for all of the MLWC values. See Response to SC Recommendation 15<br><br>***Recommendation:*** | **CO-CHAIRS** | Please refer to the response to item #55 for further explanation. |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | **New subsections must be added to Section 2.3 Predevelopment Baseline, and Section 2.5 Pre-Mining Baseline Conditions in Objective 1:**<br>Wildlife and aquatic resources (moose, furbearers and waterfowl)<br>Vegetation (community composition and changes in single plant species; including culturally significant species)<br>Harvesting and subsistence use (moose hunting, waterfowl hunting, trapping, plant gathering water use)<br>Indigenous culture and habitation (Access, Cabins, Camps, harvesting areas, places to develop and transfer skills, knowledge, language, traditions, cultural practices)<br>Education and learning (Places to transfer knowledge, skills, family history, language)<br>Health and wellness (opportunities to nurture well-being and spiritual health, food security, ability to practice and enjoy (sensory disturbance, safety, vandalism/conflict) | | |
| **2.0 Objective 1: Baseline Conditions – 2.2 Adequacy of Response to Initial Recommendations** | | | | |
| 44 | Objective 1 - SC Recommendation [14] | NOT ADDRESSED: We asked for the task identified in the 2018 proposal to be reconciled, not the 'purpose' of each objective. Please see above comment Introduction, Appendix A. | **FMCA/FMMN** | See response to #28. |
| 45 | Objective 1 - SC Recommendation [20, 21, 22, 35, 36, 39, 51, 63, 64, 65, 69, 74, 78, 93, 102, 104, 106, 113, 116, 121, 125 and 134] | PARTIALLY ADDRESSED: We asked for IK to be integrated throughout Objective 1 as opposed to provision in a table. The table was deleted so this part is addressed. We also asked that IK be integrated in both pre-development (how it was) as well as the pre-mining conditions (including if change has occurred from the pre-development reference). Many of our comments asked for additional integration of IK. The integration of IK throughout this objective will need to be validated to ensure it was applied in the right context to inform the Plan | **FMCA/FMMN** | Acknowledged, thank you. |
| 46 | Objective 1 - SC Recommendation [32] | NOT ADDRESSED: There was a reference that noted As noted in the introduction to this section, FHEC has reviewed the ITK provided through the SC and has identified where the ITK supports or departs from the results of the monitoring data analysis. In the original draft we could not find this description and the Compiled Draft response was that the section was updated. Upon review, this reference remains (now on page 2-3) but what it is referring to (i.e. identification of where ITK supports or departs from the analysis of monitoring data) is still not there. Please correct. | **FMCA/FMMN** | The sentence has been revised for clarity. |
| 47 | Objective 1 - SC Recommendation [66] | NOT ADDRESSED: We asked for additional clarity on description of Section 2.5.1.1 entitled 'Normal Range'. The response we received was that text in Section 2.5.1.1 had been revised for clarity in the Compiled Draft. The text appears to have not changed. Please correct. | **FMCA/FMMN** | Unfortunately, the wrong section was cited in item #66 of the previous responses. The text in Section 2.5.1 has been updated, which directly precedes Section 2.5.1.1. In Section 2.5.1, FHEC has provided an overview of different approaches for characterizing the MRV – one of these is calculation of normal ranges, but there are other ways of looking at the MRV, such as calculation of measures of central tendency and spread around the mean. "Normal range" is not synonymous with "MRV", so we have not made the change suggested in item #66 of the previous responses. "Normal range" is the name of a statistical technique and FHEC will continue to use this term to refer to one of the methods employed to characterize the MRV. |
| 48 | Objective 1 - SC Recommendation [67] | PARTIALLY ADDRESSED: We asked for a discussion with the SC on back-casting options be completed prior to finalizing the draft plan for incorporation into the pre-development baseline. The response | **FMCA/FMMN** | FHEC respectfully disagrees with this recommendation for a future commitment related to back-casting. FHEC is happy to discuss this further |

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| | | we received that this could be undertaken through the SC as a future work scope. We recommend that this be added as a future commitment in the OP. | | with the SC in future but will not commit to it in the OP. Note that the water modelling work does back-casting for water levels and flows. |
| 49 | Objective 1 - SC Recommendation [73 and 126] | NOT ADDRESSED: We asked that the 2018 proposal definitions for the MLWC be used as opposed to focusing only on the unmined portion of the fen. The response we received referred back to the Introduction, Figure 1-1 in the Introduction and Approval Condition 3.1.1. Upon review of the Introduction and the Approval Conditions to support the sustainability of the unmined portion of the MLWC, it is clear, as is required in Condition 3.13, MLWC has a much broader scope:<br>*3.13 The operational plan referred to in condition 3.11 and 3.12 shall contain, at a minimum:*<br>*a) physical and biological conditions in the MLWC*<br>*b) design features or measures, and other as required for the protection of the non-mined portions of the MLWC*<br>*c) a wetland monitoring program containing as a minimum a yearly survey of vegetation species distribution, abundance, health, and string and flark configuration as compared to baseline studies*<br>*d) a monitoring program to study groundwater and surface water levels and water quality in overburden and muskeg; flow measurements of polishing ponds, and level monitoring in McClelland Lake*<br>*e) proposed investigation and monitoring necessary to verify the model prediction that the MLWC will not drain towards the dewatering area through the groundwater flow system*<br>*f) indicators to evaluate the tolerance of the MLWC to project effects*<br>*g) the necessary contingency mitigation measures to maintain the water table, water chemistry and water flow within limits as indicated by natural fluctuations to maintain ecosystem diversity and function of the non-mined portions of the MLWC during operation and reclamation of the project*<br>*h) a detailed schedule for the implementation of each component of the plan*<br><br>It is evident that the original 2018 proposal definitions envisioned, as does Condition 3.13 a more comprehensive set of definitions that encompass more than just the unmined portion of the fen. We therefore resubmit our original recommendation. *The 2018 proposal defines the MLWC as including McClelland Lake, the fen, and the adjacent upland drainage basin. The watershed that contributes to the McClelland Lake Wetland Complex is referred to at the McClelland Lake Wetland Complex watershed. (page 9). This section however only focuses on the topography of the fen, particularly the strings and flarks. This section needs to be expanded, as do all of the sections 2.5.2 thru 2.5.11 to include not only the fen but also McClelland Lake and the surrounding drainage basin and where appropriate, the watershed.* | **FMCA/FMMN** | The spatial definition of the MLWC provided (The purple line in Figure 1.1-1) aligns with the spatial definition as shown in figures in the IRP (Appendix 5), the 2002 decision report (Figure 2) and subsequently, the authorized OP proposal (Figure 1-1). Additionally, Condition 3.11 of *Water Act* Approval No. 151636-01-00 (as amended) states that Fort Hills is to "…develop an operational plan for the sustainability of the non-mined portion of the McClelland Lake Wetland Complex in accordance with the IRP", as does a number of the sub-conditions under Condition 3.13 which make it clear that Fort Hills is required to maintain the non-mined portion of the MLWC. |
| 50 | Objective 1 - SC Recommendation [122] | PARTIALLY ADDRESSED: Please clarify if soil moisture monitoring will be part of the complimentary data monitoring component. If not, where is the commitment that it will continue given that it is not a primary effects indicator. | **FMCA/FMMN** | FHEC respectfully disagrees with this recommendation. Soil moisture monitoring may continue but as it is not included in the effects monitoring program under the OP, this commitment will not be included in the OP. |
| 51 | Objective 1 - SC Recommendation [133] | PARTIALLY ADDRESSED: We asked for more information to describe wildlife baseline information. Thank you for including more information on species and data collected however what remains outstanding is some description within the context of range of variability. Please include this. | **FMCA/FMMN** | Accepted, additional information has been added into the wildlife section. |

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| 52 | Objective 1 - SC Recommendation [140] | NOT ADDRESSED: We asked for more information to describe invertebrates to be consistent with the other subsections. The response we received that this information was presented to SC and TAG in 2013. A couple of sentences on the findings would make this section consistent and more complete. Please include this. | **FMCA/FMMN** | Accepted, additional details have been added regarding results of the aerial invertebrate programs. |
| 53 | Objective 1 - SC Recommendation [171 and 172] | We have reviewed Fort Hill's response to FMFN comments on Objective 1 including our concern about how climate change and water levels will be assessed and mitigated (#171). Response is adequate. We also note that Objective 3, which we have just reviewed, describes the climate scenario modeling and the assessment methodology and provides a fuller picture.<br>Regarding response #172, thank you for the clarification as to why there is no hydrology station at the north end of the lake. | **FMFN** | Acknowledged thank you. |
| 54 | Objective 1 - SC Recommendation [173] | ***Recommendation:***<br>With regard to the response (#173) as to how FHEC would monitor/detect process affected water, the response is adequate. However, we recommend that somewhere in the OP that FHEC include this short explanation, perhaps in Objective 2 in the description as to how complementary data will be used. | **FMFN** | FHEC respectfully disagrees with this recommendation as the primary program for monitoring process affected water is the site wide monitoring program and so details will remain within that program. |
| 55 | Objective 1 - SC Recommendation [15, 46, and 62] | There remain gaps in the baseline information presented in Objective 1.<br><br>The potential for information gaps in the Operational Plan (OP), including in Objective 1, was first flagged by the SC Co-Chairs on April 27, 2021 after reviewing the draft Table of Contents being put forward for the OP. These gaps were flagged again and more clearly described in the Co-Chair comments provided to Suncor on July 19, 2021. The text on pages 2-1 to 2-3 in Section 2.1 Indigenous Traditional Knowledge and Section 2.3.1 Indigenous Use of the Land and Resources pages 2-6 does not adequately describe the baseline information for wetland values associated with core functions of the MLWC.<br><br>The information in Section 2.3.1 should be broken out to include sections that describe pre-development baseline conditions for the following wetland values:<br>• Harvesting and subsistence use<br>• Indigenous culture and habitation<br>• Education and learning<br>• Health and wellness<br>• Wildlife<br><br>Section 2.5 does not describe Pre-mining baseline conditions for:<br>• Harvesting and subsistence use<br>• Indigenous culture and habitation<br>• Education and learning<br>• Health and wellness | **CO-CHAIRS** | Sections 2.1 and 2.3.1 do not reflect the full integration of Indigenous Knowledge into Objective 1. These sections are intended to serve as a high-level overview, with more detailed integration occurring within the body of the document, as related to specific subjects (e.g., wildlife, vegetation, hydrology, birds). Similarly, Section 2.5 does not include separate headings for the important socio-cultural values identified in this comment, instead incorporating available ITK regarding how wildlife, aquatic resources, vegetation, water quality and quantity, and biodiversity interact with harvesting and subsistence, culture and habitation, education and learning, and health and wellness of Indigenous Peoples.<br><br>This approach was taken to reflect that Indigenous Knowledge should be woven throughout the baseline discussion, being presented as equal to, and in tandem with, western scientific knowledge on specific subjects. Harvesting and subsistence use conditions are described in each section, and where information was available, a discussion of the role of the wetland as a source of intergenerational knowledge transfer and learning, and as a key component of the culture, health and wellbeing of Indigenous Peoples has been presented. No new ITK collection has been approved or undertaken at this time.<br><br>To better communicate the above approach within the report, Sections 2.1 and 2.3.1 have been amended to acknowledge that more detailed descriptions of baseline Indigenous use conditions are presented in subsequent sections alongside western scientific information. |

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| 56 | Objective 1 - SC Recommendation [16] | General Comment<br>This recommendation was seeking clarification on the purpose of collecting specific baseline information (for example, soils, or aerial invertebrates), an explanation on how this baseline information has influenced the OP (for example: understanding of potential impacts, the conceptual water balance model, the effects monitoring program). | **CO-CHAIRS** | The information collected was to inform the baseline understanding of the MLWC. |
| 57 | Objective 1 - SC Recommendation [17] | General Comment<br>Indigenous communities are reviewing the Operational Plan for appropriate use and application of the IK information (expected November 26) | **CO-CHAIRS** | Noted |
| 58 | Objective 1 - SC Recommendation [18] | The revised draft has transferred the IK that was previously listed in tables into the text, but Objective 1 still missing Predevelopment and pre-mining baseline sections for Harvesting and subsistence use, Indigenous culture and habitation, Education and learning, Health and wellness.<br>Indigenous communities are reviewing the Operational Plan for appropriate use and application of the IK information (expected November 26) | **CO-CHAIRS** | Noted |
| 59 | Objective 1 - SC Recommendation [25] | **Page [2-1] -** *October 19 Compiled Draft for Review*<br>Introduction to the IK section 2.1 does not outline the requirements to integrate IK into the OP and the commitments made to integrate IK into the OP (FHOP 2018) | **CO-CHAIRS** | Added context has been added to Section 2.1 on IK integration. IK integration into the OP is discussed in the Introduction (Section 1.3). |
| 60 | Objective 1 - SC Recommendation [26] | **Page [2-1 – 2-3] -** *October 19 Compiled Draft for Review*<br>The MLWC is an ancient, ecologically complex landscape that has supported indigenous people in this region for over 8,000 years. It is Alberta's oldest, largest patterned fen and it continues to support indigenous rights and values including subsistence harvesting, indigenous habitation and culture, education and learning, and health and wellness. While it is acknowledged that text on pages 2-1 to 2-3 in Section 2.1 Indigenous Traditional Knowledge and Section 2.3.1 Indigenous Use of the Land and Resources pages 2-6 has been added to describe the some of the social-ecological functions of the MLWC, this text doesn't describe the MLWC current levels of use by indigenous communities and the current role the MLWC has in providing food, maintaining culture, language, health and wellbeing. The significance of these values, and the current state of these values provide the foundation and context for many of the recommendations put forward by the AAG and the SC. | **CO-CHAIRS** | Note that according to the 2001 landform study by Halsey et al., the peatland complex at **MLWC is the 325th largest out of the 3,774 peatland complexes in Alberta**. The patterned fen element at MLWC is ranked 76th out of the 881 patterned fens in Alberta. Additionally, the ages of most patterned fens in Alberta have not been determined – making it difficult to rank the relative age.<br>It is captured in this section that MLWC serves as an important place for cultural, spiritual, and sustenance-providing activities, including likening it to a sustainable "grocery store" providing everything needed from medicine, to edible plants, to sources of meats and furs. Information has been included based on what has been shared with the SC and Fort Hills. |
| 61 | Objective 1 - SC Recommendation [27] | This section does not describe the AAG participants, but it is noted that some this information is included in the Acknowledgements section. | **CO-CHAIRS** | Noted. |
| 62 | Objective 1 - SC Recommendation [30] | IK related to Natural Variability should be incorporated into Sections 2.3 pre-development and Section 2.5 pre-mining baselines for all the MLWC values before the OP can be considered complete. Where there are gaps in information, Suncor shall make a commitment to start collecting (or in some cases simply compiling) this information. | **CO-CHAIRS** | During future development of the ESCT program or through other planned workshops (i.e. water modelling workshops or wildlife logistics workshops), ITK that is shared can help inform baseline conditions (both pre-development and pre-mining). |
| 63 | Objective 1 - SC Recommendation [31] | **Page [2-6] -** *October 19 Compiled Draft for Review*<br>Although IK presented in the previous draft has been taken out of table format, the OP still needs to better describe how the IK being referenced in Objective 1 is informing baseline conditions. In many cases, it is not clear why some of the IK is being included or how it is linked to other objectives in the OP. For example: | **CO-CHAIRS** | The level of detail required to respond to these questions was not provided in the ITK shared with Fort Hills for inclusion in the OP. Many of these questions posed are not related to the content in Objective 1. The intent of including this IK is to describe how the area is used and its importance to the Indigenous People (related to the comments in #60 above). |

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| | | *"The waters in and around the MLWC provided important habitat for fish, shellfish, frogs, fur bearers and birds, all of which were harvested by indigenous Peoples*" (P. 2-6)<br>• Which waterbodies (include a map)? Will these waterbodies, and these aquatic species be impacted by the FHOP?<br>• What is the relevance of relevance of this information and how does it link to other objectives, for example, Were fish, shellfish, frogs, furbearers and birds selected as indicators? Are these species being monitoring in these areas as part of the MLWC Effects monitoring Program? Can the baseline information presented in Objective 1 about these indicators be used as a benchmark from which to monitor potential project impacts?<br><br>"*The Firebag River was used to hunt bear which would forage for joint grass (a type of horsetail) near sloughs in the spring. The Firebag River was also the location of beaver and otter habitat and nesting grounds for grouse and sandhill crane*" (p. 2-6):<br>• Which sloughs? Will these sloughs or the Firebag River be impacted by the FHOP?<br>• What is the relevance of relevance of this information and how does it link to other objectives for example, Were bear, grouse, sandhill crane selected as indicators? Are these species being monitoring in these areas as part of the MLWC Effects monitoring Program? Can the baseline information presented in Objective 1 about these indicators be used as a benchmark from which to monitor potential project impacts?<br><br>"*Bird Eggs would be harvested in abundance in the area and would be shared with family and friends when found in abondance (IEG 2021)* (p. 2-6).<br>• Where is the bird nesting area (map)? Will this area be impacted by the FHOP<br>• What is the relevance of relevance of this information and how does it link to other objectives for example, Were [waterfowl] eggs selected as an indicator? Is this area being monitored as part of the MLWC Effects monitoring Program? Can the baseline information presented in Objective 1 about these indicators be used as a benchmark from which to monitor potential project impacts?<br><br>*"Prior to development, the MLWC area provided numerous important plant species to Indigenous Peoples. Blueberries and cranberries were harvested in wetter, mossy areas, while rosehips, raspberries and strawberries tended to grow alongside willows in drier areas. Bark from birch and balsam growing along the Firebag River and around McClelland Lake was collected for medicinal and other uses, and poplar sap was collected near the Athabasca River. ITK holders have described pre-development conditions for plant gathering in the MLWC as ideal, with rich biodiversity of culturally important plant species. One holder described how raspberries were so plentiful that berries would weigh down the branches, something that doesn't happen anymore. It was noted that blueberries, cranberries, mint, chokecherry, and diamond willow fungus were also important harvested species* | | |

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| | | *around McClelland Lake. Blue eye grass was historically harvested on sandy ridges near the old fire tower in the Fort Hills. This is also where many of the best berry patches were (Berry hill/mountain cabin). It is believed this area has now been destroyed by resource extraction activities in the region (IEG 2021)."*<br>• Is there baseline information for culturally significant plant species presence and abundance included in Objective 1?<br>• What is the relevance of relevance of this information and how does it link to other objectives for example, Are culturally significant plant species indicators (Objective 2) and are they being monitored as part of the MLWC Effects monitoring Program (Objective 5)? Where will they be monitored – around McClelland Lake, the Firebag River, the sandy ridges?? Can the baseline information presented in Objective 1 about these indicators be used as a benchmark from which to monitor potential project impacts? | | |
| 64 | Objective 1 - SC Recommendation [76] | **Page [2-34] –** Section 2.5.3 Topography *October 19 Compiled Draft for Review*<br>Some IK has been added, but it's not clear how this information influenced what Suncor knows about the topography of the MLWC or how it informed other objectives in the OP. | **CO-CHAIRS** | The inclusion of ITK informs the understanding of how the area is used (for example how topography influences travel routes, influences safety) and its importance to Indigenous Peoples (related to the comments in #60 above). |
| 65 | Objective 1 - SC Recommendation [95] | **Page [2-87]**<br>Is Suncor making a commitment to fill the gap in IK related to climate at reference sites through an AAG workplan in 2022? | **CO-CHAIRS** | During the next steps in planned workshops (i.e. reference site workshops or water modelling workshops) or other AAG activities, ITK that is shared can help inform baseline conditions. Fort Hills is not making a commitment to further ITK funded studies at this time. |
| 66 | Objective 1 - SC Recommendation [120] | **Page [2-108 ]**<br>The ITK quote on page 108 doesn't fit. Section 2.5.7 is about Aquatic resources in the fen and McClelland lake. People made dry fish at camps along the Athabasca River, not at McClelland Lake – food fish were not caught in McClelland Lake. People did/do hunt make dry meat and pick berries around McClelland Lake.<br>Indigenous communities are reviewing the Operational Plan for appropriate use and application of the IK information (expected November 26) | **CO-CHAIRS** | ITK shared has been included and not modified. MCFN ITK described fishing at McClelland Lake. |
| 67 | Objective 1 - SC Recommendation [128 and 129] | Although IK has been taken out of table format, and the OP still needs to better describe how the IK being referenced in Objective 1 is informing baseline conditions. It is not clear why some of the IK in Section 2.5.9.2 MLWC Pre-mining Baseline conditions on page 2-122 and 123 is being included or how it is linked to other objectives in the OP. For example:<br>• Are plant harvesting areas or the specific species referenced in the OP going to be impacted by the FHOP?<br>• What is the relevance of information and how does it link to other objectives, for example, Were bear berries, bullrush, wild mint, red willow, diamond willow fungus, or other traditionally harvested plants selected as indicators? Are these species (or their habitats) being monitored as part of the MLWC Effects monitoring Program? Can the baseline information presented in Objective 1 about these indicators be used as a benchmark from which to monitor potential project impacts? If there are gaps in baseline information, will FHOP start collecting this baseline information? | **CO-CHAIRS** | The planned vegetation indicators are not limited to individual plant species, though data on these species are collected through the existing vegetation program if they are present in the plots. In many cases, the level of detailed ITK required to assess some of these specific questions this has not been shared. Harvesting areas in the mined portion of the fen will be impacted by the FHOSP. In the non-mined portion, vegetation will be monitored through the Primary Effects Indicators and impacts to plant harvesting will be monitored through the ESCT Indicators. |

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| | | Indigenous communities are reviewing the Operational Plan for appropriate use and application of the IK information (expected November 26) | | |
| 68 | Objective 1 - SC Recommendation [130] | If vegetation monitoring data is not currently available for areas within the MLWC, will FHOP begin collecting this information? | **CO-CHAIRS** | FHEC believes it has a robust vegetation monitoring program that was designed to support effects monitoring in the non-mined portion of the MLWC. No additional vegetation monitoring locations are thought to be warranted at this time, however FHEC is open to discussing additions, should they be required, at the planned technical vegetation workshop in 2022. |
| 69 | Objective 1 - SC Recommendation [132] | Reference Site Baseline information require further discussion with the SC, TAG and AAG | **CO-CHAIRS** | Noted, and as identified in the Commitments Table in the Introduction section (Table 1.7-1) FHEC is committed to workshops with the TAG and the SC on the reference sites in 2022. |
| 70 | Objective 1 - SC Recommendation [137] | While Section 2.5.10.1.3 describes moose as an important cultural species, there is no information about moose from the site wide monitoring program. Moose are an indicator recommended by the SC.<br>There are no maps showing where wildlife monitoring is occurring in relation to harvesting areas. | **CO-CHAIRS** | As stated in response to Objective 1 – SC Recommendation 137 - Wildlife is monitored through the Fort Hills WMMP. This information is available through the Fort Hills WMMP and is included in the WMR that has been provided to the SC and the TAG. Additionally, Section 2.5.10.1.3 does provide information from the Fort Hills WMMP specific to moose - that moose have been captured on remote cameras in MLWC and provides some information on sightings through time. |
| 71 | Objective 1 - SC Recommendation [139] | Wildlife monitoring and Reference Site Baseline information require further discussion with the SC, TAG and AAG. | **CO-CHAIRS** | Noted, and as identified in the Commitments Table in the Introduction section (Table 1.7-1) FHEC is committed to workshops with the TAG and the SC on the wildlife monitoring program in 2022. |
| 72 | Objective 1 - SC Recommendation [141] | The relevance of Aquatic Invertebrate data information is still not clear. | **CO-CHAIRS** | As stated in the response to Objective 1 – SC recommendation 141 - FHEC respectfully disagrees with this recommendation. The purpose of Objective 1 is to provide baseline conditions, it isn't merely a discussion of monitoring. FHEC has provided a summary of all data collected and then provides, for some, rationale on why with data collection is not continuing (for the most part due to the data being so variable that they are not useful for detecting change). |
| 73 | Objective 1 - SC Recommendation [144] | Baseline information requirements for indicators requires further discussion with the SC, TAG and AAG. | **CO-CHAIRS** | As Objective 1 – SC recommendation 144 was referring to the reference sites, FHEC assumes this to be a repeat of recommendation #69 above, please see the response to item #69. |

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| **2.0 Objective 1: Baseline Conditions – 2.3 New Recommendations** | | | | |
| 74 | Objective 1 – New Recommendations<br>Page [2-1 to 2-3 and 2-6] | The text on pages 2-1 to 2-3 in Section 2.1 Indigenous Traditional Knowledge and Section 2.3.1 Indigenous Use of the Land and Resources pages 2-6 does not adequately describe the baseline information for wetland values associated with core functions of the MLWC. Specifically:<br>• Harvesting and subsistence use<br>• Indigenous culture and habitation<br>• Education and learning<br>• Health and wellness<br>• Wildlife<br>Some of the text on page 2-2, could contribute to the sections describing the social and cultural and traditional economic indicators but this information must be augmented with actual baseline information (quantitative and qualitative data with maps) that have been presented in a number of reports (IEG 2021, IEG 2019, Garibaldi 2021, FMA 2008, HEG 2017) and summary documents that have been developed specifically for the MLWC and provided to Suncor to use to develop the Operational Plan. Many of these are listed on page 2-4 in Table 2.2-1: Summary of Reports Synthesizing Monitoring Data and the Measured Range of Variability and Indigenous Traditional Knowledge Contributing to Objective 1, but the relevant baseline information from these documents should be laid out in such a way so that it is clear how the FHOSP will track changes in socio-cultural indicators over time. | **CO-CHAIRS** | See response to #55. Details of how ESCT indicators will be tracked over time is still to be determined and worked through the SC. |
| 75 | Objective 1 – New Recommendations<br>Page [2-2] | ***Recommendation***<br>The 2 ITK quotes presented at the bottom of page 2-2, could be moved to Objective 3 – project impacts "...everything that belongs to the fen there, like what you're gonna do with the fen, you're gonna destroy that, that all gonna go" (M32) (MCFN 2019), and "The would never be able to put that reclaimed area into the same state that it was before, there's no way...its not possible, cause it's taking away mother nature's filter. And mother nature must have spent thousands of years creating the fen"(M34) (MCFN 2019) | **CO-CHAIRS** | These quotes were moved to the Introduction within the cultural context section to support the last paragraph. |
| 76 | Objective 1 – New Recommendations<br>Page [2-4 to 2-6] | ***Recommendation***: Page 2-4 Table 2.2-1<br>Should also Reference:<br>Garibaldi report<br>New Petro-Canada Report - Fort Chip Metis report 2008<br><br>***Recommendation*** Section 2.3.1<br>The IEG Report provides more extensive information on pre-development baseline conditions for several MLWC values. Please add this ITK information to Section 2.3.1. | **CO-CHAIRS** | Garabaldi report added. Note that the Petro-Canada FCM study was not used in the development of the Operational Plan – by either the community reps or Suncor. The last sentence was added to section 2.1 and combined with other edits suggested for the framing of that report. |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| 77 | Objective 1 – New Recommendations Page [2-13 to 2-14] | **Section 2.3.3.6 Paleo environmental History of McClelland Lake:**<br>***Recommendation*** : Suncor missed the opportunity to link some of the science presented in Section s 2.3.2 Peatland Paleo Ecology and Section 2.4 with the IK that has been shared by the AAG and SC. No IK is integrated into these sections.<br>Barb F. and Barb H. lived through parts of the fourth period (1900 to 1970) and fifth period, and can provide ITK information from their life times and those of their ancestors.<br>Please add this ITK information to this section on Paleo environmental History of McClelland Lake | **CO-CHAIRS** | We are not able to add new and unvalidated ITK to the document at this time unless the ITK owners request for content to be added. Sections 2.3.2 and 2.4 describe specific western science assessments of pre-development conditions and ITK is incorporated into the pre-development and pre-mining baseline conditions described in Sections 2.3.1 and 2.5. A commitments table has been added to the Introduction (Table 1.7-1) that includes a commitment to incorporate additional ITK as it becomes available and is authorized for use**.** |
| 78 | Objective 1 – New Recommendations Page [2-18 to 2-21] | **Permafrost:**<br>***Recommendation:***<br>Please add an INSERT MAP that show the whole MLWC watershed and the locations of the 3 permafrost areas. The air photos are excellent, but it is difficult to identify the exact location within the MLWC watershed from the figures provided.<br><br>***Recommendation:***<br>Appears to be an Error in Title of Figure 2.4-3. Change 2019 to 2018. | | Inset maps have been added to Figures 2.4-4, 2.4-5 and 2.4-6.<br><br>Title updated to match exactly with title in source report, which does not include dates. |
| 79 | Objective 1 – New Recommendations Page [2-21 to 2-23] | **Section Ecohydrology Zones:**<br>**Recommendation:**<br>Please add information on Traditional Land Use and ITK known about each Ecohydrology Zone. | **CO-CHAIRS** | We are not able to add new and unvalidated ITK to the document at this time unless the ITK owners request for content to be added. This type of integration of ITK into the Hydrologic Response Areas (and how these overlap with the Ecohydrology Zones) can be found in the Conceptual Model appendix. |
| 80 | Objective 1 – New Recommendations Page [2-122] | ***Recommendation:***<br>The first sentence on 2-122 needs to include current use. For example: "The MLWC area has always been, and continues to be, important for harvesting plants for food and medicine."<br>***Recommendation:***<br>Baseline information should include a description or map of important gathering areas in the MLWC, for example: along certain access trails, the areas around the boat launch and northern edge of McClelland Lake, the lake inlet, the lake outlet, and the SE part of the lake near the fen – these areas need to be confirmed with communities.<br>***Recommendation:***<br>Section 2.5.9.2 McClelland Lake Wetland Complex Pre-Mining Baseline Conditions should describe the baseline conditions for vegetation communities supporting culturally significant plant species in the MLWC and reference the lists of culturally significant plant species that have been provided to Suncor. | **CO-CHAIRS** | **Added the current use. Thank you.** We are not able to add new and unvalidated ITK to the document at this time unless the ITK owners request for content to be added. |
| 81 | Objective 1 – New Recommendations Page [2-137] | **Question**<br>Section 2.5.9.3 Reference Site Baseline Conditions – Are the first 2 paragraphs in the correct section, or are they supposed to be on page 2-122, Section 2.5.9.2? | **CO-CHAIRS** | Thank you yes, those first two paragraphs were already captured in Section 2.5.9.2 and have been removed from 2.5.9.3. |

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| 82 | Objective 1 - New Recommendation Page [2-126] | For the paragraph starting by: Chemistry varied from… is easy to follow and read for the vegetation with the example of the dominant plants populating the 2 EHZ. It would be very informative for that same paragraph to give the range of value you are referring too when talking to lower concentrations of base cation or higher.<br>***Recommendation:***<br>On Page 1-126 starting with Chemistry varied… add the values (range) of base cation concentrations that you are referring to instead of only lower and higher.<br><br>TAG does not support these interpretation statements:<br>- These varied chemical and plant distributions provide evidence that the surveyed portion of the patterned fen has considerable resilience to chemical changes.<br>- flarks being more sensitive to water chemistry compared to strings<br><br>***Recommendation:***<br>Delete these statements - as resilience is cannot be demonstrated just by spatial plant distribution and where is the evidence that flarks are more sensitive to water chemistry compared to strings? Sensitive in what sense, to what? | **TAG - VEGETATION** | Values have been added to the paragraph.<br><br>Interpretation statements have been deleted. |
| 83 | Objective 1 - New Recommendation Page [2-130] | Typha name is not in italic. | **TAG - VEGETATION** | Thank you – this has been corrected. |
| **3.0 Objective 2: Define Functionality – 3.1 General Comments** | | | | |
| 84 | NA | I think the SC team will need to have more discussion about whether it is possible to integrate some of the ESCT and primary effects indicators. | **MCFN** | Noted, this can be tabled at the SC. |
| **3.0 Objective 2: Define Functionality – 3.2 Adequacy of Response to Initial Recommendations** | | | | |
| 85 | Objective 2 - SC Recommendation [3] | NOT ADDRESSED: We asked for the task identified in the 2018 proposal to be reconciled, not the 'purpose' of each objective. Please see above comment Introduction, Appendix A. | **FMCA/FMMN** | See response to #28. |
| 86 | Objective 2 - SC Recommendation [16] | PARTIALLY ADDRESSED: We asked for the description of functionality to include socio-cultural functionality. This was partially addressed by adding a partial definition from IEG 2020 but it did not include the remainder of the IEG definition. Please include the following (as also recommended above in the definitions section of the Introduction):<br>*Functionality refers broadly to the individual and collective physical, hydrological, chemical, and biological processes performed by the MLWC that relate directly to the characteristics of the ecosystem and its capacity to interact with the adjacent landscape (ICF Jones and Stokes 2009). The MLWC also performs social and cultural functions that go beyond the ecological functions* **and are viewed as critical to the overall function of the MLWC** *(IEG 2020).* | **FMCA/FMMN** | Accepted and added. |

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| 87 | Objective 2 - SC Recommendation [22] | NOT ADDRESSED: We asked for discussion and approval of the Impact Diagram. The response that we received on the compiled draft was the figure was revised by Suncor and later approved by the SC. THIS STATEMENT IS FALSE. The figure has not changed, and particularly not changed based on the what those changes should be at the September 16 SC meeting. As well, there is NO MOTION IN THE MINUTES THAT THIS FIGURE WAS APPROVED.<br>For reference, the following has been taken from the draft SC meeting minutes that have themselves not yet been approved:<br>*Discussion on Impact Flow Diagram shared with SC on May 27, 2021 - adapted version in draft of Objective 2*<br>• *Make the text in the parentheses consistent*<br>• *Removing colors from diagram*<br>• *Change to Primary Indicators and complimentary data for the blue circle*<br>The figure must be updated and recircled and approval of the SC requested prior to it being used in the Plan. | **FMCA/FMMN** | Sincerest apologies for the misstatement on the approval of the figure. The figure (Figure 3.2-1) has been updated as suggested. |
| 88 | Objective 2 - SC Recommendation [28] | PARTIALLY ADDRESSED: We asked for two wording changes to be made in the description of indicators in section 3.3.1. The response that we received in the compiled draft was that both changes were made. Only one of the changes was made. Please make the second change as previously recommended and accepted by Fort Hills:<br>*ITK holders and social scientists supporting the communities discussed* **ITK and western science** *indicators from an ITK worldview.* | **FMCA/FMMN** | Accepted and revised. |
| 89 | Objective 2 - SC Recommendation [46] | NOT ADDRESSED: We asked for two revisions to be made to the indicators criteria: (1) that reference to sufficient pre-mining data be removed and (2) that responsiveness be more specific to the design features (e.g. wall) as opposed to mitigation. The response we received was that there was no change made but no rationale was provided. Our rationale was (1) the sufficient data may not be there as identified in previous comments and (2) that the design features would be more appropriate as other mitigations may be required (e.g. non-engineering) that the primary indicators may not measure or be sensitive to. Please provide a rationale as to why these recommendations were not considered. | **FMCA/FMMN** | Apologies, the response should have said: no changes made, see response to item #2 above, which would have provided the rationale. The relevant portions of the response to Item #2 in the Objective 2 recommendations includes: "Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators. After the July 19, 2021 meeting to review comments on Objectives 1 & 2, a number of items on the Objective 2 Indicator Selection flow chart were modified based on TAG and SC feedback and shared and modified during the Aug 25, 2021 and Sept 7, 2021 meetings. … There was confusion around the box asking the question "if there sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if it is an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future.<br>Additionally, the design features are not the only project mitigations that could be employed and as such FHEC does not want to specify only those as project mitigations. |

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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| 90 | Objective 2 - SC Recommendation [52] | NOT ADDRESSED: We asked for indicators identified for the MLWC to be reconciled with Suncor's site-wide wildlife monitoring programs and that this information be provided in a table. The rationale for this was it is not clear if a site-wide program would have the temporal and spatial sensitivity needed for supporting the functionality and biodiversity of the MLWC and does not seem to be consistent with the 2002 decision report requirements, particularly with respect to sensitive species and their habitat in the MLWC. As identified in our recommendations on the original Objective 5 upon review of the draft Comparison of Suncor Site-Wide Wildlife Program for Fort Hills vs Needs of MLWC Wildlife Monitoring Program, the site-wide monitoring plan for wildlife is either not applicable or requires an expansion of scope to cover the MLWC at a spatial scale to detect change to the functionality of the MLWC. The response provided for the complied draft referred us to a response to another party's concern and said *Wildlife indicators are monitored through the Fort Hills WMMP. While no formal triggers are associated with the WMMP, via past support and work from the TAG, the MLWC program is designed to be able to detect change. If change were being detected it would be flagged to the regulator through that program*. This response does not address our recommendation and outstanding concern. Please provide the reconciled table for MLWC identified indicators with sitewide monitoring programs as originally requested and provide this in the final draft of the Plan. | **FMCA/FMMN** | FHEC respectfully disagrees with this recommendation. As stated in the previous responses, via past support and work from the TAG, the MLWC specific portion of the WMMP program is designed to be able to detect change. If change were being detected it would be flagged to the AER through that program. The WMMP monitoring requirements are clearly stated within that separate program and will remain there so as to not have overlap between the programs. |
| 91 | Objective 2 - SC Recommendation [55] | PARTIALLY ADDRESSED: We asked that more specific information be provided for the description of Social, Cultural, and Traditional Economic Values and Land Use Data. The response we received with the compiled draft included that there is still more work to be done on the ESCT program and logistics. We recommend that this be added as a future commitment in the OP, including reference to the Program in surveys, interviews, field work supporting the collection of conventional western data (i.e. CBM-type opportunities) as well as further work to link the ESCT program with triggers and limits, mitigation and management response. | **FMCA/FMMN** | A Commitments Table has been added in the Introduction section (Table 1.7-1) that includes the commitment to work the ESCT program with SC in 2022 and the commitment to seek opportunities for community member involvement. As noted, there is still more work to be done on the ESCT program and logistics, so any further specifics have not been added. |
| 92 | Objective 2 - SC Recommendation [35] | *Original Recommendation 35:*<br>*Please have someone carefully compare Table 3-1 with the final List of Indicator/Aspects provided in Table: Methods for Measuring Change in Environmental land Social, Cultural and Traditional Economic (SCT) Indicators that would be sensitive to Potential Effects from the Fort Hills Project related to the conditions in the approvals and outlined in the Operational Plan (May 2021) the was approved by the Sustainability Committee and provided to Suncor*<br><br>**Page 3-6 to 3-8 and Table 3.3-1-** October 19 Compiled Draft for Review<br><br>***Recommendation:***<br>Table 3.3-1 (Indicators recommended by the SC) does not completely match the SC document "July 27, 2021 Methods for Measuring Change in Environmental and Social, Cultural and Traditional Economic indicators that would be Sensitive to Potential Effects from the Fort Hills Project related to the conditions in approvals and outlined in the Operational Plan". **This table MUST reflect the indicators and metrics provided by the SC. The table is now a mixture of all indicators and early warning indicators but some are still missing** | **CO-CHAIRS** | Thank you, FHEC has done a careful comparison and recognizes that some items were missed: rare and sensitive wildlife species has been added under wildlife as has loss/absence of species. For the other items, these are captured within the table. Ice/snow for use as drinking water is captured under ESCT, as is beaver/ muskrat (though abundance was missed and has now been added, thank you), waterfowl and contaminants (under hunting). Wood frogs are included under wildlife. Plants important to Indigenous communities is captured under ESCT. All of the vegetation metrics are captured but worded slightly differently. For example, "change in average height of functional groups" is included in "vegetation structure (vascular plants) – mean height" and "dominance of plant functional groups – change in relative ratio". FHEC does not agree to changing mammals to moose as the wildlife program captures all mammals present however, recognizing the importance of moose to members of the SC moose has been broken out into its own line. |

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| | | Hence, I suggest adding all SC indicators to Table3.3-1 and then greying out the ones that have been recommended as poor early warning indicators by the SC. I have provided the corrective information below for both updating all indicators and then greying out poor early warning indicators. Please make these changes to Table 3.3-1:<br>Change Title of Table 3.3-1 to "List of All Indicators Recommended by the Sustainability Committee. Indicators that are considered Poor Early Warning Indicators are shaded in grey."<br>Under Ice ADD Measure quality of ice and snow for drinking<br>Under Aquatic Resources: Change Lake Aquatic Vertebrates to Beaver and Muskrat and add metrics abundance and health<br>Under Aquatic Resources: Change Aquatic birds to Waterfowl and metrics are abundance, health and behavior<br>Under Aquatic Resources: ADD and CHANGE Wood frog and metric is abundance<br>Under Vegetation : Vegetation communities (bryophytes and vascular plants) and the metrics species abundance and presence/absence<br>Under Vegetation: ADD Plants Important to Indigenous Communities and metrics are health and sustainability<br>Under Vegetation: Functional plant groups and metrics are change in average height of functional groups<br>Under Vegetation: CHANGE Dominant bryophytes and lichens – change in dominance/ratio<br>Bird communities – metrics are abundance and species diversity<br>Change Mammals to Moose and metrics are abundance, health and behavior<br>ADD Rare and sensitive wildlife species<br>ADD Loss/absence of species<br>ADD Contaminants (tissue analysis)<br><br>**The SC has indicated the following are not good early indicators (shown in grey in the SC table) … you may want to shade these on Table 3.3-1.** I kept "tree measurements" as an early indicator due to Line's recent recommendations:<br>Lake sediment quality<br>Fish population and health<br>Beaver and muskrat abundance<br>Mammal habitat<br>Bird habitat<br>Waterfowl behavior<br>Loss/absence of species<br>Rare and sensitive wildlife species<br>Rare and sensitive plant species<br>Contamination | | |

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| 93 | Objective 2 - SC Recommendation [79, 82, 84, 85, 87] | We have reviewed Fort Hills' Reponses and, as appropriate, the corresponding text in Objective 2. Thank you for the response to item #79 that the figure had been approved and recommended by the SC.<br>Reponses to 82, 84, 85 and 87 are adequate. | **FMFN** | Noted, thank you. |
| 94 | Objective 2 - SC Recommendation [80 and 86] | ***Recommendation:***<br>Regarding the recommendation (item #80, reference to item #51 and item #86) to clarify linkages between the monitoring program and complementary data, site-wide EPEA monitoring and Environmental, Social, Cultural and Traditional (ESCT) indicators FMFN appreciates the responses and that the Fort Hills OP is a living document, especially with regard to ESCT. FMFN will look forward to continuing to work through the SC and AAG with FHEC to develop strong and clear linkages between the ESCT and the response frameworks. | **FMFN** | FHEC agrees that further work in collaboration with the SC is anticipated to continue and may also include work on triggers for some of the ESCT indicators. The ESCT program is still in development but if it is demonstrated and agreed to that ESCT indicators are able to detect early change (due to mining in the watershed) in the non-mined portion of the MLWC, triggers will be considered. |
| 95 | Objective 2 - SC Recommendation [42] | Original Recommendation 42:<br>*Clarify the text on complementary data (bottom of 3-7) to state that information on these indicators is currently being collected through the existing monitoring program and will continue to be collected in the future.*<br>*Still need the baseline data to recognize changes in trends over time, even if there are not triggers and thresholds.*<br>**Page 3-9 to 3-14 -** *October 19 Compiled Draft for Review*<br><br>Section 3.3.2.2 Complimentary Data (pg 3-9) and Section 3.4.2 Complimentary Data (pg 3-14)<br>***Recommendation:***<br>The documents say: "As described under Objective 6 (Section 7) analysis and interpretation of complementary datasets may be triggered in the response framework to provide additional context for interpretation of documented effects."<br><br>It was my understanding that the complementary data would be reviewed regularly for trends, and not have to be triggered into a review.<br><br>Recommend changing "triggered" to "regularly reviewed" for trends." | **CO-CHAIRS** | This clarity has already been provided at the beginning of the second paragraph. Examination of trends in complementary data will need to be triggered into a review as part of the Response Framework. |
| 96 | Objective 2 - SC Recommendation [57 and 62] | **Not addressed.**<br><br>***Recommendation:***<br>FHOP commit to reviewing indicator classification and related monitoring programs | **CO-CHAIRS** | FHEC respectfully disagrees that these recommendations were not addressed. A commitment to conduct workshops on monitoring programs (vegetation, wildlife and water) to gather input on the monitoring program and field logistics has been included in the Introduction. |
| **3.0 Objective 2: Define Functionality – 3.3 New Recommendations** | | | | |
| 97 | Objective 2 – New Recommendations Page [3.5 – 3.6]; Table 3.1] | ***Recommendation/Question:***<br>Is there a reason why it's not possible at this time to use remote sensing? | **MCFN** | FHEC understands that the technology isn't available to determine ice thickness on landforms, only on waterbodies like large lakes or the ocean. |

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| 98 | Objective 2 – New Recommendations<br>Page [3.16]; Table 3-6] | In the consideration for new indicators, TAG and the FH team can jointly consider the feasibility of collecting new baseline monitoring data. The FH team should not be able to unilaterally say that it's too late to collect baseline monitoring data and should provide an adequate response if TAG thinks that it is feasible to collect new baseline monitoring data. As stated in my original comment, TAG indicated that it may not be too late to conduct new baseline monitoring now depending on the indicator. | **MCFN** | As stated in the previous response: "There was confusion around the box asking the question "is there sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient **to assess efficacy as an indicator**". Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if it is an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future." FHEC has a number of workshops planned with the SC and the TAG in 2022 to discuss monitoring. |
| 99 | Objective 2 – New Recommendations<br>Page [3.13] | ***Recommendation:***<br>Regarding complementary data collection (item #83, with reference to response to item #47), the Fort Hills Response states "Complimentary data are collected at the same time as the primary effects indicator data" and describes how complementary data will be used and why it is not explicitly discussed Obj 5 and 6. This response is a good clarification and the response indicates that the text in the document has been updated to provide additional clarity (page 3-13, section 3.4.2). We appreciate the updated text but recommend that the following phrase from the response be added (i.e. "complementary data are collected at the same time as the primary effects indicator data"), because the current wording "Complementary data will be included in future monitoring programs" is vague. | **FMFN** | The text in the last draft was changed to: "Complementary data will continue to be collected alongside data for primary effects indicators in future monitoring programs…" to reflect this request. |
| 100 | Objective 2 – New Recommendations<br>Page [3.3 ; Figure 3.2-1] | ***Recommendation:***<br>Figure 3.2-1 was not updated based on the input from the September 16, 2021 SC meeting. Figure 3.2-1 has not yet been approved by the SC; the revised copy from the Sept 16, 2021 meeting was to be circulated by email for final approval.<br>Recommended Changes:<br>Change Title to: Key Drivers, Potential Stressors and Potential Responses modified from the Sustainability Committee Flow Diagram…this will now be consistent with the text for this section.<br>Change the box Physical Receptors to Potential Stressors. Add "Changes In" to the three boxes below Potential Stressors … "Wetland Area, Surface Water and Groundwater Hydrology, and Surface Water and Groundwater Quality"<br>Change the words in the green box.<br>• Delete "Effects on Environmental, Social , Cultural and Traditional Economic Values and Land Use". Change the remaining text to bold, capital letters (line other wetland Values).<br>• This Box should be effects on:<br>  • SUBSISTENCE HARVESTING<br>  • INDIGENOUS CULTURE AND HABITATION<br>  • EDUCATION AND LEARNING<br>  • HEALTH AND WELLNESS (addressed in the ESCT monitoring program)<br>The revised figure should be provided to the co-chairs to be circulated for final approval by the SC. | **CO-CHAIRS** | Apologies, please see the response to item #87. Note that not all of the recommended changes here were incorporated; however, the recommended changes made at the SC meeting on September 16th, 2021 (and included in item #87) were made. |

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| 101 | Objective 2 – New Recommendations Page [3-8 to 3-11] | **Section 3.3.2.1 Primary Effects Indicators:**<br>***Recommendation:***<br>First Bullet under Primary Effects Indicators:<br>Recommend Changing to "It is a measure of wetland functionality or ecosystem diversity."<br>The EEM program is to be designed to monitor and maintain both functionality and ecosystem diversity as noted Water Act Conditions (from the Introduction). | **CO-CHAIRS** | FHEC respectfully disagrees with this request, the bullets reflect the flowchart which has been worked extensively, and also which in turn reflects the purpose of the Objective, and is focused around functionality. |
| 102 | Objective 2 – New Recommendations Page [3-8 to 3-11] | ***Recommendation:***<br>Figure 3.3-2 Indicator Selection Criteria: Recommend the following changes be made to some Boxes:<br>Box 1 – In the parameter a measure of wetland functionality or ecosystem diversity?<br>Box 4 - Is the parameter a measure of socio-cultural or traditional economic wetland values<br>Circle Below Box 4 - MLWC Environmental, Social, Cultural and Traditional Economic Indicators?<br><br>In addition, there is still concerns over two selection criteria that have been raised at several SC or AAG meetings:<br>*Is the parameter potentially responsive to Fort Hills Project mitigation?* This criterion can be interpreted to say the there may be effects to the Fort Hill Project but they are not recognized because they cannot be mitigated, so the MLWC may not be fully protected<br>*Are pre-mining baseline datasets sufficient to assess efficacy as an indicator?* Why can an indicator not be incorporated into the program once adequate baseline information has been collected? This statement could currently exclude some of the recommended Reference Sites monitoring sites and some monitoring of the SCT indicators. | | As stated in previous responses, there is confusion around the box asking the question "if there are sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if it is an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future. |
| 103 | Objective 2 – New Recommendations Page [3-8 to 3-11] | ***Recommendation:***<br>Section 3.3.2.3 Site Wide Operational Monitoring Data:<br>The document states *"Parameters included as site-wide monitoring date will not be included in the effects monitoring program and response framework described under Objective 5 and 6 respectively."*<br><br>During the SC meeting, we discussed having the site-wide monitoring data reviewed regularly for the MLWC area to check for changes/trends and added boxes in the Response Framework.<br><br>*Recommend changing this statement to reflect these changes* | **CO-CHAIRS** | FHEC respectfully disagrees with this recommendation. As stated in the previous responses, via past support and work from the TAG, the MLWC specific portion of the WMMP program is designed to be able to detect change. If change were being detected it would be flagged to the AER through that program. The WMMP monitoring requirements are clearly stated within that separate programs and will remain there so as to not have overlap between the programs. |
| 104 | Objective 2 – New Recommendations Page [3-11] | ***Recommendation***<br>Section 3.3.2.3 Social Cultural and Traditional Economic Values and Land Use Data. First paragraph.<br>Delete "tourism". | **CO-CHAIRS** | Accepted and revised. |
| 105 | Objective 2 – New Recommendations Page [3-11 to 3-18] | ***Recommendation:***<br>Section 3.4 IMPORTANT<br><br>Please update the indicator terms in Figure 3.4-1, and hence in Table 3.4-3, and Table 3.4.4 to reflect the updates provided to Table 3.3-1 (pages 3-6 to 3-8). | **CO-CHAIRS** | See response to item #92. |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

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| | | There are currently inconsistencies related to the ESCT indicators between Table 3.3-1, Figure 3.4-1 and Table 3.4-4 in Objective 2 and Table 6.3.4 in Objective 5.<br><br>Update the ESCT Hunting text in all 4 information figures and tables to reflect full text that is shown in Table 3.4-4.<br><br>**Please make the following changes to Figure 3.4-1 (page 3-12) and to Section 3.4.3 Table 3.4-3 and Section 3.4.4 Tables 3.4-4:**<br>In the Site-Wide Operational Monitoring Data BOX:<br>ADD biodiversity (Loss/absence of species, rare and sensitive wildlife species and rare and sensitive plant species),<br>CHANGE Aquatic birds to Waterfowl with metrics abundance and behavior);<br>CHANGE Amphibians to Wood Frog with the metric abundance<br><br>In the ESCT BOX: Under Ice: ADD Measure quality of snow, ice and drinking water, and add waterfowl under Wildlife health.<br>Under Hunting: delete "health assessed through tissue contamination/scat analysis)<br><br>In the Blue Box. Under "Vegetation – wetland" – What is "plant functional groups?<br><br>Figures and tables need to use consistent terms to describe "values", "Indicators" and "metrics" | | |
| 106 | Objective 2 – New Recommendations Page [3-11 to 3-18] | ***Recommendation:***<br>Page 3-14 Section 3.4.1.4 Primary Effect Indicators Section 3.4.1.4 Aquatic Resources<br>*Chlorophyll a* is not adequate to monitor for changes to aquatic resources in McClelland Lake. In addition, if changes were observed in Chlorophyll a, it would be too lake to collect baseline information for other aquatic resources to detect changes. | **CO-CHAIRS** | FHEC respectfully disagrees with this recommendation. Fort Hills will be collecting water quality and water level data at McClelland Lake along with chlorophyll a. The inclusion of chlorophyll a as an indicator is to serve as an early-warning indicator of changes to aquatic resources in the lake related to primary productivity. For potential effects not related to primary productivity, water quality is best suited for early-warning.<br>As previously discussed with the TAG and the SC, data collected to date on other aquatic resources (benthic invertebrates) has had high variability and shown that a program to monitor aquatic invertebrates would take many years (or decades) of baseline data collection and is unlikely to result in adequate statistical rigour to detect meaningful changes.<br>That said, baseline benthic invertebrate data are available and could be used to provide context for conditions compared to baseline, if changes in water quality and chlorophyll *a* were detected. |
| 107 | Objective 2 – New Recommendations Page [3-11 to 3-18] | ***Recommendation:***<br>Explain how the data collected through the monitoring described in Table 3.4-3 *Parameters Collected for Site wide Operational Monitoring Programs for Wildlife* is related to the following indicators recommended by the SC:<br>Moose Abundance, moose, behaviour, moose health (usability) | **CO-CHAIRS** | Moose abundance and behaviour is considered under the "Mammal habitat – distribution, habitat use", "Mammals – distribution, species diversity", "Moose – abundance", and "Moose – behaviour" parameters in Table 3.4-3. Moose health (usability) is considered under the "Wildlife health" and "Hunting" parameters in Table 3.4-4. |

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| | | Waterfowl abundance and useability<br>Beaver abundance and useability | | Waterfowl abundance is considered under the "Aquatic birds – diversity, dominance, changes over time" parameters in Table 3.4-3 and the "Hunting" parameter in Table 3.4-4. Waterfowl abundance and useability are both considered under the "Wildlife health" and "Hunting" parameters in Table 3.4-4.<br>Beaver abundance and useability is considered under the "Wildlife health" and "Trapping" parameters in Table 3.4-4. |
| 108 | Objective 2 – New Recommendations<br>Page [3-11 to 3-18] | ***Recommendation:***<br>During discussions at the SC**,** it was my understanding that the site-wide regional monitoring data would be reviewed regularly for trends, and not have to be triggered into a review**.**<br><br>Add a statement in Section 3.4.3 on how the Site Wide Monitoring Data will be incorporated into the EEM and the Response Framework. | **CO-CHAIRS** | See the response to item #103. |
| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.1 General Comments** | | | | |
| NA | | **NO RECOMMENDATIONS** | | |
| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.2 Adequacy of Response to Initial Recommendations** | | | | |
| 109 | Objective 3 - SC Recommendation [13] | PARTIALLY ADDRESSED: We asked for a reference to Fort Hill's response to SIR 11(c) as the 2020 Progress Report noted that a 2030 delay scenario would be addressed. We understand the implication and desire to not deferring activity an additional 5 years, as provided in the response we received to this recommendation. The point we were trying to have addressed was three-fold (1) that the AER has contemplated that a delay may occur; (2) if any response solution was provided in the Plan to avoid this being an SIR from AER on the Operational Plan as it therefore remains outstanding/unaddressed; and (3) the given (1) and (2) providing additional time (even by months vs years would greatly benefit all parties involved as the draft Plan could be reviewed and updated in a less-frantic, more thoughtful manner. | **FMCA/FMMN** | **FH Response to SIR 11(c) in the 2019 Progress Report (filed January 2020) stated:** *An updated modelling scenario including updated timing for approved activities (as per SIR #11a) and future proposed activities up to 2030 will be provided pursuant to Water Act Approval 151636-01-00 (as amended), Condition 3.15 in the 2020 Condition 3.12 Progress Report.*<br>**In the 2020 Progress Report (filed January 2021) it was stated:** *In SIR 11 c) of the 2019 Progress Report, the AER requested Fort Hills to provide the results of the cumulative effects modelling scenario assessment up until 2030 "assuming a potential delay in the decision and/or implementation of an Operational Plan." At this time, Fort Hills does not have an adequately detailed alternate mine, tailings and closure plan for the scenario where mine pit preparation activities in the MLWC watershed are delayed to 2030. Fort Hills plans to further discuss this scenario in the Operational Plan.*<br><br>As part of the Fort Hills Annual Progress Reports, an updated hydrological assessment of currently authorized activities is completed using the HGS model pursuant to Water Act Approval 151636 (as amended) Condition 3.15. This SIR was specifically related to the Condition 3.15 assessment. It is Fort Hills' understanding that the AER wanted to understand the hydrological impacts to the MLWC should a delay in the authorization of the OP necessitate deferral of mine pit preparations in MLWC beyond 2030. Given the current mine plan, a delay to mine pit preparations in the MLWC watershed beyond 2025 would involve advancing mining progression to the |

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| | | | | West and North outside of the MLWC watershed in a sub-optimal manner. Since filing of the 2020 Progress Report, Fort Hills has concluded that this alternate mine pit progression would have a similar hydrological impact to the R1 scenario presented in the OP in the 2025-2027 timeframe and reduced hydrological impact in comparison to the R1 and S1 scenarios beyond that. As a result, Fort Hills intends to use information from existing scenarios rather than generate a new alternate mine, tailings and closure plan and hydrological assessment to address this scenario. Fort Hills will continue to complete annual updates to the hydrological assessment for authorized activities within the MLWC watershed pursuant to *Water Act* Approval Condition 3.15. |
| 110 | Objective 3 - SC Recommendation [15] | PARTIALLY ADDRESSED: This is the same as the recommendations around the Introduction concordance table above regarding reconciling the tasks. | **FMCA/FMMN** | See response to #28. |
| 111 | Objective 3 - SC Recommendation [18] | PARTIALLY ADDRESSED: We asked for a copy of the 2002 EIA as well as the retracted MLWC assessment for review so that we could understand how effects to the MLWC both hydrologically and hydro-geologically dealt with in Objective 3 matched up as well as how well the EIA dealt with other VCs (upon which the Fort Hills approval would have been based and hence the site-wide mitigations, reclamation, etc.). As discussed at the October 7, 2021 workshop, this information is not available on line to review and Suncor committed to provide us that information, either via a link or as a document(s). This has not yet been done. We would like this request to be fulfilled and an opportunity to comment on the Plan once we have reviewed it. | **FMCA/FMMN** | Please see the link below to Alberta's EIA repository; the main EIA sections can be found in Volume 3.<br><br>**ftp://ftp.gov.ab.ca/env/fs/eia/2001-06-TrueNorthFortHillsOilSandsProject/Program%20Files/FortHills%20Supp/** |
| 112 | Objective 3 - SC Recommendation [19] | PARTIALLY ADDRESSED: We asked for either the R1 (development scenario with no implementation of water management design features) to be assessed for water quality OR, as we guessed and the response to the recommendation confirms – it would surpass the system limit for functionality, provide the rationale in the introduction as to why it is absent (i.e. the response that was provided should also serve as an explanation in the plan). Please update the Plan to include a short explanation as to the absence of the R1 scenario. | **FMCA/FMMN** | The text in Objective 3 has been updated to reflect this information. |
| 113 | Objective 3 - SC Recommendation [24] | NOT ADDRESSED: We identified a duplicated sentence at the beginning of Section 4.2 and the response we received was that Fort Hills disagrees. This is the sentence in the September version: *Over the course of various MLWC SC meetings and workshops, Indigenous land users have shared some of their perspectives, concerns and knowledge about the McClelland Lake Wetland Complex (MLWC). Over the course of various MLWC Sustainability Committee (SC) meetings and workshops, Indigenous land users have shared some of their perspectives, concerns and knowledge about the MLWC.*<br>Upon review of the October version the duplication was taken out. PLEASE REVISE YOUR RESPONSE TO US. | **FMCA/FMMN** | Apologies, the response was to the wrong item, as noted the sentence was removed. |

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| 114 | Objective 3 - SC Recommendation [25, 26, 28 and 111] | PARTIALLY ADDRESSED: We asked that Objective 3 ensure that baseline information informed through IK in Objective 1 be integrated through Objective 3 as well as the conceptual and numerical models and in keeping with the 2018 proposal, namely:<br>The following excerpt is from the 2018 Operational Plan Proposal, page 34 (emphasis added):<br>*2.3.1 Integration of Traditional Knowledge*<br>*The following information has been added to the Proposal in response to comments from the Sustainability Committee asking how Traditional Knowledge can be used to inform model development.*<br>*The baseline information* ***(including Traditional Knowledge) collected as part of Objective 1 will be used to develop and calibrate the surface water and groundwater model****.*<br>*Examples of how Traditional Knowledge can be used to inform the model development includes knowledge of the connectivity of McClelland Lake with smaller lakes in the vicinity, natural variability of water levels in the lake, information on lake ice dynamics, lake inflows, and lake outflows. These types of Traditional Knowledge will be important to inform our understanding of surface and groundwater systems and together used to better formulate the conceptual model and corroborate model outputs.*<br>The integration of IK throughout this objective will need to be validated to ensure it was applied in the right context to inform the Plan as well as to be consistent with the IK shared in Objective 1.<br>Notably, we recommend that pages 17 to 23 of the original draft Conceptual Model Appendix serve as an example for the rest of the Appendix, as well as the rest of the plan.<br>As suggested in the response to recommendation 28, model refinement based on IK observational data can be a workplan moving forward. We recommend that this be added as a future commitment in the OP. | **FMCA/FMMN** | Agreed, IK informed the model development work and was integrated based on the information provided to Fort Hills and we feel this is reflected in Objective 3. There may be opportunity to expand and improve on this effort. Fort Hills will be including a commitment to support water modelling workshops aimed at further refinement of conceptual water quality and water quantity models. A commitment is made to update the numerical and conceptual models. It is also hoped that MLWC AAG and others can assist in incorporating IK into the MLWC models in 2022/23.<br><br>This has been included in the commitments table that is now included in the Introduction (Table 1.7-1). |
| 115 | Objective 3 - SC Recommendation [33] | NOT ADDRESSED: We questioned the yes/no results in the assessment example Table 4.3-1 for the S1 with 'yes' below the Trigger 1 meaning that the design features are working and a 'no' meaning adaptive management is required. We did not question the use of X, Y, Z. In the response to this recommendation and in the new draft X, Y, Z was changed to aaa, bbb, ccc. To be clear we were asking that the S1 case be changed to a 'yes/no' as opposed to a 'yes'. Please make this change. | **FMCA/FMMN** | As noted in the previous response, the intent of the table has been misconstrued it was meant to be an **example** not a **template**. However, the recommendation has been accepted and the title of the table changed to template. |
| 116 | Objective 3 - SC Recommendation [44] | PARTIALLY ADDRESSED: We asked how IK can be used to validate the models. The response we received said FHEC would be happy to work with the SC in future to validate the modelling work with IK. If that this is added as a future commitment in the OP then this recommendation is ADDRESSED. | **FMCA/FMMN** | This has been included in the Commitments table that is now included in the Introduction (Table 1.7-1). |
| 117 | Objective 3 - SC Recommendation [60] | PARTIALLY ADDRESSED: We asked for the surface water and groundwater quality modelling to be completed for review of the draft plan. The EFDC Surface Water Quality Model was not completed and not part of Objective 3 at the time of this review. Furthermore, groundwater quality was not assessed. As the triggers in Objectives 6 have linkages and conditional triggering based on both quality and quantity both groundwater and surface water quality assessment outcomes need to be reviewed to understand the management response proposed in Objective 6. Both need to be completed and reviewed prior to finalizing the plan. The response we received is that this would be provided as per the schedule provided on October 7th. This information is still outstanding. | **FMCA/FMMN** | The schedule was provided and met, that the SC would receive the updated Objective 3 on November 26th with comments due back December 3rd. |

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| 118 | Objective 3 - SC Recommendation [61] | NOT ADDRESSED: We asked for a more robust description of the model prediction confidence: The discussion on Prediction Confidence (4.3.1.1) requires more information. Namely, what was the confidence rating for each of the factors considered (i.e. high, medium, low) and what was that confidence rating based on. Please provide this information before finalizing the Plan. The response we received is that this will be further addressed once the water quality results are available. It is not clear if that means that once the water quality modelling is complete that confidence ratings and rational will be added to Section 4.3.1.1? It seems that this could be done prior to that understanding that this is information going into the modelling exercise (e.g. quality and quantity of pre-mining baseline data used in the assessment – is this high (we have a robust pre-mining data set), medium (we have data but there are some gaps or anomalies say based on the 2016 wildfire or it is limited in some parameters because data collection was affected by COVID) or low (we have some data but it is not all comparable due to methodology, etc.) – this type of information is provided in the modelling appendices and just needs to be pulled out and summarized in a line or two for each of the considerations in the bulleted list. | **FMCA/FMMN** | An expansion of the prediction confidence text is provided in a revised section 4.3.1.4 of Objective 3. |
| 119 | Objective 3 - SC Recommendation [91, 93 and 101] | ***Recommendation:*** NOT ADDRESSED: We pointed out the difficulty in not having this whole section to review. The response we received was that an entire draft would be provided. We have yet to see the water quality assessment and there is no time identified in the schedule for another review of this section, and the linkages with the other sections before we are being asked for final comments. We recommend additional time to see a complete Objective 3 draft along with the additional updates based on the identified partially addressed and unaddressed recommendations. | **FMCA/FMMN** | The schedule was provided and met, that the SC would receive the updated Objective 3 on November 26th with comments due back December 3rd. |
| 120 | Objective 3 - SC Recommendation [36] | Suncor did not accept recommendation, but the recommendation is being made again: **In** Table 4.3-1 suggest using "yes or no" in the last column linked to result Z, instead of "yes". | **CO-CHAIRS** | See response to item #115. |
| 121 | Objective 3 - SC Recommendation [37] | Response #2 and #29 do not address the concerns about monitoring and methods for the qualitative risk assessment being proposed for wildlife, aquatic resource, vegetation or people. Refer to original recommendations. | **CO-CHAIRS** | FHEC respectfully disagrees, previous responses to #37, #2 and #29 do address the previous recommendations. |
| 123 | Objective 3 - SC Recommendation [94] | Concerns regarding the use of Chlorophyll a have been raised in various sections.<br>*Original recommendation:*<br>*This section is confusing to review. The first paragraph outlines all the potential effects that could occur to the aquatic biota of McClelland Lake including changes to macrophytes, phytoplankton, periphyton, benthic invertebrates, zooplankton and fish due to changes in water levels and quality, however, the only indicator being measured in the lake is chlorophyll a, so none of these potential effects could be documented.*<br>*Please explain how changes in chlorophyll a are being measured, and how these act as a surrogate to represent changes to the other aquatic resources that could result from either change in water level or water quality in the lake. For example many potential changes in types and populations of benthic invertebrates due to change in water level and quality would not be represented by changes in chlorophyll a.* | **CO-CHAIRS** | See response to items #5 and 106, though FHEC also notes that a workshop to discuss vegetation is planned for 2022.<br><br>A table of commitments has been added to the Introduction (Table 1.7-1). A commitment to a vegetation workshop has been included. However, the intent of this workshop is not to recycle on recommendations that were not accepted as part of this review process. |

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| | | *Area changes in aquatic vegetation along the shoreline of the lake due to water levels (increases or decreases) alterations beyond those predicted by modelling would not be captured as there are no plots for vegetation in the littoral zone.*<br><br>***Recommendation:***<br>Fort Hills commits to working further with the SC on recommendations to monitor vegetation along the shoreline of McClelland Lake, and to add another indicator of aquatic resources of McClelland Lake in 2022. | | |
| 124 | Objective 3 - SC Recommendation [86, 96, 106, 107] | ***Recommendation:***<br>This section should also list the potential maximum effects if mitigation is unsuccessful and not just the effects if mitigation is fully effective. This also applies to the aquatic resources section.<br>FHOP should model a scenario that reflects potential changes to water levels in the McClelland Lake | **CO-CHAIRS** | The maximum effects are listed in the sections entitled Mining without Water Management Design Features (which is the simulated R1 scenario). For example, for hydrogeology the R1 simulation results indicated the groundwater table declined approximately 1.5 m on the western side of the non-mined portion of the fen around 2048, with impacts to the groundwater table first noticeable in 2046. During the operational period, the seasonal groundwater table fluctuations within the fen and the net groundwater discharge to the non-mined portion of MLWC were simulated to decrease. This level of impact during operations was considered substantial because it exceeds the predicted and measured ranges of natural variation of 0.4 and 0.6 m, respectively.<br>As stated previously, if mitigation is unsuccessful it is assumed that results would move towards this R1 scenario and that R1 would be the maximum effects. |
| 125 | Objective 3 - SC Recommendation [108, 109, 110] | *Original Recommendations 108*<br>*Area changes in aquatic vegetation along the shoreline of the lake due to water levels alterations beyond those predicted by modelling would not be captured as there are no plots for vegetation in the littoral zone.*<br>*Original Recommendations 109*<br>*Add a section on potential effects on aquatic vegetation due to potential changes in lake levels in Surface Water Hydrology (pgs. 4-29 to 4-30).*<br>*Original Recommendations 110*<br>*Add a section on potential effects on aquatic vegetation due to potential changes in lake levels and water quality.*<br><br>***Response to 108, 109 and 110:*** *Fort Hills recognizes that the suggestion is valid; however, would like to have further discussions with the TAG the SC prior to additional work being completed on this item, particularly as it pertains to reference sites. FHEC hopes to be able to table it at the workshops planned for 2022* | **CO-CHAIRS** | See response to item #123. |

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| | | **Page [4-32 to 4-35] -** *October 19 Compiled Draft for Review*<br>***Recommendation:***<br>These three recommendations raised in the first review of the OP have been copied to ensure continued discussions on recommendations from the SC to add vegetation plots in the littoral zone (an area that provides traditional use plant to the Indigenous Land Users) and to monitor for effects of changes in water levels in McClelland Lake. As noted in the response above, this recommendation. | | |
| 126 | Objective 3 - SC Recommendation [113, 116, 117] | Indigenous communities are reviewing the Operational Plan for appropriate use and application of the IK information (expected November 26) | **CO-CHAIRS** | Noted. |
| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.3 New Recommendations** | | | | |
| 127 | Objective 3 – New Recommendations Page [4-29 to 4-30] | ***Recommendation:***<br>For clarity we recommend that in tables 4.3-12 to 4.3-14 (risk assessment results) that the Level 1 Trigger Value is noted in a footnote, or at minimum a reference to the exact section in the OP where the trigger value can be found. | **FMFN** | A temporary trigger was calculated for hydrogeology (vertical gradient) at one location and used in Objective 3. Triggers for hydrogeology are on a per well or per location basis and are will be calculated after sufficient baseline data has been collected; the trigger presented in Objective 3 is preliminary only.<br>Added a footnote to Tables 4.3-13 and 4.3-14 and referenced back to Objective 6 Section. |
| 128 | Objective 3 – New Recommendations Page [4-4] | ***Question:***<br>The document states that Groundwater quality was not assessed at this time.<br>Will water quality assessment to be provided to the SC in November include both with the surface water quality and groundwater quality? | **CO-CHAIRS** | As noted in responses to the previous draft, groundwater quality is included as an input to the EFDC model, but EFDC is a surface water quality model. Groundwater quality modelling will be considered during future work. |
| 129 | Objective 3 – New Recommendations Page [4-4 to 4-7] | Section 4.3.1 Description of Models Used:<br><br>***Recommendation:***<br>Add ITK into the text that describes the 9 locations for hydrological processes related to HRAs. Members of the AAG provided information on the location of groundwater springs, and the flow around the unnamed lake etc. during out AAG and SC meetings.<br><br>***Recommendation:***<br>Figure 4.3-2<br>Add a small insert figure that shows the locations of the HRAs.<br>Change the Figure Title Block in Figure 4,3-2 to the same Figure Block that is shown on Figure 1 in the Plain Language Report that describes the flow shown by the different colored arrows. Also add the definition of hydraulic windows as was suggested in my comments for Figure 1. | **CO-CHAIRS** | The Objective 3 Conceptual Model appendix, describes the ITK related to the HRAs and how ITK informed the modelling work.<br>A note has been added to Figure 4.3-2 to provide detail on the meaning of the different coloured arrows. |
| 130 | Objective 3 – New Recommendations Page [4-31 to 4-37] | **Concern**<br>Sections 4.3.22 Water Quality, Section 4.3.2.4 Aquatic Resources, and Section 4.3.2.5 have not been updated or changed from the First Version of the OP and are still incomplete. | **CO-CHAIRS** | These concerns are noted and these items were provided November 26th, 2021 as per the OP schedule. |

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| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.4 Recommendations on Appendix F** | | | | |
| 131 | Objective 3 -Appendix F Page [135 - 136] | Indigenous communities are reviewing the Operational Plan for appropriate use and application of the IK information (expected November 26)<br><br>Page number 135 to 136,<br>Appendix F Section 33. Section 1.4 Synthesis: the 2021 MLWC Conceptual Model<br>For added context include community statements that "hunting has reduced beaver numbers" (FNFN Member personal communication Nov 5, 2021) – so that it is clear that drying conditions caused climate change and industrial drainage is not the only factor contributing to declining beaver numbers. | **CO-CHAIRS** | Noted. With respect to the added ITK based on personal communication, we are not able to add new and unvalidated ITK to the document at this time, and more so when it has not been formally shared with Fort Hills. |
| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.5 Recommendations on Appendix G - Plain Language Report** | | | | |
| 132 | Figure 1 | The Plain Language Report is excellent and is very presented and well written with ITK integrated.<br><br>***Recommendation:***<br>Although several of the springs mapped in Figure 1 were verified with ITK knowledge holders (mentioned in the SC and AAG meeting with knowledge holder)s, it would be worthwhile reviewing and confirming all the locations of the spring that are mapped in Figure 1.<br>In the title block define what are "hydraulic windows" | **CO-CHAIRS** | Noted. The definition of hydraulic window has been provided.<br><br>A list of commitments for future work with the SC and TAG has been included in the Introduction (Table 1.7-1). Commitments included water modelling workshops and incorporation of additional ITK as it becomes available and is authorized for use. These specifics have not been added but may be included in the agendas for related workshops. |
| **5.0 Objective 4: Design and Contingency Mitigation – 5.1 General Comments** | | | | |
| NA | Objective 4 – General Comments | **NO RECOMMENDATIONS** | | |
| **5.0 Objective 4: Design and Contingency Mitigation – 5.2 Adequacy of Response to Initial Recommendations** | | | | |
| 133 | Objective 4 – SC Recommendation (No Page Number) | NOT ADDRESSED: We asked for space for further discussion of the design alternatives including feasibility studies that were carried out as well as how this tied in to the management framework and in follow up to outstanding action items. To this end, we made specific reference to the following excerpt from the 2020 Progress Report that describes the development of Objective 4 (emphasis added):<br>*The Sustainability Committee has also requested information on **what measures could potentially be implemented if unintended consequences arise and sustainability is not maintained** in unmined portions of the McClelland Lake Wetland Complex. Fort Hills considers that **assessment of feasibility and outcome success to be an important component of the design features and contingency mitigation measures** that are developed in support of the Operational Plan. The **results of these assessments will support further discussion with the Sustainability Committee and Advisory Groups** in balancing design options that are identified. If these assessments suggest that the confidence in achieving successful outcomes with a specific design feature is low, **alternative measures will be identified for further discussion with the Sustainability Committee and Advisory Groups**. Additional tasks in this regard to the planned work activities for 2019.*<br><br>We also asked for a concordance table with the 2018 proposal tasks. | **FMCA/FMMN** | A list of commitments for future work with the SC and TAG has been included in the Introduction (Table 1.7-1).<br>See response to item #28 in regards to the concordance table. |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

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| | | Please see previous comments with respect to the content of the concordance table in the Introduction.<br>With respect to outstanding action items and further discussions the response we received with the compiled plan was that: (1) *Discussion related to the mitigations and engineering design have been discussed for more than a decade with the SC and input and recommendations have been incorporated into the plan as presented* – we presume this to be Section 5.1.2 that provides a paragraph on discussions of water supply alternatives as well as a paragraph on closure features. (2) *There are outstanding action items that came from the June meeting that need to be further discussed at the SC, in particular follow-up discussions on water modelling and reference sites. These followup meetings are planned for 2022* and (3) *Contingency mitigation measures are outlined in Section 5.5 and included as alternative design concepts throughout Objective 4*.<br><br>**We recommend that future commitments are made in the OP to identify additional work that will be done with the SC and its advisory groups and, as identified below in our last recommendations that this work is more than just 'sharing' information but done so collaboratively to allow the SC to provide input into areas, for example, that are identified for further investigation or further evaluation.** | | |
| 134 | Objective 4: SC Recommendation [5] | NOT ADDRESSED: We asked for consistent language based on that used in the progress reports with respect to collaborating on future work. The response we received was that language has been added. Based on our review (page 5-3 from the compiled draft) it states:<br>Future stages of work to develop preliminary and detailed designs for the various system components and contingency measures will be shared with the SC. As noted above, we recommend that future work be collaborative and reflect more than 'sharing'. | **FMCA/FMMN** | A list of commitments for future work with the SC and TAG has been included in the Introduction (Table 1.7-1). This includes a commitment to collaborate with the SC and its Advisory Groups on the staged engineering mitigation plans. We suggest that some design features (i.e. water source, cutoff wall, resupply system) may be more important for SC review and input than other features (i.e. ditches, pipelines, sedimentation ponds and pumps) and a prioritization effort may be necessary. |
| 135 | Objective 4: SC Recommendation [6] | PARTIALLY ADDRESSED: This compiled recommendation contains several individual recommendations we had on Section 5.1.2. Many of them are addressed however there is still one that is outstanding and was not specifically responded to. It is:<br><br>*The last paragraph references a mitigations meeting that was held on February 12, 2020 with a number of recommendations resulting in mine plan changes (to be addressed in a forthcoming mine amendment application that has not yet been provided) as well as the Fort Hills Reclamation and Closure Plan that again has not been provided (or is part of a Community(s) reclamation advisory group). Reference should be given to input provided at:*<br>1. *June 17, 2021 Modelling and Engineering Mitigations Workshop*<br>*for example, the use of snow pack discussion led to a need for a follow up discussion; suggestion to conduct an experiment to test aspen vs spruce transition and moisture correlation; understanding water supply quality with respect to alkalinity and whether different water quality will be needed for different zones; potential need for a reference system not driven only by flora/fauna but by hydrogeologic system; stepping into watershed boundary of the non-mined portion of the fen with early works and prior to detailed design approval – this* | **FMCA/FMMN** | Agreed. Reference to those workshops and outcomes based on the recorded minutes have been added to Section 5.1.2. |

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| | | *led to a final action to schedule a follow-up meeting to continue discussions on MLWC Water modelling and mitigations and candidate reference sites but this meeting did not occur*<br>2. *October 15, 2020 Mining, Reclamation and Closure Plan SC Update Meeting for example, there was information shared about potential new impacts from the mine plan changes that could require a change to mitigations – however the application has not yet be completed or reviewed; there was concern about engagement with respect to reclamation and specifically for the MLWC; a question was raised about the length of the wall and the response was that the length was not yet finalized – these are all mitigation related*<br>*Not all input and actions have been included in this section that need to be included.*<br>Please address this recommendation – this may be done through future commitments in the OP. | | |
| 136 | Objective 4: SC Recommendation [8] | PARTIALLY ADDRESSED: This recommendation focused on collaboration with the SC on design features and mitigations that may be necessary based on information/data coming from site-wide programs as well as the ESCT program: *Based on the 2020 Progress Report, design features and mitigation measures, including those alluded to in EPA-related conditions as well as to address cultural values were to be worked on collaboratively with the SC to address the impacts of mine development on the MLWC.* The response we received was that further discussions and work would occur on the site-wide wildlife program and any adjustments to that program would be made with the respect to applicable applications/approvals not the Operational Plan. We recommend some specific language be drafted as a future commitment in the OP to do this work related to effects from non-primary indicator information. | **FMCA/FMMN** | A table of commitments has been added to the Introduction (Table 1.7-1).<br><br>The specific commitments made related to this recommendation are:<br>- Wildlife workshop<br>- ESCT program workshop<br>- Support for ESCT program initiation in 2022 |
| 137 | Objective 4: SC Recommendation [12] | NOT ADDRESSED: We identified that the terms pre-development was being used as opposed to pre-mining. The response we received was that pre-development is the same as the baseline case. This in contradictory to the definitions provided in the Introduction where pre-mining baseline identifies modeling. Please correctly use pre-mining or revise the definition. | **FMCA/FMMN** | Pre-development has been changed to pre-mining as requested. |
| 138 | Objective 4: SC Recommendation [16] | PARTIALLY ADDRESSED: We asked how FHEC plans to collaborate and seek input from the SC, AAG and TAG on continued evaluation of water resupply sources. The response we received was that there was additional language added and that the SC should discuss priority areas for the review of preliminary and detailed designs. With respect to the former, we refer to the above recommendations on 'sharing' to be more collaborative. With respect to the latter, we recommend that this be a future commitment in the plan. | **FMCA/FMMN** | A table of commitments has been added to the Introduction (Table 1.7-1). A commitment to work staged engineering mitigation plans has been captured. This will be done collaboratively and in a way that considers value trade-offs. |
| 139 | Objective 4: SC Recommendation [20] | PARTIALLY ADDRESSED: We asked how the OP and CCR Plan were linked and how the SC can inform and be informed by the CCR Plan. The response we received was that the SC can make recommendations regarding the MLWC portions of the plan (CCR) and those will be considered by FHEC. We recommend that this be a future commitment in the plan. | **FMCA/FMMN** | Fort Hills is committed to work with the SC through reclamation and closure, and gather input on mitigations, including the MLWC closure landscape. This has been added to the commitment table in the Introduction. |
| 140 | Objective 4: SC Recommendation [28] | PARTIALLY ADDRESSED: We asked how IK informed the closure landscape and drainage plan and how, if at all, it resembles the pre-disturbance land and waterscape to return the area for traditional use and cultural practices. This will need to be validated to ensure it was applied in the right context to inform the Plan. | **FMCA/FMMN** | Agreed. This should be part of the validation activity. |

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| 141 | Objective 4: SC Recommendation [31] | PARTIALLY ADDRESSED: We provided a number of general comments to this section including how ecological and cultural trade-offs of each option were selected or dismissed (this will help better inform engineering and non-engineering mitigations i.e. these mitigations each have their own ecological and sometimes cultural effects) as well as how IK was integrated to inform this section of the plan. With respect to the former the response we received was that trade-offs were not discussed and may be an area to focus on going forward. We recommend that the SC working through trade-offs be a commitment for future work in the plan. With respect to aspects of IK, this will need to be validated to ensure it was applied in the right context to inform the Plan. | **FMCA/FMMN** | All ITK integrated in the plan has had appropriate validation.<br><br>A table of commitments has been added to the Introduction (Table 1.7-1). A commitment to work staged engineering mitigation plans has been captured. This will be done collaboratively and in a way that considers value trade-offs. |
| 142 | Objective 4: SC Recommendation [45] | NOT ADDRESSED: We asked about Section 5.5 (Contingency Measures) and were referred in the response to this recommendation to Section 5.2.1 that provides a general statement preceding the objective of the mitigations: *Traditional land users have guided that the continued supply of the appropriate water is imperative to sustain the non-mined portion of the fen*.<br>This statement along with Sections 5.5 to 5.7 will need to be validated to ensure that the IK shared has been applied appropriately. From a content perspective, our recommendation still stands: *This section should discuss the possibility of multiple functional gaps potentially occurring simultaneously; or for malfunctions to effect one or more of the proposed mitigations. This section should also include an adaptive management plan or framework to account for unanticipated systems challenges or failures.* | **FMCA/FMMN** | The second part of the response was: "The combination of the extensive monitoring program (environmental effects monitoring, operational monitoring, performance monitoring requirements for the cutoff wall) and the ERP will help manage any unanticipated system challenges or failures. More detail will be available as engineering design matures." FHEC believes that this part of the response provides more clarity and that, as noted, more detail will be available in future. |
| 143 | Objective 4: SC Recommendation [49] | PARTIALLY ADDRESSED: This recommendation suggested that access be included as an engineering mitigation and that the list of access 'ideas' from the SC should be discussed, added to if necessary and then validated by the SC and AAG prior to being incorporated into the final version of the Plan. The response that we received referred to access as that for Indigenous use, some of which may be outside of the lease. We understand access may include for Indigenous use but also suspect that this will include access to build the platform and wall and generally support construction and operation of the design features by Fort Hills. We also suspect that this may be an application resulting from future detailed designing and if so request that the AAG be involved in informing those routes. With respect to finalizing the access 'ideas', the response we received stated: *FHEC is committed to working with the SC on these ideas to better understand them and determine next steps*. We recommend that this work is identified as a commitment in the plan. | **FMCA/FMMN** | A table of commitments has been added to the Introduction (Table 1.7-1). Collaboration on the upcoming engineering mitigations is included in the list of commitments, as is the commitment to continue working with the SC on non-engineered access management (such as signage and maps). |
| 144 | Objective 4: SC Recommendation [51] | PARTIALLY ADDRESSD: This recommendation requested that the MLWC wetland functions diagram (from Objective 2) be linked to the non-engineering mitigation. A sentence linking the two has been added to Section 5.7. As well, in the October draft the following statement is made: Fort Hills Operations can work with the SC to find opportunities to promote cultural, spiritual, education and wellness practice in the McClelland Lake area. We would like to see this work as a commitment in the plan. | **FMCA/FMMN** | A table of commitments has been added to the Introduction (Table 1.7-1). A commitment to continue work with the SC on developing the non-engineering mitigations is included. Wellness practice was added based on this recommendation. |

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| 145 | Objective 4: SC Recommendation [54] | PARTIALLY ADDRESSD: This recommendation requested wording be added to be more collaborative (see above recommendations on the use of 'sharing'). The updated compiled Objective 4 was revised but we recommend that the following amendments be made:<br>*FHEC will work in collaboration with the SC and its Advisory Groups to share information and ~~review~~* **develop** *mitigation plans*. | **FMCA/FMMN** | A table of commitments has been added to the Introduction (Table 1.7-1). Fort Hills has committed to work the staged engineering mitigation plans (eg. water source, cutoff wall, resupply system) in collaboration with the SC and its Advisory Groups to share information, review and gather input. Ultimately, Fort Hills is accountable for the design and development of the mitigation plans. |
| 146 | Objective 4: SC Recommendation [No Numbers] | **We note that FHEC has not yet provided a response to FMFN's recommendations and questions on Objective 4.**<br><br>We have therefore examined other responses and the updated text of Objective 4 to ascertain the extent to which our recommendations have been addressed.<br><br>1) **FMFN Recommendation:** FHEC should indicate how it will update the simulation(s) of water resupply volumes: 1) as more years of MLWC hydrological data are collected, and 2) taking into account climate change scenarios/predictions.<br><br>**Response/updated Objective 4:** The response to item #3 (TAC Hydrology question) indicates that FHEC has added a section on Operating Philosophy to Objective 4 (s. 5.4.5) and in this section notes: *FHEC recognizes the need for an operating philosophy accounting for approximate hydrology forecasts influenced by future climate conditions that are unknown in advance.* FHEC then gives a brief overview of their notional plan and indicates: *FHEC would like the opportunity to hold workshop(s) on this plan with TAG and the SC in 2022.*<br><br>FMFN considers this response adequate and looks forward to the workshops.<br><br>2) **FMFN Recommendation:** We recommend that FHEC:<br>a. Take into account climate change predictions and regional changes in runoff (e.g. from forest fires) when developing its hydrological design statistics,<br>b. Design the sedimentation ponds for a higher capacity than 1 in 10 year,<br>c. Clearly describe what happens to water that exceeds the sedimentation pond design capacity and spillway capacity (1 in 100 year) and how it is safely routed away from the fen and lake; and<br>d. Develop a contingency plan to show how water quality in the MLWC will be protected in the event of an exceedance of the sedimentation pond and spillway capacity.<br><br>FHEC provided information on climate change scenario modeling in Objective 3 and therefore 2a has been addressed. It is not apparent if items 2b-d have been addressed, are therefore we include them as a recommendation below. | **FMFN** | FHEC has responded to these recommendations and questions (see items 57 & 58 of the Objective 4 response table dated Oct 25, 2021) and apologizes for any confusion caused. FMFN's efforts to update the recommendations based on the most recent draft of Objective 4 are appreciated. Responses to the updated recommendations follow:<br><br>**"**Design the sedimentation ponds for a higher capacity than 1 in 10 year"<br>- FHEC considers that the 10-year design criteria for managing sediment outflows from the sedimentation ponds in the McClelland Lake watershed are still appropriate for the following reasons: a) they comply with the EPEA approval conditions; b) the additional inflows to the sedimentation ponds during flood events larger than the 10-year design event will be relatively small because of the local contributing drainage areas to these ponds are relatively small; and c) any potential sediment loading associated with the pond outflows during flood events greater than the 10-year design event will be relatively small compared to the overall sediment yields in the McClelland Lake watershed during such large flood events, so any potential sediment outflows from the sedimentation ponds are expected to have negligible effects on the sediment concentration of the water inflow to the non-mined portion of the MLWC.<br><br>"Clearly describe what happens to water that exceeds the sedimentation pond design capacity and spillway capacity (1 in 100 year) and how it is safely routed away from the fen and lake"<br>- The inflows beyond the design capacities of the ponds and spillways are expected to become overland flows, which may cause some local erosion. However, the sediment yield from such local erosion will be relatively small in comparison to the overall sediment yield in the McClelland Lake watershed during large flood events exceeding the 100-year design flood. Therefore, any potential local sediment yield due to the pond overflows will have negligible effects on the sediment concentration of the water inflow to the non-mined portion of the |

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| | | 3) **FMFN Recommendation:** FHEC indicates that for muskeg drainage and overburden dewatering that the only treatment required will be sedimentation ponds for settling and mixing with natural runoff. FHEC does not indicate what would be done if it turns out that the water quality of muskeg drainage and overburden dewatering is not sufficiently similar to the fen (within the measured range of variation) or it is somehow contaminated (e.g. exposure to lean oil sands)<br><br>The above concern is not addressed in the updated Objective 4, therefore we have included our previous recommendation below.<br><br>***Recommendation:***<br>We recommend that FHEC:<br>Design the sedimentation ponds for a higher capacity than 1 in 10 year,<br>Clearly describe what happens to water that exceeds the sedimentation pond design capacity and spillway capacity (1 in 100 year) and how it is safely routed away from the fen and lake; and<br>Develop a contingency plan to show how water quality in the MLWC will be protected in the event of an exceedance of the sedimentation pond and spillway capacity.<br><br>***Recommendation:***<br>FHEC should have a contingency plan and explain in the operational plan how it would address treatment of muskeg drainage and overburden runoff if it turns out that sedimentation ponds and natural mixing are insufficient to ensure that the water quality (from muskeg drainage and overburden dewatering) is within the range of measured variability of the fen. | | MLWC during such large flood events exceeding the 100-year design flood.<br>"Develop a contingency plan to show how water quality in the MLWC will be protected in the event of an exceedance of the sedimentation pond and spillway capacity."<br>- The water inflow to the non-mined portion of the MLWC will be monitored. If any exceedance of the inflow TSS concentration is detected, the causes will be identified and evaluated. Contingency operational measures such as routing the sedimentation pond outflows to the closed-circuit system will be considered and implemented if necessary.<br><br>"FHEC should have a contingency plan and explain in the operational plan how it would address treatment of muskeg drainage and overburden runoff if it turns out that sedimentation ponds and natural mixing are insufficient to ensure that the water quality (from muskeg drainage and overburden dewatering) is within the range of measured variability of the fen."<br>- Water quality of muskeg drainage and overburden dewatering water is discussed in Table 5.2-1. If the water quality did not meet required specifications, the contingency would be to recycle to the industrial wastewater system if required. However, Section 5.2.3 also includes the following statement: "FHEC plans to continue its evaluation of the above-mentioned water resupply sources, including confirmation of any water treatment requirements, as well as potential use of FHUC Quaternary aquifer water particularly during the initial water resupply period." |
| 147 | Objective 4: SC Recommendation [10] | **Original Recommendation #10.**<br>• *In the Post Closure plans what is the balance between surface water and groundwater resupplying the water the MLWC fen?*<br>• *Are there any concerns related to damning by beaver of the surface water distribution system ditches so the surface water supplies will not reach and hence fully meet the needs of the MLWC fen?*<br><br>**Page [NA]-** *October 19 Compiled Draft for Review*<br><br>***Recommendation:***<br>Please add monitoring of potential of beaver damning of re-supply water ditches to fen and lake as part of the design. Concern that if a high proportion of the water supply to the fen is surface water (hence question on ratio between surface water and groundwater supply) during post closure ... then this could be disrupted by beaver activity. | **CO-CHAIRS** | As stated in the previous response, it is technically possible that beavers could dam up a resupply water ditch and this will need to be monitored. Mitigation and/or management plans for this situation would be developed as part of the detailed design for the resupply system, as appropriate. |

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<tr><td>148</td><td>Objective 4: SC Recommendation [39]</td><td>Original Recommendation:<br>Constructing the working platform is planned to involve stage loading of the muskeg where required, including a pre-load that is later removed.<br>What happens if there is significant peat burst causing elevation or compression of peat below ground to the surface water resupply? Could some of these effects impede water flowing towards the fen?<br><br>Original Response:<br>Pressure in the NOP sands will be maintained with the injection wells to prevent subsidence of the peat.<br><br>Recommendation:<br>• FHEC answer should be added to text on now page 5-40</td><td>TAG - Vegetation</td><td>"In addition, pressure in the NOP sands will be maintained with the injection wells to prevent subsidence of the peat." is added in the text.</td></tr>
<tr><td>149</td><td>Objective 4: SC Recommendation [42]</td><td>Original Recommendation:<br>The Athabasca River water is planned to be used as the resupply water source in late mine life and during the reclamation period. A water treatment plant may be required for the river water before discharging to the fen, because the concentrations of some of the river water quality parameters (e.g., sodium and chloride) may be higher than the water quality requirements of the fen.<br>The water treatment plant, if required, would likely be located near the injection wells or the water storage pond. The treatment plant may involve raw water pre-treatment (i.e., removal of total suspended solids [TSS], turbidity, dissolved iron), parameters of concern (POC) treatment (e.g., Sodium), and post-treatment to meet the appropriate criteria before delivery for resupply (e.g., through blending,pH adjustment, chemical addition).<br><br>Main potential differences between the Athabasca River water and the fen could be pointed out. There is the water chemistry baseline of FH project and Vitt and House have indicated the natural range of variation usual in the fen. My main questioning is there really a treatment that can be applied for any base cations or metals that would be completely out of range. At this stage, the potential chemical element that is expected to be widely different (comparing river and muskeg water) could be identified so that a particular attention will be given to their monitoring and correspondingly what is expected to be used in term of treatment. Or more simply are the options presented for water treatment will cover all cases of differences. Is reverse osmosis membranes applicable to great quantity of water? Maybe a statement of each options on what element could be targeted by each treatment and the potential in term of water quantity and cost would help to see where this approach is leading.<br><br>Original Response:<br>FHEC recognizes that Athabasca River water will likely require some sort of treatment prior to being used as resupply water for the fen. FHEC is committed to treating water used to an appropriate quality, if necessary, prior to using as resupply for the fen. At this conceptual stage, and considering</td><td>TAG - Vegetation</td><td>The following table was prepared during early design work as a summary of Athabasca River water quality.<br>Table 4. Summary of Historical Water Quality Data for the Athabasca River<br><table><tr><th rowspan="2">Parameter</th><th rowspan="2">Units</th><th colspan="3">Winter</th><th colspan="3">Spring</th><th colspan="3">Summer</th><th colspan="3">Fall</th></tr><tr><th>Min</th><th>Max</th><th>Median</th><th>Min</th><th>Max</th><th>Median</th><th>Min</th><th>Max</th><th>Median</th><th>Min</th><th>Max</th><th>Median</th></tr><tr><td>pH</td><td>pH Units</td><td>7.0</td><td>8.3</td><td>7.9</td><td>7.4</td><td>8.3</td><td>8.1</td><td>7.6</td><td>8.3</td><td>8.1</td><td>7.7</td><td>8.4</td><td>8.2</td></tr><tr><td>EC</td><td>µS/cm</td><td>400</td><td>540</td><td>428</td><td>190</td><td>470</td><td>240</td><td>210</td><td>290</td><td>250</td><td>260</td><td>380</td><td>318</td></tr><tr><td>TDS</td><td>mg/L</td><td>220</td><td>330</td><td>250</td><td>110</td><td>440</td><td>159</td><td>120</td><td>240</td><td>151</td><td>90</td><td>560</td><td>175</td></tr><tr><td>TSS</td><td>mg/L</td><td><3</td><td>36</td><td>3</td><td>28</td><td>394</td><td>148</td><td>10</td><td>1220</td><td>70</td><td><3</td><td>159</td><td>22</td></tr><tr><td>Calcium</td><td>mg/L</td><td>33</td><td>49</td><td>43</td><td>21</td><td>40</td><td>25</td><td>24</td><td>32</td><td>28</td><td>25</td><td>36</td><td>30</td></tr><tr><td>Magnesium</td><td>mg/L</td><td>10</td><td>15</td><td>12</td><td>4</td><td>11</td><td>7</td><td>6</td><td>10</td><td>8</td><td>7</td><td>10</td><td>9</td></tr><tr><td>Potassium</td><td>mg/L</td><td>1.2</td><td>5</td><td>2</td><td>0.9</td><td>2</td><td>1.7</td><td>0.6</td><td>1.5</td><td>1.0</td><td>0.5</td><td>1.5</td><td>1.0</td></tr><tr><td>Sodium</td><td>mg/L</td><td>20</td><td>53</td><td>34</td><td>8</td><td>38</td><td>12</td><td>7.1</td><td>17</td><td>10</td><td>9</td><td>29</td><td>13</td></tr><tr><td>Bicarbonate</td><td>mg/L</td><td>150</td><td>200</td><td>176</td><td>87</td><td>170</td><td>105</td><td>95</td><td>123</td><td>112</td><td>107</td><td>155</td><td>123</td></tr><tr><td>Chloride</td><td>mg/L</td><td>11</td><td>54</td><td>25</td><td>1.3</td><td>39</td><td>7</td><td>1.7</td><td>20</td><td>6</td><td>3</td><td>36</td><td>10</td></tr><tr><td>Sulphide</td><td>mg/L</td><td><0.003</td><td>0.03</td><td>0.003</td><td><0.001</td><td>0.02</td><td>0.005</td><td><0.001</td><td>0.01</td><td>0.004</td><td><0.002</td><td>0.008</td><td>0.003</td></tr><tr><td>Sulphate</td><td>mg/L</td><td>29</td><td>67</td><td>38</td><td>9</td><td>43</td><td>20</td><td>12</td><td>33</td><td>19</td><td>15</td><td>36</td><td>26</td></tr><tr><td>Nitrogen, Total</td><td>mg/L</td><td>0.2</td><td>0.9</td><td>0.4</td><td>0.3</td><td>1.4</td><td>0.9</td><td>0.3</td><td>2.4</td><td>0.7</td><td><0.2</td><td>1.7</td><td>0.4</td></tr><tr><td>Phosphorus, Total</td><td>mg/L</td><td>0.01</td><td>0.1</td><td>0.03</td><td>0.02</td><td>0.4</td><td>0.1</td><td>0.03</td><td>1.0</td><td>0.06</td><td>0.02</td><td>0.1</td><td>0.04</td></tr><tr><td>DOC</td><td>mg/L</td><td>4</td><td>12</td><td>8</td><td>6</td><td>22</td><td>13</td><td>5</td><td>21</td><td>10</td><td>5</td><td>33</td><td>8</td></tr><tr><td>Phenol (Total)</td><td>mg/L</td><td><0.001</td><td>0.004</td><td>0.002</td><td><0.001</td><td>0.02</td><td>0.007</td><td><0.001</td><td>0.01</td><td>0.004</td><td><0.001</td><td>0.05</td><td>0.002</td></tr><tr><td>Aluminum (Al)</td><td>µg/L</td><td>29</td><td>289</td><td>65</td><td>460</td><td>9240</td><td>4240</td><td>890</td><td>15100</td><td>2590</td><td>20</td><td>21200</td><td>552</td></tr><tr><td>Iron (Fe)</td><td>µg/L</td><td>291</td><td>1080</td><td>389</td><td>921</td><td>9770</td><td>4210</td><td>841</td><td>17200</td><td>2320</td><td>66</td><td>2740</td><td>672</td></tr><tr><td>Manganese (Mn)</td><td>µg/L</td><td>12</td><td>34</td><td>16</td><td>36</td><td>259</td><td>106</td><td>47</td><td>499</td><td>73</td><td>5</td><td>93</td><td>37</td></tr></table>Notes:<br>1. Sources: RAMP (accessed October 2020) and Syncrude (2014).<br><br>Comparing to the fen water quality data presented in the OP, key focus areas for water treatment would likely include (as pointed out in the recommendation):<br>- High concentrations of sodium and chlorides relative to levels seen in the fen<br>- Higher pH than seen in the fen<br>- Seasonally high TSS, iron, aluminum, and turbidity due to nature of river water</td></tr>
</table>

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| | | *the large time lag associated with when Athabasca River water would be required, FHEC will continue to work the treatment requirements in future*<br><br>***Recommendation:***<br>OK but in the future progress reports, an initial comparison between the range of chemistry of the Athabasca river and the fen water chemistry should be made to be aware of what potentially can be the main difference. The data are already available for doing this explatory exercice. | | FHEC wishes to clarify that Athabasca River water is not "planned to be used". As illustrated in Figure 5.1-1 of Objective 4, this water source has been selected as part of an overarching conceptual design concept for the MLWC solution. Preliminary and detailed design work on this component (and all components) are required to define the water source that is ultimately selected and the corresponding water treatment. It is proposed in Objective 4 that final approval of the late life water source system components occurs closer to the execution timeframe. As per Figure 5.8-1, a regulatory submission is currently planned for 2057.<br><br>Additionally, FHEC will need to apply for renewal of the FHOSP *Water Act* Licence No. 190012-01 (as amended), every ten years. Changes in water sources, use and diversion volumes for FHOSP including the MLWC OP will need to be justified by FHEC and reviewed and approved by AER as part of the *Water Act* Licence renewal application process. |
| 150 | Objective 4: SC Recommendation [47] | Original Recommendation:<br>It is well known that through years of research, the oil sands companies have developed a successful approach to restore boreal forest post-mining operations. It is also known that in the Fort McMurray region there is a real lost of wetlands and associate with loss of peatlands, comes the loss of several ecosystem services, particularly the long-term C sequestration function helping to mitigate climate change and warming. TAG welcome the effort that Suncor proposes following the recommendation of an Elder to restore a wetland on the area where a wetland pre-existed. BUT as the knowledge is not quite there with a warranty that the constructed fen will succeed, it would be wise to have a compensation plan to restore elsewhere good quality peatlands. Although this would be a loss to the local community for wildlife habitat for example, it would be a significant gain globally making sure that this project will maintain a no-net-loss of wetland. Agreed that this is not required to Suncor by the regulators, but it is good corporate citizenship. And this measure would be implemented if only the constructed fen ends up to be a failure in the form of not being an ecosystem having the capacity to accumulate peat.<br>Recommendation<br>As a contingency mitigation measure, have a plan to compensate the loss of fen areas (if it occurs) in proposing that the restoration of peatlands elsewhere in Alberta would then be implemented.<br><br>Original Response:<br>FHEC and Suncor participate in numerous research and development efforts on wetland reclamation. Wetland compensation has not been included as part of the mitigation measures<br><br>***Recommendation:***<br>OK at this level of the Operational plan but a higher level of discussion with FHEC and Suncor is warranted. It will close to impossible to restore a peat-accumulating ecosystem anew. The land is just | **TAG - Vegetation** | As acknowledged in the follow-up recommendation from TAG, planned mining activities for FHOSP in the MLWC watershed within the current Water Act Approval Fenceline boundary are not subject to the Alberta Wetland Policy and Wetland Mitigation Directive; however, any development in areas of MLWC outside of the current Water Act Fenceline boundary would be subject to the avoidance, minimization and/or replacement requirements of the Alberta Wetland Policy and Wetland Mitigation Directive. As TAG notes, many of our operations in the Wood Buffalo region impact peatlands. Suncor assesses climate impacts across it's operations and participates in industry-wide climate initiatives (please see our Sustainability reporting at https://sustainability.suncor.com/en/climate-change). |

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| | | too salty afterwards. The Syncrude project is turning into a cattail marsh (and we know cattail do not accumulate peat) and the Suncor nakotee fen - all reintroduced mosses have disapeared and mostly Carex aquatilis is prevailing. I do not deny the huge investment made by oil sands company to support research but we have to recognise what is possible and not. We can restore peatlands impacted by in-situ well pads but it is a different matter (relief wise and chemically wise) to recreate wetlands within open mine pits operation area. | | |
| **5.0 Objective 4: Design and Contingency Mitigation – 5.3 New Recommendations** | | | | |
| 151 | Objective 4 – New Recommendation<br>Page [5.3] | Section 5.3.2 Sustainability Committee Input<br>***Recommendation:***<br>Please add the following Statement:<br>*The AAG also provided recommendations on reducing the effects of the Fort Hills Project on local Indigenous community members by suggesting ways to provide safe reliable access to McClelland Lake, improve security in the region, and approaches to mitigate changes to or loss of cultural and habitation, education and learning and hence health and wellbeing of community members. These recommendations are summarized in Sections 5.7 and 5.8 of the OP.* | **CO-CHAIRS** | Thank you. This has been added. |
| 152 | Objective 4 – New Recommendation<br>Figure 5.4.4 | ***Recommendation:***<br>Figure 5.4-4. For clarity:<br>Add the sump as well as the water storage pond to the figure.<br>Add arrows for the direction of water movement for the blue water supply pipelines. | **CO-CHAIRS** | The sump and pond are already shown in the figure. Flow arrows were added as requested. |
| 153 | Objective 4 – New Recommendation<br>Page [5.36 to 5.37] | **Section 5.4.3.2**<br>***Recommendation:***<br>Due to the extended length of the cutoff wall, can you add a map that shows the changes in the surface and groundwater flow directions on both sides of the wall. Will there be flooding along the wall during the operations phase, particularly near NED? | **CO-CHAIRS** | Management of the runoff from the area west of (or upstream of) the cutoff wall will be included in the Fort Hills mine operational water management system. Management of such runoff is outside the scope of this MLWC operational plan**.** |
| 154 | Objective 4 – New Recommendation<br>Page [5.48] | **Section 5.4.6.3**<br>***Recommendation:***<br>Now will water from NED entering McClelland Lake along the west side of the lake be treated before entering the lake? | **CO-CHAIRS** | No treatment requirement is anticipated because the runoff from the reclaimed area post closure is expected to be similar to natural runoff and of appropriate quality for direct discharge to the receiving environment. |
| 155 | Objective 4 – New Recommendation<br>Page [5.53] | **Section 5.7:**<br>***Recommendation:***<br>Add the word "area" to the end of 7$^{th}$ bullet? The sentence is incomplete. | **CO-CHAIRS** | Accepted and added, thank you. |
| **6.0 Objective 5: Develop an Effects Monitoring Program – 6.1 General Comments** | | | | |
| 156 | NA | I think there could still be more detail about the differences between the reference sites and MLWC. For instance, there is a hydrological divide separating the patterned fen and the lake at ALWC and GGWC. What might the impact of this divide be? Would that mean that the MLWC fen would be more impacted by mining because the water mostly drains into McClelland Lake? Are the reference sites impacted by anything that the MLWC isn't, or vice versa? | **MCFN** | FHEC has provided some of this information in the reference site memo that was provided with the responses to Objective 1. (MLWC_OP_RegionalReferenceSites_Memo_19Oct2021_DRAFT).<br>FHEC is committed to working on the reference sites with the TAG and the SC through workshops in 2022, this has been added via the commitments table in the Introduction section (Table 1.7-1). |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

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| **6.0 Objective 5: Develop an Effects Monitoring Program – 6.2 Adequacy of Response to Initial Recommendations** | | | | |
| 157 | Objective 5: SC Recommendation [10] | PARTIALLY ADDRESSED:<br>1. In keeping with recommendations on the integration of IK in the Introduction of the plan (see above), suggested edit for page 6-1 in October draft: *As discussed in Objective 2 (Section 3.3.1), the linkages between the ~~environmental~~* bio-physical, bio-cultural *and socio-cultural functions ~~and~~ highlights the interrelated nature of ecological and socio-cultural elements in the MLWC.*<br>2. Also, in keeping with recommendations on the integration of IK in the Introduction of the plan, suggested edit for title of Figure 6.1-1 as well as the referred to Figure 3.3-1 in Objective 2 to describe function as bio-physical, bio-cultural and socio-cultural function.<br>3. Please use bio-cultural reference along with socio-cultural as needed throughout the plan.<br>4. Suggested edit to the last sentence in Section 6.1.1 that refers to ongoing engagement: *It is recognized that* as our collective understanding improves with additional monitoring data and information that the SC will collaboratively work to inform and, if necessary, adapt the monitoring program design. *~~with improved information and changing participation that sometimes the advice and recommendations change, and~~ FHEC is committed to ongoing engagement with the SC to solicit input and adapt the monitoring program design if* warranted to improve the monitoring program and inform management responses. *~~appropriate.~~* | **FMCA/FMMN** | The indicator work that the AAG completed, provided in the Indicator Report and validated discussed "environmental and socio-cultural" functions of the wetland, and characterized indicators under these headings. This work was validated by the AAG and provided to Fort Hills for incorporation and while we understand the recommendation, we don't feel it's appropriate to change the terminology used and provided in this work product. We will include a statement that includes the bio-physical, bio-cultural and socio-cultural aspects and the interrelated nature of the environmental and socio-cultural elements.<br>The 4th edit was revised as recommended.<br><br>Note that commitments have been reflected in the commitments table in the Introduction section (Table 1.7-1). These include ongoing SC engagement on the Environmental Effects Monitoring program, and the Response Framework. |
| 158 | Objective 5: SC Recommendation [23] | PARTIALLY ADDRESSED: This recommendation will be addressed if #4 above with respect to recommendation 10 is revised to say: It is recognized that as our collective understanding improves with additional monitoring data and information that the SC will collaboratively work to inform and, if necessary, adapt the monitoring program design. FHEC is committed to ongoing engagement with the SC to solicit input and adapt the monitoring program design if warranted to improve the monitoring program and inform management responses. | **FMCA/FMMN** | Accepted and edited. |
| 159 | Objective 5: SC Recommendation [24] | NOT ADDRESSED: Please see similar recommendation about concordance with the 2018 Proposal – we requested a concordance with the tasks for each outlined in the Proposal NOT the purpose of each objective. | **FMCA/FMMN** | See response to #28. |
| 160 | Objective 5: SC Recommendation [25] | NOT ADDRESSED: We specifically recommended the following: *Specifically, the SC recommended Short Early Warning Indicators and Methods that included both AAG and TAG input. Providing a repeat of the 'values' provided in Objective 2 as opposed to the detailed input provided in the recommendation to inform the effects monitoring program is out of place here.*<br>The response we received was *Content and context was added to Section 6.1.1 to better describe SC input into the monitoring program*. However, this did not address our recommendation which was to include the early warning indicators and methods approved by the SC. There is reference in Section 6.2 to the 'indicator aspects' with a further refence at the end of the list of aspects to Section 6.3.6 for more discussion on the indicators. Upon review of the SC approved *Short Early Warning Indicators and Methods* neither the aspect<br>list on page 6-3 nor list of indicators provided in Table 6.3-4 are those provided in that document. As well, integrated methods were proposed yet are not provided in the draft plan. Please update the | **FMCA/FMMN** | See the response to item #92. Additionally, as previously stated, it is premature to discuss including additional methodologies into the OP at this time. FHEC is committed to workshops with the SC and supporting advisory groups to discuss monitoring in 2022 and the proposed additional methodologies can be discussed there. |

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| | | referred to sections to address our original recommendation including providing the indicators and their proposed methods. (see also next recommendation) | | |
| 161 | Objective 5: SC Recommendation [26] | PARTIALLY ADDRESSED: We originally recommended that *The effects monitoring program must include how (approach, methods) these linkages will be assessed and/or monitored through time and carried into the response management framework*. This remains outstanding and not addressed. | **FMCA/FMMN** | Objective 5 cannot at this time describe how the linkages between the environmental and socio-cultural functions will be assessed or monitored though time as the details of the ESCT program have not been completed at this time. FHEC has committed to working on this program in 2022 with the SC. |
| 162 | Objective 5: SC Recommendation [37, 41, 42, 44 and 74] | NOT ADDRESSED: We asked that Objective 5 include the whole of the effects monitoring program for the unmined portion of the MLWC (not just the fen), integrate western science and indigenous knowledge, carried over in its entirety to the forthcoming response framework (Objective 6) and informed by SC recommendations. The response referred us to Figure 1.1-1 in the Introduction. Please also refer to our response above to Objective 1 recommendations 73 and 126 where we indicate that reference to Approval Condition 3.1.1 alone does not define the MLWC but that Condition 3.1.3 defines a much broader scope. Given this, Objectives 5 must be expanded in scope and carried over into Objective 6. | **FMCA/FMMN** | FHEC respectfully disagrees with this recommendation. Condition 3.11 of Fort Hill's Water Act Approval 151636-01-00 (as amended) requires that an Operational Plan be developed for the sustainability of the non-mined portion of the MLWC. A number of the sub-conditions of Condition 3.13 also directly point to the need to monitor and maintain the non-mined portion of the MLWC. As such, monitoring programs have been focused on this area which is depicted in Figure 1.1-1. |
| 163 | Objective 5: SC Recommendation [45] | PARTIALLY ADDRESSED: We asked that for each indicator, gaps and plans to fill those gaps be identified. The response we received was that additional monitoring will be conducted to fill in gaps for the reference sites. In keeping with our previous comments, we recommend that section 6.3.6 also refer to working early in 2022 to finish the ESTC indicator program so that baseline data can be collected prior to the 2025 draining and ditching activities to inform monitoring, mitigations and management responses and that this is made as a commitment in the plan. | **FMCA/FMMN** | A table of commitments has been added to the Introduction (Table 1.7-1). |
| 164 | Objective 5: SC Recommendation [48 and 75] | NOT ADDRESSED: We recommended (Recommendation 48) that the plan *describe the approach to be taken to quantitatively and/or qualitatively ascertain the natural or normal range of variability, conduct BACI analysis (for example by using ordinal ranking), measure temporal trends, etc. for the ESCT indicators*. The response we received that this was too premature as the ESCT program has not been fully developed to include in the plan. We also recommended (Recommendation 75) that *the Community Participation in MLWC Effects Monitoring Program (via proposed environmental monitoring or through the interview and observation log methods) needs to be detailed to the extent possible prior to submission of the plan (i.e. provide the proposed framework, identified methods and any other information as that area is further developed through workshops, etc.). This should also include it's linkages to the development of thresholds and triggers to support in them for inclusion in response management*. The response we received referred us to a response that read: *Monitoring of important values will be carried out under the ESCT monitoring program, and while full details of that program will not be ready prior to OP submission, Fort Hills has committed to working with the SC to finalize that program post-submission*. In keeping with previous recommendations, we recommend that the ESCT program development be identified as a high priority to be completed in 2022, that this program be linked to the mitigation and management responses and that this is made as a commitment in the plan. | **FMCA/FMMN** | A Commitments Table has been added in the Introduction section (Table 1.7-1) that includes the commitment to work the ESCT program with SC in 2022 and the commitment to seek opportunities for community member involvement. As noted, there is still more work to be done on the ESCT program and logistics so any further specifics have not been added. |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

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| 165 | Objective 5: SC Recommendation [90, 91, 92, and 93] | We have reviewed FHEC's responses to our comments on Objective 5.<br><br>Regarding item #90, our request to include maps of Audet Lakes and Gypsy Gordon Wetland Complex sampling locations – response is adequate. We appreciate that FHEC has updated the text to include the specific Figure references in Objective 1.<br><br>Item #91, regarding additional clarity on how monitoring results that fall outside the normal range will be interpreted, FHEC refers to updated text in Objective 6. Response adequate.<br><br>Item, #92, response is adequate – clarified that grid plots are not currently included at Audet or Gypsy Gordon at this time.<br><br>Item #93 – FHEC indicates that it welcomes input on early warning ESCT indicators in the future SC discussions. | **FMFN** | Noted, thank you. |
| 166 | Objective 5: SC Recommendation [1 and 34] | *Original Recommendation #1*<br>*Add discussion on the monitoring programs for the complimentary, and site wide indicators. Please outline how the complimentary data sets will be used to support the understanding of the integrated indicators, as this is the function of complimentary indicators.*<br>*If changes occur in complimentary or site wide monitoring indicators how will mitigation or management responses to these changes be addressed*<br><br>*Suncor Response*<br>*Complimentary data are collected at the same time as the primary effects indicator data, and will be used to help interpret the primary effects indicator results. The site wide programs will remain outside of the OP. Fort Hills is keeping these programs purposefully seperate to avoid duplication and overlapping requirements.*<br><br>***Recommendation**:*<br>The Suncor response doesn't address the concern. The original recommendation is about understanding how different data sets and information generated from the site wide monitoring programs and the MLWC Effects Monitoring Program will work together. Describe how wildlife, noise, air quality data collected through site-wide programs will be considered and used to understand potential effects and inform/trigger management responses | **CO-CHAIRS** | How the data from the site-wide monitoring programs are considered and used is very much dependent on what parameter was being triggered, the nature of the effects and the mitigation required. A level 1 trigger exceedance is intended to provide an early warning that effects requiring mitigation may occur if data continue trending in the same direction and should a level 1 trigger exceedance occur, the complementary data and the ESCT and site-wide monitoring data will be examined to aid in determination of the cause or source of the effect. The details of this will be captured in the management response plan that will be developed once the level 1 trigger is exceeded to better understand the metric that exceeded. |
| 167 | Objective 5: SC Recommendation [3, 6 and 67 and 71] | *Original Recommendation #3*<br>*Add Sustainability Committee recommendations from the approved Indicators and Methods table for additional monitoring in the McClelland Lake area including:*<br>• *Add vegetation plots along lake shore (to reflect traditional use areas and culturally important plants such as the littoral zone that could be affected by changes in water levels or quality of the lake).* | **CO-CHAIRS** | FHEC has a number of workshops planned with the SC and the TAG in 2022 to discuss monitoring. A table of commitments has been added to the Introduction (Table 1.7-1).<br>Water levels are already measured in McClelland Lake, lake water level is currently measured at the L1 station managed by Environment Canada, which is a shoreline station, and is representative of littoral area water levels as asked by SC. These levels are taken via elevation and therefore are |

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| | | • *Add one or two additional water quality plots at the lake near the shoreline and near the proposed vegetations plots and/or water levels plots. At the technical meetings on April 29/30 at least one new water quality monitoring site was recommended for the lake.*<br>• *Review the sites of two shallow water level plots that are currently being monitored by Suncor to ensure they reflect the best locations and if possible, proximity to the shall water vegetation and water quality plots (this is a revised recommendation as it was not clear earlier that these shallow sites would continue to be monitored)*<br><br>*Suncor Response*<br>• *Fort Hills respectfully disagrees with this recommendation at this time. Work to increase the scope, scale, and cost of the monitoring programs has not been fully assessed and it would be premature to include this in the OP. Fort Hills commits to continue discussing additions to existing field programs with the SC post-submission.*<br><br>*Original Recommendation #67*<br>• *As discussed in the introduction, review the sites of two shallow water level plots that are currently being monitored by Suncor to ensure they reflect the best locations and if possible proximity to the shall water vegetation and water quality plots (this is a revised recommendation as it was not clear earlier that these shallow sites would continue to be monitored).*<br>• *Beavers are not mentioned in this section 6.3.2.1, but in Section 6.3.2.2 (page 6-17) and Section 6.3.2.3 it says that beaver activity is documented during each field visit (page 6-17 and a 6-18). Are beaver surveys still going to be carried out?*<br><br>*Response:*<br>• *See response to item #3 above.*<br>• *Beaver activity mentioned in hydro section but these would be incidental observations, further beaver surveys are not planned at this time.*<br><br>*Original Recommendation 71*<br>• *At a minimum, culturally important plants should be monitored in the permanent and grid-based monitoring plots. Add meandering surveys for culturally important plants.*<br>• *Add vegetation plots along lake shore (to reflect traditional use areas and culturally important plants such as the littoral zone that could be affected by changes in water levels or quality of the lake).*<br>• *Note that plants in the MLWC can be affected by air emissions, especially NOX this close to the mine site that can cause changes to plant growth* | | representative of lake water level for the entire lake. There is no need to add additional locations as the data is already being collected. |

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
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| | | *Response:*<br>• *Culturally important plants will be documented if present in the plots. Addition of new programs needs to be further discussed and evaluated - please see response to #3 above*<br><br>Page 6-16 and Responses from Fort Hills on Recommendations #3 and #6 for Objective 5<br><br>***Recommendation:***<br>We are very pleased that For Hills commits to continue to discussing additions to the existing field programs with the SC post-submissions (Response to Recommendation #3 for Objective 5). We look forward to continue discussions about adding vegetation plots along the shoreline of McClelland Lake and to the Wildlife Workshop in 2022 (outlined in Recommendations #1, #3 and #6, #67 and #71 for Objective 5).<br><br>We also pleased that Fort Hills has added the additional water quality monitoring sites in McClelland Lake and that culturally important plants will be documented in permanent and grid based monitoring plots.<br><br>***Recommendation re: Hydrology Sampling Location:***<br>• The SC has been asking to include a hydrology site in McClelland Lake to measure the level of the lake near the shoreline of McClelland Lake to evaluate change of water levels that could influence littoral zones and riparian areas where traditional land users collect plants<br><br>• The two hydrology sites that are currently mapped appear to be outside the lake and are monitoring flows at the outlet of MLWC and inflow at the discharge of unnamed creek of McClelland Lake.<br>• Hence, we recommend adding a lake level monitoring site along the shorelines of McClelland Lake. | | |
| 168 | Objective 5: SC Recommendation [5] | *Original Recommendation #5: There are several new monitoring sites being established that do not have historic data sets such as the new peat wells (page 6-13), and water and vegetation monitoring sites at Gypsy Gordon and Audet Lake, yet there were several indicators recommended by the SC that were excluded from consideration in the monitoring program as they did not have enough baseline information. The indicators excluded from the environmental monitoring program should be revised as this may not be a valid reason for exclusion from the monitoring program.*<br><br>*Suncor Response As discussed under comments on Objective 2, after meeting to review comments on Objectives 1 & 2, a number of items on the Objective 2 Indicator Selection flow chart were modified based on TAG and SC feedback. There was confusion around the box asking the question "if there sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not* | **CO-CHAIRS** | As stated in the previous response: "There was confusion around the box asking the question "if there is sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if it is an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future." FHEC has a number of workshops planned with the SC and the TAG in 2022 to discuss monitoring. |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

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| | | *include anything in the OP for which there is not enough baseline to determine if its an effective indicator or not.*<br>***Recommendation:***<br>This response does not address the question. Why can an indicator not be incorporated into a program once adequate baseline information has been collected? IF FHOP started collecting baseline information on some of these indicators, there would be no reason to exclude them. The SC does not agree with some of the indicator classification | | |
| 169 | Objective 5: SC Recommendation [21] | The Response to Recommendation 21 is only partially addressed since it requires Suncor to commit to work with the SC to revise the indicator classification system in 2022 (see Objective 2, Issue 2). | **CO-CHAIRS** | FHEC respectfully disagrees with this recommendation. There is much work to be done with the SC and the TAG going forward but FHEC is committed to the overall indicator classification as presented.<br>A table of commitments has been added to the Introduction (Table 1.7-1). Commitments to ongoing SC engagement on the approach to indicators have been included. While Fort Hills is open to improving the approach, the intent is not to recycle on recommendations that were not accepted as part of this review process, nor to revise indicator classifications. |
| 170 | Objective 5: SC Recommendation [36] | The Response to Recommendation 36 is only partially addressed since it requires Suncor to commit to work with the SC to review vegetation monitoring around McClelland Lake in 2022. | **CO-CHAIRS** | FHEC has a number of workshops planned with the SC and the TAG in 2022 to discuss monitoring. A table of commitments has been added to the Introduction (Table 1.7-1). |
| 171 | Objective 5: SC Recommendation [68] | The Response to Recommendation 68 is only partially addressed since it requires Suncor to commit to work with the SC and AAG to integrate qualitative and quantitative water quality data/sampling programs from the Primary effects program, complementary data and the ESCT program which is still not developed, in 2022. | **CO-CHAIRS** | See the response to item #170. |
| 172 | Objective 5: SC Recommendation [71] | The Response to Recommendation 71 is only partially addressed since it requires Suncor to commit to work with the SC to review monitoring for culturally important plants. | **CO-CHAIRS** | See the responses to items #170 and #179. |
| 173 | Objective 5: SC Recommendation [72, 73] | The Response to Recommendation 36 is only partially addressed since it requires Suncor to commit to work with the SC and the AAG to design the ESCT monitoring program in 2022. | **CO-CHAIRS** | See the response to item #170. |
| 174 | Objective 5: SC Recommendation [ 83 ] | *Original Recommendation:*<br>*Noted that TAG vegetation still needs to revise Objective 1 and 2 but before any change in general plant community as will be done with the permanent plots and the random sampling with spatial grid covering the whole MLWC, I reiterate that shrub encroachment from the margins of the strings (or constrictions from their present range) or changes the growth rates of trees (larch trees on strings – dendrochronological study) could give earlier warnings of changes than plant communities. Dwarf birch is a clonal species colonising a band actually larger on the downside of the water flow through the strings of the patterned fen and could react rapidly to drying or wetting. There is numerous papers in the boreal tundra showing shrubs to be a plant component quite responsive to environmental changes.* | **TAG VEGETATION** | Noted thank you, see the response to item #170. |

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| | | *Here are some examples of such studies:*<br>*Johansson T, Malmer N, Crill PM, Friborg T, Aakerman JH, Mastepanov M et al. Decadal vegetation changes in a northern peatland, greenhouse gas fluxes and net radiative forcing. Global change biology. 2006 Dec;12(12):2352-69.*<br>*Myers-Smith IH, Forbes BC, Wilmking M, Hallinger M, Lantz T, Blok D et al. 2011. Shrub expansion in tundra ecosystems: dynamics, impacts and research priorities. Environmental Research Letters. 2011 Dec 20;6(4):045509.*<br>*McManus, K. M., D. C. Morton, J. G. Masek, D. D. Wang, J. O. Sexton, J. R. Nagol, P. Ropars, and S. Boudreau. 2012. Satellite-based evidence for shrub and graminoid tundra expansion in northern Quebec from 1986 to 2010. Global Change Biology 18:2313-2323.*<br>*Walker, M. D., C. H. Wahren, R. D. Hollister, G. H. R. Henry, L. E. Ahlquist, et al.. 2006. Plant community responses to experimental warming across the tundra biome. Proceedings of the National Academy of Sciences of the United States of America 103:1342-1346.*<br>*Summary of Walker et al. 2006 paper: The decrease in plant biodiversity of the study is explained by the augmentation of the height and density of shurbs, graminoid plants and herb plants, which consequently caused a diminution of lichens and mosses intolerant to shade.*<br>***Recommendation: Commitment Identified***<br>*OK based on: Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future.* | | |
| 175 | Objective 5: SC Recommendation [86] | *Original Recommendation*<br>*Page 6-26 section 6.3.5.2.1 : Why not add the average height of abundant species as so often discussed in past 2 years or at least by some defined functional group (grasses, sedges, birch, willows, some abundant herbs)? Idem for grid-based vegetation – height?*<br>***Recommendation: Commitment Identified***<br>*OK based on: Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future.* | **TAG VEGETATION** | Yes, thank you, as noted FHEC has a number of workshops planned with the SC and the TAG in 2022 to discuss monitoring. This has been added to a new table of commitments in the Introduction (Table 1.7-1). |
| **6.0 Objective 5: Develop an Effects Monitoring Program – 6.3 New Recommendations** | | | | |
| 176 | Objective 5 – New Recommendation<br>Page [6-5 to 6-9] | **Proposed Monitoring Locations**<br>***Recommendation:***<br>Currently Surface water quality is not being monitored in the early warning indicator program ...although it is listed as a monitoring component in Table 6.2-1 and listed on Figure 6.2-1.<br>Recommend modifying table and figure, or adding explanation in the text (rather than just a footnote in Table 6.2-1). | **CO-CHAIRS** | There are three surface water quality locations along the cutoff wall that will fall under early warning monitoring (initially accounted for under integrated monitoring). Table 6.2-1, Figure 6.2-1, and associated text have been updated. |
| 177 | Objective 5 – New Recommendation<br>Page [6-7]; Figure 6.21 | Figure 6.2-1<br>***Recommendations:***<br>Table 6.2-1 clearly lists the lake monitoring sites for surface water quality and aquatic resources, but the 3 monitoring locations are not clearly marked on Figure 6.2.1. | **CO-CHAIRS** | Thank you, the three surface water quality/aquatic resources monitoring locations are now shown on Figure 6.2-1 as follows:<br>1. yellow circle on shore at boat launch<br>2. light blue dashed polygon in lake to represent a composite sample taken from the shallow portion of the lake |

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| | | Recommend marking the 3 surface water quality /aquatic resources monitoring locations clearly on Figure 6.2-1.<br><br>Cannot find the Climate Stations on Figure 6.2-1. Difficult to distinguish from the partial survey grid plots marker.<br><br>Recommend changing symbol to designate the climate stations. | | 3. dark blue dashed polygon in lake to represent a composite sample taken from the deep portion of the lake<br><br>The colour/symbol for the climate stations has been changed to light blue/diamond so it contrasts better with the imagery and grid markers. |
| 178 | Objective 5 – New Recommendation<br>Page [6-24 to 6-28] | ***Recommendation:*** Table 6.3-4 page 6-28<br>There are currently inconsistencies related to the ESCT indicators between Table 3.3-1, Figure 3.4-1 and Table 3.4-4 in Objective 2 and Table 6.3.4 in Objective 5.<br>Please make the following changes to Table 6.3.4:<br>Under Ice: ADD Measure quality of snow, ice and drinking water<br>Add behavior under Aquatic resources Waterfowl – abundance and health<br>Add beaver and muskrat, and waterfowl under Wildlife health.<br>Update the ESCT Hunting text in all 4 information figures and tables to reflect full text shown in Table 3.4-4. | **CO-CHAIRS** | "Measure quality of snow, ice and drinking water" is accounted for under "Water use – Access to and use of clean water in the fen, wetland and McClelland Lake including ice/snow" in Table 6.3-4. Please see item #92 and Table 6.3-4 for other updates. |
| 179 | Objective 5 – New Recommendation<br>Page [6-24 to 6-28] | ***Recommendation:***<br>The Response from Fort Hills to #71 for Objective 5 stated "Culturally important plants will be documented in the plots if present. Addition of new program needs to be further discussed and evaluated".<br><br>Section 6.3-5 Vegetation Monitoring<br>Recommend adding the following statements into Section 6.3.5. *Data on plants that are culturally important plants will be collected from permanent plots and grid plots and analyzed for changes.*<br>Add similar statements in Section 6.3.5.2 Data Collection and Section 6.3.5.4 Analytical Approach. | **CO-CHAIRS** | The text will not be changed as recommended at this time; however, FHEC is open to the recommendation of analyzing the culturally important plants data for change, and that this recommendation is tabled at the vegetation workshop in 2022. |
| 180a) | Objective 5 – New Recommendation<br>Page [6-24 to 6-28] | ***Recommendation:***<br>Section 6.3.6<br>Please change this sentence to add the new underlined text.<br>"*FHEC is committed to continue to support this work to ensure participation by community members in the effects monitoring program and to define methodologies and logistics, and to work with the SC to implement.* | **CO-CHAIRS** | A table of commitments has been added to the Introduction (Table 1.7-1). The commitment to seek opportunities for community member involvement in monitoring programs is included. |
| **Objective 6: Develop Response Framework – 7.1 General Comments** | | | | |
| 180b) | Objective 6 – General Comment<br>(No Page Number) | General:<br>Several of the concerns about the Management Response Framework based on the first review of the OP have not been addressed in the Oct 19 Revised Operational Plan.<br><br>Mitigation is not implemented until after the Level 2 indicators are exceeded. At Level 2 both the MRV measured at MLWC (Level 1) and Regional Range of Variation measured at the reference sites (Level 2) have been exceeded. (This is outlined on Figure 7.2-2 and discussed in Section 7.2-1). | **CO-CHAIRS** | FHEC acknowledges concerns about timing of mitigation in relation to trigger levels. To address these concerns, Level 2 triggers for water quality, aquatic resources, and vegetation have been redefined so that mitigation will be implemented if an effect outside the MLWC normal range is persistent, regardless of whether the effect has gone beyond the bounds of the regional normal range. |

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| | | Setting Level 2 limits equivalent to Regional Ranges of Variation so that changes will be allowed to occur at the MLWC beyond the MRV before mitigation is implemented, could lead to unacceptable changes and effects to the functionality and biodiversity of the MLWC. (Regional Ranges appear to be used for all indicators except groundwater and surface water levels and groundwater quality which all used MLWC data).<br>The SC has stated several times that mitigation should be implemented once the MRV of the MLWC has been exceeded, hence after Level 1 trigger, to ensure the protection of the MLWC.<br>Recommendation: Either implement mitigation at Level 1 OR set the Level 1 trigger lower than the MLWC MRV, and the Level 2 trigger at the MLWC MRV.<br><br>Limits are the levels of change that, if exceeded, would result in significant adverse effect to components of the environment. No Limits are being being set for Primary Effects Indicators. They are to be set once the Level 2 triggers have already been exceeded …as noted on page 7-11 Section 7.2.4.2.<br>Table 7.2-1 Proposed Limits for Each Primary Effect Indicator (page 7-5) are challenging to accept, particularly for Aquatic Resources (as we are only measuring one trophic level) and Vegetation (as we have not quantified the Limit and I am not aware that we are not measuring peat accumulation).<br>Recommendation: Limits should be measurable, and quantifiable and set early in the design of the monitoring program, not after Level 2 triggers are exceeded.<br><br>The Level 2 triggers for actions for most of the Environmental Resources have not been simplified, but more conditions have been added (see updated and attached "Summary Table of Triggers from Draft Objective 6 from the Revised Operational Plan Nov 4, 2021.)<br>Recommendation: Review and if possible reduce, the number of conditions that require to be met before mitigation is triggered | | In the revised response framework for water quality, aquatic resources and vegetation, the Level 1 trigger continues to act as an early warning that an effect may be occurring within the MLWC. Level 1 trigger levels are set based on statistical distributions, not measured data min/max values. Therefore, when using an alpha level of 0.05 as we are for the normal range calculations, we expect 5% of future data points to occur outside the MLWC normal range even if nothing is happening within the MLWC. Therefore, we need to see the indicator value outside the normal range AND the significant BACI/trend towards/beyond the normal range bounds to avoid triggering a response when not needed. A Level 1 trigger exceedance represents a minor level of change that is within the bounds of conditions occurring regionally within wetlands of similar function and plant community composition. Management actions occur when a Level 1 trigger exceedance occurs (e.g., confirm effects, identify cause, plan mitigation, etc.); mitigation is implemented when a Level 2 trigger exceedance occurs.<br><br>In the revised response framework for water quality, aquatic resources and vegetation, the Level 2 trigger is related to persistence of effects. If an effect persists outside the MLWC normal range for three years, mitigation will be implemented regardless of whether the bounds of the regional normal range have been reached/exceeded. FHEC has made this change in response to concerns raised by the SC. Although no longer needed for regional normal ranges, reference site data will be used in the BACI model to evaluate whether changes documented at the MLWC are also occurring at reference sites, and whether they are related to the Fort Hills Project.<br><br>Limits have been set for each primary effects indicator in Table 7.2-1, and qualitative limits are appropriate to capture the environmental effects that must be avoided. However, the comment likely refers to Level 3 triggers, which have not been defined for some indicators. If a Level 2 trigger is reached, development of benchmarks (where applicable) and development of Level 3 triggers will occur, and mitigation will be implemented. Additional text is provided in Sections 7.2.1.3, 7.3.3.2, and 7.3.5.2 to explain why Level 3 triggers have not been set for all components, and what information would be used if it becomes necessary to define Level 3 triggers.<br><br>Although the number of conditions in the trigger statements may make them appear complicated, their intent is straight-forward: detect a change and verify that its magnitude is large enough to be outside of normal conditions. Higher level triggers escalate the magnitude of effect and associated actions |

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| | | | | to prevent reaching an undesirable state. Multiple criteria are necessary to achieve this at each trigger level. For example, setting the Level 1 trigger based on a single criterion (i.e., exceeding MRV) would be problematic because 1) as noted above, exceedance may be detected when no effect has occurred and 2) lack of a significant BACI effect would indicate that the changes occurring in the MLWC are also occurring at the reference sites. |
| 181 | Objective 6 – General Comment<br>Page [7-10] | ***Recommendation:*** Please provide the SC with copies of the two documents that appear to have been used extensively to design the Response Framework (i.e., referenced on page 7-10).<br>Wekeezhii Land and Water Board (WLWB 2010) and<br>Water Board/Gwich'in Land and Water Board (MVLWB/GNWT 2019). | **CO-CHAIRS** | WLWB 2010: Final-Draft-Response-Framework-for-Aquatic-Effects-Monitoring.pdf (wlwb.ca)<br>MVLWB/GNWT 2019: aemp_guidelines_-_mar_5_19.pdf (mvlwb.com) |
| **7.0 Objective 6: Develop Response Framework – 7.2 Adequacy of Response to Initial Recommendations** | | | | |
| 182 | Objective 6: SC Recommendation [48] | I think we may need to see example triggers first. How would we know that a trigger is effective?<br><br>Section 7.2.1 – Back to the comment made above. It won't be clear whether the triggers are effective until the mitigation measures are in place. No further recommendations unless we can see an example trigger. | **MCFN** | Trigger levels and associated numerical values for one example are provided for each discipline in the figures accompanying the trigger descriptions in Section 7.3. The numerical values will be updated as additional pre-mining baseline data are collected prior to commencement of mining in the MLWC watershed. These numerical values are statistically derived, and they are intended to be conservative enough that mitigation can return metric values to pre-trigger levels before wetland function in the non-mined portion of the MLWC is compromised. |
| 183 | Objective 6: SC Recommendation [49] | I understand that triggers are based on values, but would it be possible to have more sensitive triggers closer to the cut off wall? This way it could provide even earlier warning that something may need to be investigated. | **MCFN** | In Objective 5, an early warning plot network is described and shown in Figure 6.2-1. The early warning plots occur near the cut-off wall and other mine features. The purpose of the early warning plots is to identify effects before changes occur within the non-mined portion of the MLWC. Trigger values are the same at each monitoring location; the early warning will be detected spatially. |
| 184 | Objective 6: SC Recommendation [2 and 4] | PARTIALLY ADDRESSED: We identified that (emphasis added) (1) the content of Objective 6 was not discussed or workshopped (as were other sections of the Plan) with the SC, AAG or TAG to allow it to be informed by the SC and its Advisory Groups. This Objective is a key piece in ensuring that the functionality and biodiversity of the unmined portion of the MLWC is protected, or at a minimum maintained and yet the **response framework as proposed envisions varying degrees of change are acceptable, conditional and, in some cases, a judgement call**; and (2) **the SC and AAG were not involved in the development of the framework, its fundamental principles, limits, triggers or management responses.** The review of Objective 6 was the first time that this information was presented even though it essential to ensure the protection of the of the MLWC and more importantly that potential effects do not result in irreversible harm to its functionality or biodiversity. This Objective should be rewritten collaboratively informed by both technical and Indigenous knowledge as was identified in the 2018 proposal. The response we received referred us to the April 29 and 30, 2021 meeting that dedicated 1 hour and 3 figures to the triggers and thresholds with no detail and no discussion on the actually management response. Meeting minutes from that | **FMCA/FMMN** | A table of commitments has been added to the Introduction (Table 1.7-1). A commitment to ongoing SC engagement on the Response Framework and approach to indicators has been included, to align with prior responses to the SC. |

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| | | workshop committed to a mitigation and management response workshop but no such workshop occurred.<br>That being said, the responses to Recommendations 2 and 4 included the following commitments: (1) FHEC welcomes further discussion at the SC about how the Response Framework can be applied to MLWC and updated as additional information and details are developed and (2) FHEC supports further discussions and workshops on the application of the approach to the indicators with the SC. We recommend that both of these commitments are provided in the final version of the plan. | | |
| 185 | Objective 6: SC Recommendation [11 and 26] | PARTIALLY ADDRESSED: We asked for additional clarity to be provided in Figure 7.2-1 and emphasized the differentiation between monitoring and management. The response we received included adding clarity to Section 7.2 which partially addressed our recommendation. Upon review of we still strongly recommend that management occurs once a Level 1 trigger is exceeded (i.e. once the parameter) trends outside of the MRV for the unmined portion of the MLWC and not after a Level 2 trigger is exceeded. Please adjust the framework accordingly. For Recommendation 26 we asked the management occur once effects exceed a Level 1 Trigger. The response we received that the proposed management response (i.e. once a Level 2 Trigger is exceeded. We respectfully disagree that this is a precautionary or protective approach to ensure the sustainability of the unmined portion of the MLWC. Again, please adjust the framework accordingly. | **FMCA/FMMN** | Level 1 triggers are set to be conservative and bring about a management response when there is a 5% chance the trigger exceedance represents normal conditions and adverse effects related to the Fort Hills Project are not occurring. Please see additional information on using statistical distributions to define triggers in response to #180 b). Many management actions are taken when a Level 1 trigger is exceeded (e.g., confirmation that an effect has occurred and we are not responding to a measurement error, evaluation of the spatial extent of the effect, identification of the source/cause of the effect, and identification of potential mitigation options).<br><br>As per revised Level 2 triggers (described in more detail in response to #180 b) and in the Objective 6 document) for water quality, aquatic resources and vegetation, implementation of mitigation will now occur if an effect persists outside the MLWC normal range for three consecutive years, regardless of whether the bounds of the regional normal range are exceeded. This change to the triggers was made in response to feedback from the SC. |
| 186 | Objective 6: SC Recommendation [17] | NOT ADDRESSED: We asked for input into the principles as well as to be provided the COSIA document for which the monitoring approach was adapted. The response we received referred us back to the response to Recommendation 4 which is encouraging but it is unclear how the AER would accept changes or modifications to the principles upon with the framework is based. Also, there is no assurance that the monitoring approach adopted is appropriate if we are not able to see the source document. This concern therefore remains unaddressed. | **FMCA/FMMN** | Noted. |
| 187 | Objective 6: SC Recommendation [18 and 27] | PARTIALLY ADDRESSED: Among other things, we asked that Level 3 Trigger as well as the System Limit be added to all relevant tables and figures. Upon review of Figure 7.2-3 and comparing it to Figure 7.2-2 the levels still do not match up – there should be no dark orange, it should be red. This would then match up with Objective 3, Figure 4.3-1. Please revise. | **FMCA/FMMN** | The figure has been updated to include a red zone above the system limit – the colour of the blocks with the text "Level 1 Trigger", "Level 2 Trigger", etc. is the same as the section on the graph above it; therefore, red was added above the System Limit instead of removing orange from between the Level 3 trigger and System Limit. Figure 4.3-1 in Objective 3 has been similarly revised. |
| 188 | Objective 6: SC Recommendation [23] | PARTIALLY ADDRESSED: We recommended that the Investigation of Solutions and Mitigation Tier be more specific and include timeliness to ensure applied mitigation is effective. The response we received referred us to Section 7.2.4.3. Upon review of this section, we found commitment to pause activity once a Level 3 trigger is exceeded to be caveated with the word consider: Consider stopping further development within the MLWC watershed until the cause of the trigger exceedance has been | **FMCA/FMMN** | FHEC respectfully disagrees with this recommendation. Depending on the circumstances, stopping development may not mitigate impacts or could make them worse. Mitigations must be the first strategy implemented and if that is not effective, then the decision to stop development will be made as required. No commitments have been added to the plan. |

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| | | identified and an effective mitigation solution is developed and implemented (bullet 3, page 7-12 of compiled draft Objective 6). This is not in keeping with Figure 7.2-1 or Section 7.2 that reads If mitigation implemented following a Level 2 trigger exceedance is ineffective and a Level 3 trigger exceedance occurs, development in the watershed will stop until effective mitigation is implemented (Figure 7.2-1). Please revise the wording in bullet 3, page 7-12 to read **stop further development within the MLWC watershed until the cause of the trigger exceedance has been identified and an effective mitigation solution is developed and implemented**. This needs to be identified as a commitment in the final plan. | | |
| 189 | Objective 6: SC Recommendation [28] | PARTIALLY ADDRESSED: We provided a number of questions and recommendations in this as general guidance. Many of our requests were adequately addressed and the response included the following: FHEC welcomes further discussion at the SC about how the Response Framework can be applied to MLWC and updated as additional information and details are developed. We recommend that this offer become a commitment in the plan to address this Recommendation, including to understand the applicability and appropriateness of the triggers and the multi-parameter conditions necessary to set off a trigger. | **FMCA/FMMN** | A table of commitments has been added to the Introduction (Table 1.7-1). |
| 190 | Objective 6: SC Recommendation [No Numbers] | FHEC has not yet provided responses to FMFN comments on Objective 6. Therefore we have reviewed the responses to other parties to see if our recommendations have been addressed.<br><br>**FMFN Recommendation:** The response framework including triggers and limits have not previously been discussed with the SC or AAG. We suggest a meeting/workshop (SC, AAG, TAC) dedicated to the discussion of triggers and limits including how the ESCT indictors will be included in the response framework.<br>• **Response**: FHEC has provided several responses regarding trigger and limits and has more explicitly added examination of trends to the description, which we appreciate. FHEC has also committed to further work on integrating ESCT indicators and to workshops in 2022. Response is adequate for now.<br><br>FMFN Recommendation**:** Clarify in the text how and when site-wide EPEA monitoring monitoring will influence the monitoring program and interpretation of trigger exceedances and management/mitigation responses. This is particularly important for wildlife (numerous species) and for air emission deposition because neither of these are built into the framework as Integrated Indicators.<br><br>Describe somewhere in the operational plan (e.g., objective 1- baseline) when complementary data will be collected and specifically how these data will be used in the trigger system and response. For example, will PAHs, metal, naphthenic acid data be collected at least periodically as part of water quality monitoring. If these types of data are planned to be used as complementary they should be collected at least periodically. Under what circumstances or situations would these data be collected? | **FMFN** | The responses to FMFN responses to Objective 6 were provided late, please see the previous Tables for the fulsome response (Attachment 3, Table 5). Additionally, see response to item #185. |

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | • **Response:** FHEC responded to the above two recommendations in item #89 in Objective 5 and item Objective 2 item 83 and 47. Response is adequate; see our recommended additional wording, in our recommendation for Objective 2, above.<br><br>FMFN Recommendation: The main figure indicates that ESCT indicators will be used in a similar way to complementary data to feed into the monitoring under the surveillance tier. ESCT indicators are currently in development but once developed these should factor into the response framework in a more integrated way rather than being supplementary information that feeds into it.<br>• **Response:** FHEC responded to this in item #17 and commits to finalizing the ESCT program by end 2022 – response is adequate<br><br>**FMFN Recommendation:** Generally concerned about the timeliness for response and mitigation. Figure 7.2-1 and accompanying text indicate that if a Trigger 1 exceedance occurs that only continued monitoring and investigations occur and mitigation only occurs potentially after Trigger 2 exceedance and additional monitoring after that. The response framework does not seem to be very responsive in a timely way (especially since the way the Triggers are currently stated (e.g. groundwater levels) it would take several years to document even a Trigger 1 exceedance. The overall framework needs to build in mitigation at an early timestep and Trigger level and/or change the Triggers to be more temporally responsive.<br><br>The groundwater limit proposed by FHEC is "groundwater levels (outside of fen) or gradients (within fen) occur outside the outer bound of recorded data AND surface water levels are outside of acceptable limits". What is the rationale for including the surface water level changes as a requirement within this limit? A more precautionary approach would be to identify triggers for groundwater only rather that requiring there to also be a change in surface water levels (which have their own triggers anyway)<br><br>For vegetation monitoring, provide a clear rationale (e.g. statistical information on vegetation parameters) for less frequent monitoring after baseline established, or alternatively monitor permanent vegetation plots and grid plots annually until such time as data indicates that monitoring frequency could be less often and still allow timely mitigation responses.<br><br>What is the rationale for all the groundwater triggers also being dependent on surface water level changes? Please clarify regarding 3 to 5 years data for groundwater and surface water levels – is this referring to the amount of baseline data needed for comparison – or is it really saying that 3 to 5 years of data that is outside 2 standard deviations is needed for a Level 1 trigger to be met? Based on FHEC's proposed monitoring response framework, exceedance of a Level 1 trigger lead would leave to an investigation of cause, prior to any development of mitigation, which is only at Trigger level 2. A change that results in Trigger level 1 may need mitigation and this should be built into the response framework. The framework does not seem to be "early warning". 3 to 5 years of documented change | | |

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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | in groundwater and surface water could lead to changes in vegetation, wildlife, and other resources important for exercise of Treaty and Aboriginal (s.35) rights. The framework should be designed to be responsive temporally and spatially with mitigation to prevent changes from increasing.<br>• **Response:** FHEC has added more text on mitigation and a section on Trigger Assessment Frequency / adaptation – response is adequate.<br><br>FMFN Recommendation: Similar to above regarding hydrogeology, what is the rationale for 3 to 5 years temporal trend being required for Level 1, 2, and 3 surface water hydrology triggers? If the 3 to 5 years is for baseline data, then this should be clearly noted. How will this work as an early warning, responsive monitoring framework?<br>• **Response:** FHEC clarified in the text of the triggers that the 3-5 years is for the baseline data – clarification noted and appreciated. Response adequate.<br><br>FMFN Recommendation: Consider what is the appropriate frequency for assessing hydrogeological and surface water quality triggers – is annual appropriate? Or 3 times per year after each data set collected? At minimum, data should be analyzed after each data collection period and checked to see if it is outside the range of natural variation.<br>• **Response:** FHEC responded to questions about monitoring frequency in item #22. Response indicates that early warning indicators monitoring locations and frequency will be adapted over time and there is clarification added to Obj 6 with a Trigger Assessment Frequency section (including that surface and groundwater chemistry triggers are assessed 2x per year and surface water levels, groundwater levels and groundwater gradients are assessed 3 x per year. Response is adequate<br><br>FMFN Recommendation: The AAG and FHEC may want to consider Indigenous Water & Sediment Quality Guidelines (IQWSQ), currently in development, to inform both the Integrated and ESCT indicators, and the Triggers and Limits.<br>• **Response:** FHEC responded that they checked and these are not yet available but they are open to looking at them when they are complete – response is adequate. | | |
| 191 | Objective 6: SC Recommendation [5] | *Original Recommendation #5 There were no discussions with the Sustainability Committee (SC) on the details of the Response Framework, Limits and Thresholds before this section of the Operational Plan was provided to the SC for review. It is recommended that a workshop be held with the SC so the Response Frameworks may be adequately developed for all wetland values that will be affected by the FHOP*<br>*Modify the existing text in Section 7.1.1 to include the bolded words below. "Indigenous communities have shared with Fort Hills that they are concerned that mining part of the fen will put the entire MLWC at risk and participants in the Sustainability Committee (SC) have expressed concern that FHOP will not be able to sustain the function of the unmined portion of the MLWC and that it can never be replaced.* | **CO-CHAIRS** | A table of commitments has been added to the Introduction (Table 1.7-1). Commitments to ongoing SC engagement on the Response Framework and approach to indicators have been included. While Fort Hills is open to improving the Response Framework, the intent is not to recycle on recommendations that were not accepted as part of this review process. |

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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | *Suncor response Key elements of the Response Framework were shared as a pre-read and discussed during the April 29-30, 2021 workshop. During those workshops, the approach outlined in Objective 6 was discussed and feedback solicited. Questions were asked about how the framework applied the Natural versus Measured Ranges of Variability, and additional context was added throughout the section to help clarify. FHEC welcomes further discussion at the SC about how the Response Framework can be applied to MLWC and updated as additional information and details are developed. Text has been updated as suggested..*<br>***Recommendation:***<br>The SC still have concerns with certain aspects of the Response Framework (see general comments on Objective 6). It is recommended that a workshop be held with the SC so the Response Frameworks may be adequately developed for all wetland values that will be affected by the FHOP | | |
| 192 | Objective 6: SC Recommendation [15] | **Page [7-5; Table 7.2.1 ] -** *October 19 Compiled Draft for Review*<br><br>***Original Response*: Aquatic Resources**: *Talks about trophic status of McClelland Lake, yet currently the monitoring program only INCLUDES CHOLOROPHYLL A, AND NO OTHER TROPHIC LEVELS. Hence The Systematic Limits Not to be reached is too vague and cannot be measured.*<br>*Vegetation: The system limit "Not to be Reached" is too vague and would be hard to measure.*<br><br>***Response:*** *Trophic status will be informed by chlorophyll a concentration (primary effects indicator) and nutrients (complementary data).*<br>*The system limit for vegetation was updated to provide more clarity "...as expressed by a departure from pre-mining baseline plant community characteristics".*<br><br>***Recommendation:***<br>The Limits that are in Table 7.1-2 are too vague to be us used. Nutrients do not represent a trophic level. I do not believe Peat accumulation is being measured.<br><br>Recommend setting quantifiable and measurable Limits. in Table 7.2-1 and Section 7.2.1.2 based on discussions with the MLWC SC. | **CO-CHAIRS** | The following text has been revised in Objective 6 (Section 7.3.4.1) to specify that the limit is quantifiable and measurable as the trophic status will be assessed using accepted classification system:<br>**"**Based on this approach, the limit defined for the aquatic resources indicator is a change in trophic status of McClelland Lake as a result of mining activities. The trophic status will be categorized according to internationally accepted criteria (e.g., Organization for Economic Cooperation and Development criteria)." |
| 193 | Objective 6: SC Recommendation [16] Page [7-5 to 7-6] | ***Original Recommendation*:** *Need to have a discussion with the SC about using the Regional Normal Range or Standard Deviations as a Trigger. This entails taking regional values from the reference sites and applying them to evaluate change in the MLWC. The wider range of variance expected from other reference wetlands might lead to unacceptable changes and effects on environmental resources in MLWC.*<br>*I believe the original intent of the Reference Sites was ONLY to assess regional changes in climate or other natural effects and that this information would be used to separate natural changes and effects from the changes and effects on MLWC from the Fort Hills Project (using the BACI design).* | **CO-CHAIRS** | As per recommendations from the SC, Level 2 triggers for water quality, aquatic resources and vegetation have been updated so they no longer depend on the regional normal range. Instead, if the effect that exceeded the Level 1 trigger persists for three years, the Level 2 trigger would be reached and mitigation would be applied, regardless of how the effect compares with the regional normal range. Please see response to #180b and updates to Objective 6 for additional information.<br><br>A table of commitments has been added to the Introduction (Table 1.7-1). Commitments to ongoing SC engagement on the Response Framework and approach to indicators have been included. While Fort Hills is open to |

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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | *Does using the range of change in an indicator at the reference sites and applying a regional level of change as the trigger for an indicator in the MLWC make sense … could this not potentially put the function and biodiversity at MLWC at risk?*<br>*The reference sites are different enough from the MLWC that they could increase or decrease the levels of triggers for environmental resources beyond the MRV at MLWC and that may result in changes to the biodiversity and function of MLWC when indeed mitigation should have been put in place to reverse the change earlier.*<br><br>***Response:*** *The purpose of the reference sites is twofold: (i) assess regional effects using a BACI model, as described in request #16; (ii) characterize the physical and biological characteristics of similar patterned fen ecosystems in the region to understand the full range of characteristics that can occur within patterned fens. For example, if the reference sites have a broader range of water quality characteristics and still support a diverse and functional patterned fen ecosystem, then it may be acceptable for water quality characteristics to occur outside the MLWC normal range but within the reference site normal range without expecting a decline in ecosystem function.*<br><br>***Recommendation:***<br>All discussions with the SC, TAG and AAG up to the release of the draft OP have indicated using the MRV associated with the MLWC as the outer boundaries for change before a mitigation is required.<br><br>Recommend having a discussion with the SC prior about including the Regional Normal Range of Standard Deviations as a Trigger in the Management Framework for MLWC. Please add this as a commitment. | | improving the Response Framework, the intent is not to recycle on recommendations that were not accepted as part of this review process. |
| 194 | Objective 6: SC Recommendation [16] Page [7-5 to 7-6] | ***Original Recommendation:*** *Add a second Trigger Diagram that reflects the Level 1 and 2 Tigger Exceedance for Biological Responses. The biological responses will show the downward trends that would be expected for aquatic resources, vegetation etc. Figure 7.2.2 only represents changes in chemical responses. Both diagrams are necessary in the report.*<br><br>***Response:*** *Figure 7.2-2 is intended to show a response for water level, water quality, or biological indicators alone. It would be possible to design a figure showing a response in the physical environment with a response in the biological indicators lagging; however, we feel that would unnecessarily complicate what is intended to be a straight-forward relationship between an increase in measured data (for any indicator/metric) and intersection with Level 1 and Level 2 triggers.*<br><br>***Recommendation:***<br>The diagram reference does not represent potential changes in biological systems.<br>The appropriate biological diagram should be added or only reference chemical changes when referencing the diagram. | **CO-CHAIRS** | This figure was removed because it did not work with the revised Level 2 triggers for water quality, aquatic health and vegetation. We included some of the information from Figure 7.2-2 on Figure 7.2-3 (which was subsequently renamed to Figure 7.2-2). |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| 195 | Objective 6: SC Recommendation [16] Page [7-5 to 7-6] | ***Recommendation:***<br>Agree that the with proper monitoring and actions for Level 1 and 2 Triggers, there should never be a need to trigger Level 3 in the Management Response framework. That being said, the Level 3 limit represents the clear boundaries in the system not to be exceeded. (quote from the Introduction).<br><br>Recommend having a discussion with the SC that the Level 3 Trigger level is not being set before the monitoring program begins. Please add this to the list of commitments. | **CO-CHAIRS** | The Level 3 trigger is different from the system limit for each discipline. Limits represent the clear boundaries in the system not to be exceeded and have been defined for each discipline in Table 7.2-1. For additional information, please see response to #180b) and updates to Objective 6.<br><br>A table of commitments has been added to the Introduction (Table 1.7-1). Commitments to ongoing SC engagement on the Response Framework and approach to indicators have been included. While Fort Hills is open to improving the Response Framework, the intent is not to recycle on recommendations that were not accepted as part of this review process. |
| 196 | Objective 6: SC Recommendation [25a] | ***Original Recommendation:*** *The time required to determine the effectiveness of mitigation has not been discussed in this section of the document. Does the continued monitoring need to indicate there is a decrease or increase in change before further action is taken?*<br><br>***Response:*** *The time required would be very much dependent on what parameter was being triggered, and the nature of the effects and mitigation. And it would depend on the scenario, but likely further action wouldn't be taken unless the situation was not improving*<br>**[Page 7-9 – 7-12] -** *October 19 Compiled Draft for Review*<br><br>***Recommendation:***<br>**Section 7.2.4: Management Response T**he Management Response should have plans if mitigation does not appear to work to reverse any negative trends that have been monitored. Hence there should be some timeframes roughly adhered to for further action, if the original mitigation does not reduce the negative changes.<br>Recommend having a discussion with the SC to set a timeframe to determine when further action is required if mitigation does not appear to be effective. Please add this to the list of commitments. | **CO-CHAIRS** | As stated in the previous response, the time required would be very much dependent on what parameter was being triggered, and the nature of the effects and mitigation. As such, FHEC is not willing to commit to a specific timeframe at this time but is committed to discussing the response framework in further post-submission workshops.<br><br>A table of commitments has been added to the Introduction (Table 1.7-1). Commitments to ongoing SC engagement on the Response Framework and approach to indicators have been included. While Fort Hills is open to improving the Response Framework, the intent is not to recycle on recommendations that were not accepted as part of this review process. |
| 197 | Objective 6: SC Recommendation [34,40] | ***Recommendation:***<br>The response does not address water quality triggers and limits, the need to be more specific in descriptions of "aquatic life", or the fact that FHOP is not monitoring wetland plants of aquatic resources n/surrounding McClelland Lake. However it is noted that Suncor has committed to meet with the SC to review monitoring around McClelland Lake, as well water quality triggers and limits and response frameworks for a range of indicators in 2022. | **CO-CHAIRS** | Noted. |
| 198 | Objective 6: SC Recommendation [45] | The Response to Recommendation 45 is only partially addressed since it requires Suncor to commit to work with the SC and the AAG to agree on triggers and limits for the ESCT monitoring program and response framework in 2022. | **CO-CHAIRS** | A table of commitments has been added to the Introduction (Table 1.7-1). |
| 199 | Objective 6: SC Recommendation [24]; Table 7.2-2 | Original Recommendations:<br>*Make sure that surface water quality sampling takes into account the weather of the season, it is better to get a variety of weather conditions then to plan sampling according to spring, summer and fall to establish the normal range of variation.*<br>*Alternate the vegetation permanent transect program with the grid-based wetland monitoring.* | **TAG - VEGETATION** | FHEC is committed to working through the vegetation program with the TAG and the SC through workshops in 2022, this has been added via the commitments table in the Introduction section (Table 1.7-1). |

## Complied Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 12, 2021)

| Table1: SC and TAG Comments on the Revised MLWC Operational Plan (OP) | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | ***PARTIALLY ADDRESSED:***<br>***New Recommendation:***<br>For next progress report on the OP it would be good to have a table of events linking mining and mitigation developments (wall construction) with the years of vegetation monitoring. | | |
| 200 | Objective 6: SC Recommendation [36] | *Original Suggestion:*<br>*Have a discussion with Dr Kelman Wieder (Villanova University, USA but having a good knowledge of Ft McMurray peatland region with Vitt) on the best approach to set thresholds with N and how best to follow the temporal trends. (see text in Line's TAG Vegetation submission for details).*<br>*Is the water quality of the rainwater will also be analyzed for samples coming for the non-mined fen location? Important for N analyses between the MLWC fen and the reference sites.*<br><br>*Original Response:*<br><br>*Nitrogen is not included as a primary effects indicator; therefore, thresholds/triggers have not been set. Nitrogen data will be collected as complementary; FHEC will consider moving this to a primary effects indicator if needed in the future.*<br>*Analyses of rainwater chemistry are not currently included.*<br><br>***PARTIALLY ADDRESSED:***<br>***New Recommendation:***<br>*OK for Now. A note has to be taken to discuss the use of analysing the chemistry of rainwater- for workshop 2022* | **TAG - VEGETATION** | Noted. |
| 201 | Objective 6: SC Recommendation [43] | *Original Recommendation:*<br>*From text: An example of how measured values will be compared to normal ranges for baseline data at the MLWC and reference sites is shown in Figure 7.3-7 and Figure 7.3-8. And later… and applying best professional judgement*<br>*In Figure 7.3-8 we see in S5 a variation in species richness going from 65 to 40 species. With the stability of the system that Vitt and House 2020 are reporting, it is really hard to believe that there is not bias in the data related to the ability of the botanist to identify and collect species from the field. TAG reiterate that change in the structure of the vegetation will be much more reliable (everybody knows what is a grass (including sedges), mosses and shrubs and other herbs. It is this relative change that can respond quickly to water table change.*<br>*Recommendation*<br>*Add similar visualization in time with temporal relative abundance of functional groups having pairs of data within the same graphs with different symbols (e.g., x for graminoid plants and for mosses).*<br><br>*Original Response:*<br>*We explored the data as recommended by Line and found that similar variation existed even when data were summarized by strata. Moving forward, Line's recommendations for calibration of field* | **TAG - VEGETATION** | See response to item #199. FHEC is committed to providing the results of the data exploration to TAG in advance of the workshop. |

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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | *crews estimating percent cover will be implemented. Hopefully a more accurate dataset can be collected in the future.*<br><br>***PARTIALLY ADDRESSED:***<br>***New Recommendation:***<br>*OK but the results of the vegetation data exploration should be presented to discuss and compare and also see how it was done. A discussion for a workshop with time spent indoors with expert botanits.* | | |
| **7.0 Objective 6: Develop Response Framework – 7.3 New Recommendations** | | | | |
| 202 | Objective 6– New Recommendation<br>Page [7-31] Section 7.3.6 | Since it's unlikely that ESCT indicators will have triggers developed in time for the operational plan submission, it's hard to see whether this response is adequate. Meaningful ESCT triggers must work in conjunction with the primary effects indicators. | **MCFN** | FHEC is committed to working through ESCT program with the SC through workshops in 2022, this has been added via the commitments table in the Introduction section (Table 1.7-1). |
| 203 | Objective 6– New Recommendation<br>Page [7.3 to 7-12];<br>Figure 7.2.1 | **Section 7.2.4-1, Figure 7.2.1**<br><br>***Recommendation:***<br>Text in Section 7.2.4-1 indicate that under Level 1 Trigger Exceedance:<br>The SC will be engaged<br>The site-wide monitoring will be reviewed if applicable.<br>Both these commitments should be shown in boxes in Figure 7.2-1 for Trigger 1 as they are currently missing. The SC Engagement been documented for Trigger 2. | **CO-CHAIRS** | Figure 7.2-1 has been updated to show SC engagement and consideration of site-wide data following the Level 1 trigger exceedance. |
| 204 | Objective 6– New Recommendation<br>Page [7-12] | **Section 7.2.4.3 Level 3 Trigger Exceedance**<br><br>***Recommendation:***<br>It is the intent never to reach Level 3, as mitigation should be in place to reduce negative trends or changes. If Level 3 is exceeded, further development of the MLWC should be stopped until further mitigation/management plan is put in place.<br><br>Recommend remove bullet 2 or re-ordering the information, and put mitigation in a separate paragraph after consideration of stopping further development. | **CO-CHAIRS** | See response to item #188. |

**Complied Comments and Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 30, 2021)**

## Table 2 - Compiled Recommendations of Sustainability Committee (SC) and Technical Advisory Group (TAG) on Revised MLWC Operational Plan (October 19, 2021)

*This Table includes comments from TAG Hydrology, TAG -Vegetation for Objective 2 & 3, ACFN, and updated comments related to IK integration from FCM/FMMN/FMFN. This version of the Table includes all Pre-ambles and Recommendations or Questions from based on their review of the Operational Plan. Hence the Documents from each organization have not been included.*

| Table 2: SC and TAG Comments on the Revised MLWC Operational Plan (OP) (Nov 29, 2021) | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| **General/Major Comments** | | | | |
| 1B | TAG written Comments November 18, 2021 | TAG earlier commented (on Objective 1): "The OP is not ready … should be ready to proceed in a few years …". *If* the commitments for further work can be considered sufficient and appropriate to call the OP complete, then this item is addressed; however, there are several outstanding issues to be addressed by the future commitments. TAG still suggests that it may take a year or two to complete work on reference ecosystems, collect more baseline data, update (flow and water quality) models, and evaluate monitoring/trigger requirements. Ultimately it is up to the regulator to accept the OP. Perhaps the regulator will accept that these deficiencies can be rectified within the available time. | **TAG-Hydrology** | For all TAG Hydrology recommendations, see responses in separate Attachment 3, Table 3. |
| 2B | TAG written Comments November 18, 2021 | **Reference ecosystems** are yet to be adequately defined, instrumented, monitored, and interpreted. Definition of monitoring sites based on vegetation is not sufficient because vegetation does not provide a good indication of landscape connectivity. The reference ecosystems require monitoring, baseline data, conceptual models (and perhaps numerical models), plus clear connections to expected behaviour in MLWC. Understandings of groundwater flow and hydrogeochemistry, with connections to surface water and vegetation, are required. To enhance these comparisons, paired sites between MLWC and reference ecosystems must be defined, and the expected behaviour must be determined/predicted. The hydrologic records will be short, which will introduce uncertainty, but are necessary for comparisons of expected behaviour. See detailed comments in every TAG report since the 2017 OP proposal.<br>A reference lake with a suitable pairing to McClelland Lake has not been defined. Basic comparisons based on bedrock, pattern fen area to lake area, and bathymetry should be made. Birch lake is proposed but lacks a pattern fen inflow to the system. | **TAG-Hydrology** | See response to item #1B |
| 3B | TAG written Comments November 18, 2021 | The **conceptual hydrogeologic model** is dramatically improved. However, identical summaries should not be repeated in different sections of the OP. The three summaries should be tailored to the three different audiences – the layperson, the general reader and the specialist in the Plain Language Summary, Objective 3 and the Conceptual Model appendix, respectively. Provide descriptions to accompany the numbered map features (e.g., a separate or embedded table, or a descriptive caption). | **TAG-Hydrology** | See response to item #1B |
| 4B | TAG written Comments November 18, 2021 | The **integrated hydrologic (numerical) model** remains a work in progress, as expected. The present version of the model appears to disagree with existing field data – there is a bias in the results. These issues have been discussed in previous comments. The updated model may have implications for defining mitigation strategies, triggers, and responses. TAG expects that future iterations of the model will incorporate improved representations of aspen ET, freeze/thaw processes and climate inputs. Consequently, the next calibrated version of the model should be an improvement over the existing biased model. TAG also anticipates that the numerical models will require continual updating and calibrating in the future. | **TAG-Hydrology** | See response to item #1B |
| 5B | TAG written Comments November 18, 2021 | Sections of **water quality modelling** (both conceptual and numerical) in Objective 3 are missing. Initial comments on the November 15, 2021, presentation on the conceptual model have been provided under separate cover. These comments include the need to consider nutrients and understanding the root causes of large variations in surface-water chemistry. We await an updated Objective 3 section and a revised model report (appendix). | **TAG-Hydrology** | See response to item #1B |
| 6B | TAG written Comments November 18, 2021 | **Understanding** gained from updates to the conceptual models, and ensuing updates to the numerical models, for the hydrological system and the geochemical system, must be integrated into the remainder of the OP (e.g., definition of triggers, mitigation options, responses) and evaluations of both MLWC and reference ecosystems. | **TAG-Hydrology** | See response to item #1B |
| 7B | TAG written Comments November 18, 2021 | **Section 2.4.3 (EZHs) and 2.5.5 (Background) Objective 1**<br>It is not adequate to use vegetation characteristics alone to indicate ecosystem type and, importantly, the climate-hydrology-chemistry response which is controlled by geologic setting, geochemistry, and climate. It appears that vegetation (i.e., EZHs) has been used to direct mitigation responses of MLWC and for comparison to reference locations. This is likely to cause problems in management of MLWC. The recently presented conceptual (hydrogeologic and water quality) models (15 Nov) provide the understanding of the landscape connectivity; that understanding should be used throughout all objectives. | **TAG-Hydrology** | See response to item #1B |
| 8B | TAG written Comments November 18, 2021 | Two types of pattern fens (EHZ1 and EHZ2) occur and are recognized within MLWC. However, there are at least two different major flow paths and geologic sources that are not clearly recognized, or at least are not looked at independently, in the analyses of the baseline data and in defining indicators and triggers. Importantly, the Normal ranges provided in Objective 1 are elevated when two major flow systems with different geochemistry are lumped. | **TAG-Hydrology** | See response to item #1B |
| 9B | TAG written Comments November 18, 2021 | The monitoring, analyses, plus definition of triggers and response to the NOP pattern fen (EHZ1) and adjacent EHZ (EHZ 4,5, & 6), should be independent of those for the fen fed by the Ft Hills (FHUC). These different sources should be considered in the evaluation of background conditions, of groundwater sources that influence potential source water quality to each pattern fen, and the other fen systems. Using the HRA framework to distinguish the different pattern fens will be necessary to adequately locate sampling sites and set targets of expected natural variation that will trigger a mitigation response (Objectives 5 and 6). | **TAG-Hydrology** | See response to item #1B |
| 10B | TAG written Comments November 18, 2021 | Fig 2.5-34 and others should report the chemistry of the EHZ 4,5 & 6 surface water in the NOP independently of FHUC source water (flow path-source and chemistry). The variability in chemistry for EHZ 5 and 6 is very large, this appears to reflect the differences in position relative to NOP and FHUC. Report the medians for each region as designated in the new conceptual model. | **TAG-Hydrology** | See response to item #1B |

## Complied Comments and Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 30, 2021)

| Table 2: SC and TAG Comments on the Revised MLWC Operational Plan (OP) (Nov 29, 2021) | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| 11B | TAG written Comments November 18, 2021 | For EHZ4, the reported variability for SW is very low. This appears to be sampled from only one of the two dominate source waters to the fen. Does this represent only one of the NOP or FH, or is this only one location? Distinguishing between temporal variability expected at one site vs spatial variability is critical in setting targets for mitigation | **TAG-Hydrology** | See response to item #1B |
| 12B | General Comment | We have found, throughout the IK review, that where IK is provided in the Operation Plan, the references are vague, not attributed to the respective Community, the use pluralism where not appropriate (i.e. attribution to individual vs multiple knowledge holders). The use of 'IK Holders shared…' should only be used when referencing multiple knowledge holders from multiple communities. We therefore recommend a global change when IK is referenced using the following format:<br>([Community Acronym] IK Holder(s), [date], [source (e.g. document, meeting, workshop)]. | **FCM_FMMN_FMFN** | Accepted. ITK references are updated. |
| 13B | ACFN letter Nov 26, 2021 | **RE: Request for Validation of Indigenous Knowledge in the Operational Plan**<br>1. The Operational Plan states that the Indigenous Knowledge Baseline Report contains ITK "…provided by members, Elders, knowledge holders, land users, staff and leadership from Fort Chipewyan Metis, Fort McKay Metis Nation, Fort McKay First Nation and Mikisew Cree First Nation" (p.2-1). This is despite ACFN's participation in the workshops or the Aboriginal Advisory Group as a whole. As Objective 1 of the Operational Plan is based on the ITK in the Baseline Report, we are unsure where or how ACFN's IK has been included in Objective 1 and throughout the Operational Plan, and are accordingly unable to validate Fort Hills' use of it.<br>2. While there are ACFN-specific comments included in the Operational Plan1, most references to ITK and related input and comments are not attributed to individual communities, making it difficult to ascertain whether any are attributable to ACFN. If the statements are taken from the ITK Baseline Report, they would not attributable to ACFN, (as described above).<br>3. Further, during review meetings, Suncor stated that ACFN elders' and members' input provided at earlier SC meetings is still reflected in the Operational Plan. Citing comments from the late Elders Pat Marcel and Charlie Voyageur regarding water connectivity, Suncor stated that the water model includes connectivity. For ACFN to validate the use of Pat's and Charlie's information, however, Suncor's water model would need to be clearly presented to Roy Ladouceur, Alice Rigney, and other ACFN Elders and land users, so that they could confirm whether Suncor's understanding of connectivity and ACFN's are aligned. This has not occurred to the degree that we requested, and thus it is not possible to validate whether Suncor has used ACFN's ITK appropriately.<br>➢ **To respond to Suncor's request to validate the use of ACFN's ITK, can Suncor please clearly demonstrate where ACFN's ITK has been included or incorporated into the Operational Plan, and how?**<br>4. Lastly, ACFN's Indigenous Traditional Knowledge (ITK) Study will not be finalized for provision to Suncor until mid-December 2021.<br>➢ **Once ACFN's ITK study has been provided, ACFN requests to discuss with Suncor where and how the findings of the study could be integrated into the Operational Plan.** | **ACFN** | References have been updated throughout the Operational Plan to recognize the community of the ITK Holder.<br>We look forward to the completion of the ACFN ITK study and will work with ACFN to determine next steps for incorporating/integrating this into the plan through progress reports. |
| 14B | ACFN letter Nov 26, 2021 | As noted in A) 1, 2, and 3 above, we are uncertain where and how ACFN's ITK has been included and used in the Operational Plan. We also have yet to provide ACFN's ITK Study, though it is currently being finalized. These are obvious information gaps from ACFN's perspective. | **ACFN** | Please see response to 13B above. |
| 15B | ACFN letter Nov 26, 2021 | Primary Area of Concern<br>Overall, the Operational Plan is a water management plan, or plan to manage water in and out of the fen. It is not a plan that meets the approval conditions to demonstrate that the unmined portion of the fen can be protected. | **ACFN** | Fort Hills respectfully disagrees with this comment. The Operational Plan contains engineering mitigations to sustain water quantity and quality; as well as access and security management; and cultural, education and learning mitigations. These are all focused on protecting the non-mined portion for the MLWC. |
| 16B | ACFN letter Nov 26, 2021 | Primary Area of Concern<br>**1) Proposed "Mitigations" are not equivalent to "Protection**": It is not surprising that ACFN Elders and Members have a strong opinion as to whether the fen should be mined at all. What Suncor refers to as "mitigation", (i.e. the water management features such as the cutoff wall) are not viewed as mitigation or protection to ACFN, but as destruction. | **ACFN** | We recognize that conversations around protecting this important area are sometimes tough and we appreciate how community members have continued to share with us their knowledge, experience, ideas and frustrations too. Within the plan (Section 1.2.1) we acknowledge that "While community members and ITK holders have been participating in the SC and advising Fort Hills in the development of the OP, it is noted that many individuals do not feel that it is possible for the MLWC to support their values if development continues and mining of the MLWC occurs." |
| 17B | ACFN letter Nov 26, 2021 | Primary Area of Concern<br>**2) Impacts and Uncertainty re: Water Quantity**:<br>• How much confidence is there in Suncor's MRV and predicted drop of 1.5m in the lake and fen (if no "mitigation")? ACFN's experience and observations are that actual water levels are typically lower than predicted by industry. ACFN is concerned as to how Suncor will manage effects if the predicted drop is greater than 1.5m.<br>• Suncor's plan to withdraw and treat water from the Athabasca Region to resupply the fen (from 2060-2075), is not viewed by ACFN as appropriate or realistic mitigation and water management, for the fen or the region.<br>• How has Suncor's plan to withdraw and treat water from the Athabasca River to resupply the fen considered climate change? ACFN Elders and members are not confident that there will be sufficient water in the Athabasca River to resupply the fen in 40 years, from 2060-2075. What are Suncor's plans if this is there is not sufficient water in the Athabasca River for this? | **ACFN** | • Details on confidence have been added to section 4.3.1.5 of the OP, which is the Prediction Confidence section of Objective 3. FHEC will continue working with the SC, TAG, and AAG to improve the tuning and confidence in the models. Please note that the predicted drop of 1.5m is for the scenario where mining proceeds without water management design features (R1). This change exceeds Level 3 triggers and presents too high of a risk to functionality of the fen. As such, water management features that better maintain water levels are recommended (S1 scenario). The responses framework described in Objective 6 is intended to manage any unexpected effects with the mitigations in place. |

**Complied Comments and Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 30, 2021)**

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| | | | | • FHEC has provided a sentence within Objective 4 indicating the water withdrawal considers the provincial Surface Water Quantity Management Framework (SWQMF) and prior responses have indicated more work is required to ensure appropriate water treatment to achieve a quality suitable for supply to MLWC. In addition to this, see response in Attachment 3, Table 1 #149, part of which is quoted below. ACFN's feedback regarding the appropriateness of Athabasca River water will be taken into consideration as part of the final concept selection process.<br>*FHEC wishes to clarify that Athabasca River water is not "planned to be used". As illustrated in Figure 5.1-1 of Objective 4, this water source has been selected as part of an overarching conceptual design for the MLWC solution. Preliminary and detailed design work on this component (and all components) are required to define the water source that is ultimately selected and the corresponding water treatment. It is proposed in Objective 4 that final approval of the late life water source system components occurs closer to the execution timeframe. As per Figure 5.8-1, a regulatory submission is currently planned for 2057.*<br><br>*Additionally, FHEC will need to apply for renewal of the FHOSP Water Act Licence No. 190012-01 (as amended), every ten years. Changes in water sources, use and diversion volumes for FHOSP including the MLWC OP will need to be justified by FHEC and reviewed and approved by AER as part of the Water Act Licence renewal application process.*<br><br>• Climate change has been considered both in the water modelling that forecasts required volumes and in that the plan takes the SWQMF into account. Objective 4 provides alternative water source options, which will be considered as water source options as design progresses on the late life water supply solution. |
| 18B | ACFN letter Nov 26, 2021 | Primary Area of Concern<br>**3) Information Gaps and Uncertainty re: Water Quality:**<br>• This section has only just been provided, and ACFN's review is not complete.<br>• As above, Suncor's plan to withdraw and treat water from the Athabasca Region to resupply the fen (from 2060-2075), is not viewed by ACFN as appropriate or realistic mitigation and water management, for the fen or the region.<br>O What water quality will Suncor be striving to meet with treatment? ACFN is concerned that water quality in the fen and lake will continue to deteriorate, and by 2060, Suncor will not have to meet pre-disturbance conditions.<br>O By 2060, the Athabasca River may contain process-affected water, or water from tailings ponds that has been treated for release to the environment. ACFN is concerned not only about the release of treated tailings water to the Athabasca River, but the use of this water for other reclamation activities, including resupply to the fen. | **ACFN** | • Noted.<br>• See response to #17B.<br>• Water will be sourced and treated (as necessary) to meet criteria determined during next stages of preliminary and detailed design. The water quality modelling roadmap provided in Objective 3 describes the path to closing gaps prior to the OP being authorized. Objective 6 commits FHEC to maintaining water quality indicators within a statistical range of the MRV. If triggers are hit, action is required to understand and mitigate the response. These safeguards provide accountability to prevent deterioration of water quality in the fen and lake.<br>• If Athabasca River water is selected as the source, water quality at the point of withdrawal will be given careful consideration. |
| 19B | ACFN letter Nov 26, 2021 | Primary Area of Concern<br>**4) Climate Change:**<br>ACFN is concerned that the function of the fen with regard to climate control has not been adequately assessed:<br>• What is the carbon value of the stored peat in the fen?<br>• What are the climate consequences of methane and co2 releases from mining a portion of the fen?<br>• Have these been thoroughly assessed? | **ACFN** | This ask is outside of the scope of the OP and there is no regulatory requirement to assess this as a part of the OP. The MLWC Project development team includes a representative from the Suncor Sustainability Office to ensure development decisions are appropriately informed by the latest climate change science and policies as well as corporate sustainability goals. FHEC acknowledges that many of our operations in the Wood Buffalo region impact peatlands. Suncor assesses climate impacts across its operations and participates in industry-wide climate initiatives (please see our Sustainability reporting at https://sustainability.suncor.com/en/climate-change). |

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| 20B | ACFN letter Nov 26, 2021 | Primary Area of Concern<br>**5) Information Gaps and Uncertainly re: Wildlife:**<br>The Operational Plan is to demonstrate that the ecological functionality of the fen can be protected, not just functions related to water. ACFN is of the view that including wildlife monitoring only in site-wide monitoring is not sufficient. This is an information gap. | **ACFN** | FHEC believe it has a robust wildlife monitoring program in the MLWC. The MLWC portion of the wildlife monitoring program has been worked extensively with the TAG over a decade, and has been designed to be able to detect change. FHEC has committed to workshops in 2022 (see Table 1.7-1 in the Introduction) to discuss the wildlife monitoring with the SC and the TAG. |
| 21B | ACFN letter Nov 26, 2021 | **RE: Do you feel the commitments included in the Operational Plan will fill gaps and address concerns related to the operational plan?**<br>While ACFN recognizes that the commitments are meant to address information gaps, there remains too much uncertainty for ACFN in terms of how the commitments will be fulfilled in a manner that ensures the functionality of the unmined portion of the fen can be protected. | **ACFN** | The submission of the Operational Plan is a significant milestone but does not imply the end of the work of the Sustainability Committee. FHEC has included a table in the Introduction section (Table 1.7-1) that includes the commitments to future work with the Sustainability Committee made in the OP. FHEC has also stated the commitment to work in collaboration with the SC and its Advisory Groups to share information and review mitigation plans as they progress. Additionally, FHEC has been clear that it will submit detailed engineering designs to the AER at least six months prior to the start of associated construction activities for a design feature. FHEC also plans further data collection, studies, investigations, and planning and design works to complete the detailed design. |
| **1.0 Introduction - 1.1 General Comments** | | | | |
| | | NO NEW COMMENTS | | |
| **1.1 Introduction – 1.1 Specific Comments** | | | | |
| 22B | Section 1.4 (Operational Plan Organization) | The title of this subsection is misleading. This subsection also includes FHELP's evaluation of progress and completeness.<br>All objectives except for Objective 4 are judged to be "… complete for the purposes of the OP submission". This appears to be optimistic (see the first comment in this document). | **TAG-Hydrology** | See response to item #1B |
| 23B | Page 1-14 | The *only* mention of "reference site(s) (or ecosystems)" within the Introduction is buried in the Objective 5 description. The wording is vague; the wording should be "sites within reference ecosystems". More importantly, reference ecosystems must be incorporated elsewhere in the Introduction ; without adequate characterization and integration of reference ecosystems the other Objectives cannot be considered complete. (See General Comments on reference ecosystems.) | **TAG-Hydrology** | See response to item #1B |
| 24B | Page 1-15 | The OP will be a "living document". When and how will it be updated? Perhaps the incorporation of iterative "loops" in Figure 1.4-1 would better indicate that most sections (objectives) will be revisited, and modified accordingly, with future data and understanding throughout the operations | **TAG-Hydrology** | See response to item #1B |
| **2.0 Objective 1: Baseline Conditions – 2.1 General Comments** | | | | |
| | | NO NEW COMMENTS | | |
| **2.0 Objective 1: Baseline Conditions – 2.2 Adequacy of Response to Initial Recommendations** | | | | |
| 25B | Objective 1 - SC Recommendation [1] | **PARTIALLY ADDRESSED:** If the commitments for further work can be considered sufficient and appropriate to call the OP complete, then this item is addressed; however, there are a number of outstanding issues to be addressed by the future commitments.<br>TAG still suggests that it may take a year or two to complete work on reference ecosystems, collect more baseline data, update modelling, and evaluate monitoring/trigger requirements. The amount of water quality work required is unknown.<br>Ultimately it is up to the regulator to accept the OP. Perhaps the regulator will accept that these deficiencies can be rectified in the near future. | **TAG-Hydrology** | See response to item #1B |
| 26B | Objective 1 - SC Recommendation [2] TAG contributions | Not in Objective 1. Appears to have been moved to Introduction. Improved, although now it does not highlight many of the direct contributions that TAG suggestions have made … . IK is better woven into the entire document. | **TAG-Hydrology** | See response to item #1B |
| 27B | Objective 1 - SC Recommendation [6] Synthesis of the Conceptual Model | **PARTIALLY ADDRESSED:** The conceptual model is greatly improved. However, the synthesis of the Conceptual Model should not be repeated three times verbatim - the three times need to be tailored to the three different audiences (Layperson in the Plain Language Summary; an overview for the general reader in Objective 3; detailed for the specialist in the Conceptual Model appendix). | **TAG-Hydrology** | See response to item #1B |
| 28B | Objective 1 - SC Recommendation [7] Reference Ecosystems | **PARTIALLY ADDRESSED:** Work is progressing on defining, monitoring and understanding reference ecosystems. Further work is required and this work is included in "future commitments".<br>The Gypsy Gordon complex is not in the same climatic zone, so cautious interpretations are required. | **TAG-Hydrology** | See response to item #1B |
| 29B | Objective 1 - SC Recommendation [8] Reference Ecosystems | **NOT ADDRESSED:** The Initial comment has not been addressed. Further work is required.<br>Vegetation is not a good indicator of landscape connectivity, which will influence system responses to climate and land use. Groundwater evaluations are required in addition to the surface water studies. Geochemical interpretations will help with understanding groundwater flow regimes and similarities with MLWC. | **TAG-Hydrology** | See response to item #1B |

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| 30B | Objective 1 - SC Recommendation [9] Figure Titles | TAG far prefers "beefier" captions that explain a figure without excessive reference to the text; however, we realize these are personal preferences of scientists. We need to agree to disagree on this style preference. | **TAG-Hydrology** | See response to item #1B |
| 31B | Objective 1 - SC Recommendation [10] Wildlife | **NOT ADDRESSED:** Wildlife is a separate monitoring program. | **TAG-Hydrology** | See response to item #1B |
| 32B | Objective 1 - SC Recommendation [11] | **NOT ADDRESSED:** Wildlife are an integral component of an ecosystem. | **TAG-Hydrology** | See response to item #1B |
| 33B | Objective 1 - SC Recommendation [44] Reference Sites | **NOT ADDRESSED:** See replies to 7 and 8.<br>Baseline hydrology, hydrgeology and geochemistry have not been started. Reference sites with ecosystems remain to be defined. | **TAG-Hydrology** | See response to item #1B |
| 34B | Objective 1 - SC Recommendation [52] | **NOT ADDRESSED**: How do you reconcile the history of the shallow ledge of the lake, 2/3 of the lake? This is required | **TAG-Hydrology** | See response to item #1B |
| 35B | Objective 1 - SC Recommendation [53] | **NOT ADDRESSED:** This is not a response to specifics in this question. | **TAG-Hydrology** | See response to item #1B |
| 36B | Objective 1 - SC Recommendation [56] Page 2-16 | **PARTIALLY ADDRESSED**: The comments in Objective 3 indicate this is considered. However, the basic analyses of the water quality data in Section 2.5 Objective 1 still require that the EHZ's associated with NOP source water be plotted, analyzed and considered in later sections as being independent of the FH source water. Currently they are lumped and potentially inflate the natural variability. This has implications in determining water treatment of injected/inserted water supplies to various portions of the pattern fen. | **TAG-Hydrology** | See response to item #1B |
| 37B | Objective 1 - SC Recommendation [61] | **PARTIALLY ADDRESSED**: See comments on #61 | **TAG-Hydrology** | See response to item #1B |
| 38B | Objective 1 - SC Recommendation [67] Page 2-24 | **NOT ADDRESSED**: See reply to 8 | **TAG-Hydrology** | See response to item #1B |
| 39B | Objective 1 - SC Recommendation [81] | **PARTIALLY ADDRESSED**: Somewhat constrained to the Fort Hills mine. Consider extending it to encompass the model domain so that the bounding rivers are shown. | **TAG-Hydrology** | See response to item #1B |
| 40B | Objective 1 - SC Recommendation [86] Figure 2.5-8 | **NOT ADDRESSED**: Response must be for a different question. Figure 2-20 (now Figure 2.5-8) was a plot of barometric pressure over time. It is still not clear that this figure is necessary. | **TAG-Hydrology** | See response to item #1B |
| 41B | Objective 1 - SC Recommendation [89] Page 2-64 | **NOT ADDRESSED**: See reply to 8 | **TAG-Hydrology** | See response to item #1B |
| 42B | Objective 1 - SC Recommendation [112] Table 2-25 and Figure 2-50 | **NOT ADDRESSED**: See also reply to 8. HRAs not defined for reference sites. | **TAG-Hydrology** | See response to item #1B |
| 43B | Objective 1 - SC Recommendation [145] | **PARTIALLY ADDRESSED**: "aquatics baseline information presented in Sections 2.5.4 through 2.5.7". The use of the modifier "aquatics" seems odd. The referenced sections include GW, SW, water quality and aquatics. This section appears to be out of place; it seems to form part of the conceptual model (as written) but is presented in isolation. | **TAG-Hydrology** | See response to item #1B |
| 44B | Objective 1 - SC Recommendation [146] | **NOT ADDRESSED**:<br>See also reply to 8. Reference ecosystems are required. | **TAG-Hydrology** | See response to item #1B |
| 45B | Objective 1 - SC Recommendation [20, 35, 39, 63] | **NOT ADDRESSED:** We asked for IK to be integrated throughout Objective 1 as opposed to provision in a table. The table was deleted so this part is addressed. We also asked that IK be integrated in both pre-development (how it was) as well as the pre-mining conditions (including if change has occurred from the pre-development reference). Many of our comments asked for additional integration of IK. The integration of IK throughout this objective will need to be validated to ensure it was applied in the right context to inform the Plan.<br>Based on our IK review, we are still only seeing reference to the Baseline Report regarding where the IK has been shared from. What should be stated first is WHERE all the IK has come from to inform this section, and the entire Operational Plan (ie, in AAG and SC meetings, the On The Land Workshop and in all of the workshops that have included AAG members, then reference to previous TLU studies and ITK community reports, and BOTH Baseline **and Indicator** reports.), then specific IK references for Objective 1 can follow, which should be more than just the IEG 2021 report.<br><br>We suggest a minor addition to replace the first sentence of the first paragraph in 2.1:<br>*To support development of this section and the OP in general, Indigenous Knowledge has been included from all areas of engagement, such as, AAG and SC meetings, the On The Land Workshop and from all of the workshops that have included AAG members, previous TLU studies and ITK community reports, an Indigenous Knowledge Baseline Report developed by the Integral Ecology Group (IEG) for the SC and Aboriginal Advisory Group (AAG) (IEG 2021), and a McClelland Lake Wetland Complex Indicators and Methods report for the SC and AAG (Garibaldi 2020). The Indigenous Knowledge Baseline Report contains…* | **FCM_FMMN_FMFN** | Text updated as recommended (note Garabaldi report was finalized 2021). Revisions to ITK will be made where specific changes and edits are recommended. As per the Sharing Agreement, new ITK cannot be incorporated by Fort Hills without validation. |

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| 46B | Objective 1 - SC Recommendation [21, 36, 51, 63,69] | **NOT ADDRESSED**: The tables of ITK have been removed as recommended in the review, however it was recommended to include this information in Section 2.3 Pre-development Baseline Conditions (how it was) and Section 2.5 Pre-mining Conditions, (including if change has occurred from the pre-development reference) as appropriate. An attempt should be made to be clear on the state based on *the reference to change* in addition to the context (e.g. pre-development ice thickness was good/reliable for winter lake travel; pre-mining ice thickness/strength has been weakened corresponding to the presence of contaminants).<br>Based on our IK review, we are seeing that some of the ITK put in section 2.5 referring temporally to the Pre-Development baseline conditions should also be in section 2.3.1 at least first, if referenced again in 2.5, then hopefully with discussion of change if provided by ITK. Recommended revisions or inclusions are provided in bold for 2.3 and 2.5. **SEE NEW RECOMMENDTIONS FOR OBJECTIVE 1** | **FCM_FMMN_FMFN** | Revisions to ITK will be made where specific changes and edits are recommended. As per the Sharing Agreement, new ITK cannot be incorporated by Fort Hills without validation. |
| 47B | Objective 1 - SC Recommendation [22] | **NOT ADDRESSED**: This section on IK, if retained, should focus on how it informed and was integrated into defining the baseline conditions including for both the pre-development and pre-mining references cases as well as the natural range of variation (including to set limits and thresholds even if a MRV is used). For example, in the discussion of the reference sites that are then carried into the other baseline conditions.<br>This section is still missing elements of our initial request. Specifically, ITK about water quality has been excluded from the "core teachings about water" and its contribution to the health and wellness of the fen and MLWC in Section 2.1. Suncor has stated, "TK often speaks to some of the key elements of the environment that require monitoring, serving to *frame and inform* the scientific analysis undertaken and the resulting description of the baseline conditions presented here." We would add, "Core teachings related **to water quality** and water quantity in the MLWC have been shared by ITK holders. We also recommend, "The principle of connectivity – the land, the water, habitat, wildlife, harvesting, knowledge transmission, and health and wellness – is an important concept for the Indigenous Peoples who use this land, **as is the importance of water quality to the functionality of the fen and broader MLWC itself, and for use and consumption by people, animals, aquatic resources, biota, etc. In addition, recognition that water levels…"**<br>Further, it is still unclear how ITK *informed* the scientific analysis undertaken and resulting datasets in the OP. If ITK did not inform the analytics, assumptions, and datasets, then please state that ITK has only served to frame member land users perspectives on the environment, and resulting descriptions of baseline conditions at this point, and that future analysis and datasets will be updated and informed by ITK once the monitoring and ESCT Program is implemented. | **FCM_FMMN_FMFN** | Text revised as recommended. ITK has helped inform many aspects and objectives of the OP, including baseline information, monitoring programs, indicator selection, and understanding of how water is connected and valued throughout the MLWC. Each section objective includes a section describing how input for the SC, including the AAG, has been incorporated. We agree that there is opportunity to continue to refine and enhance ITK integration as part of future work, and commitments on this is included in the Introduction (Table 1.7-1). |
| 48B | Objective 1 - SC Recommendation [64] | **PARTIALLY ADDRESSED**: This Section should also start with western science and Indigenous knowledge and information on the NRV and any changes (see also comments on the Paleoecology sections with respect to the results pertinent to framing the pre-mining condition – i.e. influences of climate change and anthropogenic activity) and not merely default to the proposed MRV.<br>Based on our IK review, the pre-development and pre-mining baselines can be improved by accepting our SC Recommendation [21, 36, 51, 63, 69] above. With respect to including appropriate reference to NRV, we recommend the following text be included at the beginning of this Section: "Knowledge holders have shared IK to inform both pre-development (in reference to what is 'natural' or 'normal' from an ecological and cultural understanding) as well pre-mining conditions (in reference to current ecological and cultural conditions and the changes relative to pre-development reference conditions). With respect to the NRV, though it is a western science construct that describes resiliency of, for example, a resource, IK provides a comparable description, both ecologically and culturally of the natural or normal range that can be expected over time, based on experiential evidence of that resource, for example". | **FCM_FMMN_FMFN** | Some of the suggested text has been included, adding clarity by adding in "Knowledge holders have shared ITK to inform both pre-development as well as pre-mining conditions." However, pre-development, pre-mining and normal range has all been defined within the Introduction and within Objective 1 and adding to those definitions here adds confusion. The use of the terms needs to be consistent through the OP. |
| 49B | Objective 1 - SC Recommendation [65] | **NOT ADDRESSED**: ITK has been integrated into each discipline (subject to previous comments regarding context or content deficiencies), however the request for "2.5.1 Analytical *Approach should be followed by a section that describes* ***how IK informed the approach*** and…validated by the AAG and SC" has not been done. Specifically, if possible, **how did the ITK influence/get considered in the measures and how is it discussed regarding MRV?**<br>To align with 2.5.1 there should be a 2.5.2 that describes how IK informed the Pre-mining Baseline (PMB). We therefore recommend that the following section 'IK Integration Approach' be added as an additional section following the Analytical Approach. The following text is recommended to describe this section: Indigenous knowledge has provided a better understanding of the current case as described in the Pre-mining Baseline. IK has done so by describing change, if any, from PDB conditions, attributing potential causes of that change, and identifying, through integrated early warning indicators based on MLWC functionality, additional monitoring to document the PMB prior to 2025 when early works of draining and ditched is expected to occur. While IK did not necessarily contribute to the MRV, it placed it in context to the NRV. Going forward, the ESCT Program which will be fully developed in 2022 will help better inform the conceptual model, effects to functionality both ecologically as well a culturally, and support further development of detailed mitigations and management response plans. | **FCM_FMMN_FMFN** | The recommended text was added to the opening paragraphs of the Pre-mining baseline conditions section. Some modifications based on location within the OP as the ESCT monitoring has not been introduced yet.<br>Included text "ITK has provided a better understanding of pre-mining baseline conditions by describing change, if any, from pre-development baseline conditions, attributing perspectives of potential causes of that change. While ITK did not yet necessarily directly contribute to the MRV, it placed it in context to the NRV." |
| 50B | Objective 1 - SC Recommendation [74] | **PARTIALLY ADDRESSED**: Please add, *Cutlines were made in the early 1970s following and significantly widening the old dog team trails around areas of McClelland Lake that were made before mining in the region* (IEG 2021). | **FCM_FMMN_FMFN** | Thank you. Added to topography section. |
| 51B | Objective 1 - SC Recommendation [113, 116] | **NOT ADDRESSED:** Though additional ITK is included, the context requires clarification and revision. 2.5.7. Aquatic Resources, 2.5.7.1. Introduction (Pg 108) The first sentence is correct in that "*McClelland Lake and the surrounding waterbodies is an important habitat for aquatic species harvested by Indigenous Peoples, and was used extensively for fishing and shellfish gathering activities prior to industrial development."* What needs clarification and interpretive review, from IEG and MCFN, is the following statement, "***Fishing at McClelland Lake*** *was an important part of the seasonal round in recent history*", which should be accurately based on the information provided by MCFN knowledge holders, not concluding statements that state something that pulls the content further than what has been provided (unless demonstrated with other references). Other knowledge holders' families, who have lived around McClelland Lake since before industry, know there were no large-bodied fish in it at least since a pre-development winter kill. It was noted by MCFN land users their use of the area is over the last 30 years. We request a closer look by the IEG subject matter expert of MCFN's report, authored by Fekete, and confirmation with knowledge holders at the interpretation, as the information following mentions fishing for pickerel and jackfish '*from the area*', and '*some of those areas*', and '*down a creek*' coming to the lake. This is the context that needs to ground the interpretation, | **FCM_FMMN_FMFN** | We agree that on the topic of fish that there are differences in the ITK that has been shared and we have incorporated multiple perspectives into the OP. We have updated the statement on clams as suggested. Thank you**.** |

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| | | given that as land users travel through an area and make camp, use of resources are from surrounding areas, including rivers and creeks, of which there are several around McClelland Lake. Fekete is not a subject matter expert, and English is a second language of many land users, so tense and concepts shared by the knowledge holder can be fluid and easily misinterpreted by non-subject matter experts.<br>Further, we need confirmation and revision of the statement in the second paragraph that clams are collected from the rocky bottoms of watercourses feeding *into* the lake, if the reference is only from IEG, as the only reference to clams in the IEG report is from FCMA knowledge holders who have shared that clams were collected from the Firebag River. We recommend, "Grayling have been harvested in clean clear waters such as those of the Firebag River. *Clams are also collected from the rocky bottoms of watercourses such as the Firebag*." | | |
| 52B | Objective 1 - SC Recommendation [121] | **NOT ADDRESSED**: Though additional ITK is included, the context requires revision.<br>2.5.8. Soils (Pg 2-118) The last sentence in the paragraph requires factual confirmation in the reference provided. Also, the second sentence on page 122 states, "Some important plant species harvested by Indigenous Peoples in the area include wild mint, sweetgrass, red willow, diamond willow fungus, saskatoon betties, pin cherries, blueberries, and low-bush cranberries/mooseberries. Blueberries, cranberries, mint, chokecherries, muskeg tea, rat root, and diamond willow fungus are, in particular, important species that continue to be harvested in the MLWC area as a source of food and medicine each year (IEG 2021). IEG (2021) also reports that sweetgrass as an important species harvested. Recommendation that sweetgrass be added to the list of important plant species and particular important species that continue to be harvested. | **FCM_FMMN_FMFN** | Thank you. Sweetgrass has been added to the list of important species that continue to be harvested. |
| 53B | Objective 1 - SC Recommendation [125] | **NOT ADDRESSED**: Though additional ITK is included, the context requires revision.<br>2.5.9.2. McClelland Lake Wetland Complex Pre-Mining Baseline Conditions<br>(Pg 2-122-123) Again there is no provision of or comparison to the Pre-development baseline and the Pre-Mining baseline conditions. The different timeframes are important when discussing changing conditions. This section needs to include, "the rich biodiversity" found by land users/ITK holders in pre-development baseline conditions (IEG 2021). There also needs to be better representation of those ITK holders who do not harvest some resources anymore because of their declining quality. The first paragraph generalizes that all plants are still harvested, when it is very clear in the IEG 2021 report that the Fort Chipewyan Métis specific ITK holder said that she does not collect and eat any berries anymore from around McClelland because of emissions and contaminants, or medicinal balsam bark blisters because they look unhealthy/dry (IEG 2021 Plant list resources).<br>For revision we recommend:<br>*ITK holders have noted the rich biodiversity found in the MLWC during the pre-development baseline. Some ITK holders continue to harvest plants, although there has been a decline in quality observed since the onset of industry. One ITK holder noted that she does not collect and eat any berries anymore from around McClelland Lake because of emissions and contaminants, or collect medicinal balsam bark blisters because they look unhealthy and dry. The reduction in biodiversity of plants includes some rare medicinal plants that are now very rare or no longer available within the MLWC and adjacent areas* (IEG 2021: 19). *Once culturally important plants disappear, it is difficult to bring them back* (IEG 2021:17). | **FCM_FMMN_FMFN** | **Thank you, this has been added. This is in addition to the very similar content already included: "**An excerpt from IEG 2021 effectively summarizes observations from ITK holders regarding the current state of many of the plant species harvested:<br>*"Since the 1960s, participants have noticed many negative changes to culturally important plant species. For example, some medicinal plants are now very rare or are no longer available within the McClelland Lake Wetland Complex and surrounding area. Other plants that are available have changed. For example, some plants ripen at abnormal times of the year and may have different textures, or taste. When participants observe these changes, they question the plant's health and purity. One member described how many of her family's historic berry patches are now gone due to industry and that her children and that her children will not have the opportunity to experience and visit them. Members have also observed that the cranberries and blueberries are smaller and drier than in the past. Members are concerned about the safety of berries for consumption, and whether they are contaminated by chemicals. Members identified that the condition and location of plants within an area does naturally change over time; however, the changes they have observed in the past few decades are beyond their expectations"* (FMFN ITK Holder, IEG 2021)."" |
| 54B | Objective 1 - SC Recommendation [134] | **NOT ADDRESSED**: Though the tables have been removed and ITK included as text and revised, the context requires revision. Regarding Section 2.5.10. Wildlife, 2.5.10.1. Wildlife Pre-Mining Baseline Conditions:<br>**SEE NEW RECOMMENDTIONS FOR OBJECTIVE 1** | **FCM_FMMN_FMFN** | We understand that this was a header for recommendations and the details of the recommendation are below. Please see responses below. |
| **2.0 Objective 1: Baseline Conditions – 2.3 New Recommendations** | | | | |
| 55B | Section 2.5.4.2 Reference Site Baseline Conditions | "Groundwater data [have} not been collected at reference sites to date." (Objective 1)<br>and<br>Table 6.2-2 (Proposed Monitoring Locations … [Reference Complexes])<br>No groundwater monitoring locations are proposed. (Objective 5)<br><br>These omissions are significant shortcomings to the OP. The data are required. How can robust conceptual models be developed and comparisons to MLWC be performed without these data? (See General Comments on reference ecosystems.) | **TAG-Hydrology** | See response to item #1B |
| 56B | Table 2.5-1 | Table 2.5-1, right most column. Min should be Max. | **TAG-Hydrology** | See response to item #1B |
| 57B | Figure 2.5-22 | Now Figure 2.5-22. A solid reference to the methods would help; Hatfield 2019?. | **TAG-Hydrology** | See response to item #1B |
| 58B | 2-1 | Section 2 Obj 1 Define Baseline Conditions<br>For **Objective 1: SC Recommendation** [19], the SC recommendations missed including/requesting that it be stated that IK informed the PDB as well. This link is not apparent here or in the section 2.1, or that the Baseline Report discusses both IK-informed PDB and PMB. In the first paragraph under Define Baseline Conditions please include the bolded: …"For the Operational Plan (OP), a distinction is drawn between predevelopment baseline conditions (i.e., conditions occurring before the influence of oil sands development, defined temporally as 1960 or earlier) and pre-mining baseline conditions (i.e., conditions including existing anthropogenic disturbances and effects on the natural environment, prior to mining in the McClelland Lake Wetland Complex (MLWC) watershed, defined temporally by the timelines captured in monitoring or modelling data). **Pre-development baseline** | **FCM_FMMN_FMFN** | **Accepted, bolded text added. Regarding NRV and MRV, the following was added between the NRV and MRV descriptions "**The NRV can be informed by pre-development baseline conditions (including traditional knowledge and paleo-environmental data) as well pre-mining baseline conditions (including traditional knowledge and measured/modeled data), with recognition that indigenous knowledge may help inform how conditions have changed from pre-development times." |

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| | | **conditions are informed by traditional knowledge, as well as paleo-environmental data**. Pre-mining baseline conditions are **also** informed by traditional knowledge, and include MLWC monitoring program data, historical imagery, and model predictions prior to mining in the MLWC watershed."<br>Also, at the beginning of the second paragraph, it only discusses NRV in a PMB context which is odd since it goes on to describe NRV as over a long time period of natural and before major changes. It doesn't discuss how NRV links with PDB and IK (as Tom does link NRV with IK in the Baseline Report, and both are the discussed in AAG meetings as stated in recommendation 20 in the excel table). As a seguay from the first paragraph to the second, we recommend taking out 'pre-mining' from the first sentence in the second paragraph so that the discussion is focused on the description of NRV, then adding adding how NRV ties or links with PDB and IK. Then add how regarding NRV and PMB link before the MRV description. Making these specific corrections would better explain the generalized last statement in the third paragraph of section 2, and WHERE the three sources of information were used to define baseline conditions. As Suncor has correctly stated, it is critical how the baseline conditions (and where IK has informed them) is understood at the beginning of the report. These recommended changes will help that understanding<br>Additionally, here or in 2.1, it needs to be explicitly explained what the tie IK has to both these baselines, and *why* the reference to change is important: ie, it is important to understand how and why IK informs both the pre-development (oilsands) baseline and pre-mining baseline and why that context is critical to understand.<br>We recommend the following text be added: ***Pre-development baseline is informed by generations of knowledge passed down to the following generations. This knowledge becomes critical for several of the MLWC AAG communities' participants, who were young land users living on and around the MLWC during both these baseline timespans. They received generational knowledge about, and remember being witness to, the expected function and high quality of environmental conditions before an event that brought subsequent changes to those conditions, in the region and particularly around the MLWC. Those knowledge holders have the comparative knowledge of both baseline conditions first hand, seeing the changes observed since Pre-mining baseline conditions due to cumulative effects on the MLWC***. | | |
| 59B | 2-6<br>2.3.1 Indigenous Use of the land and Resources | 1) The second sentence, first paragraph in 2.3.1, to: Prior to oilsands industrial development (pre-1960s), **unhindered** access and use of the land and waters in the area included hunting, trapping, fishing, berry picking **and other plant foods, medicinal and ceremonial plant harvesting, wood and water collection;** | **FCM_FMMN_FMFN** | Accepted and added. |
| 60B | 2.3.1 Indigenous Use of the land and Resources | 2) Adding some content about how the land was understood by knowledge holders, such as the connections of the waterbodies around the area **(ie, Water is connected thru the entire area-groundwater, surface water. Fen, lakes, creeks, rivers; all the valued and necessary water sources are connected (FCM Knowledge holder, IEG 2021). (Or if recognized by all knowledge holders, then say so.);** and | **FCM_FMMN_FMFN** | Accepted and added. |
| 61B | 2.3.1 Indigenous Use of the land and Resources | 3) Adding to the second paragraph after the first sentence, the following content: **Ice integrity was good and strong for winter sled-dog travel across the lake, and snow was clean for drinking water (FCM Knowledge holder, IEG 2021);** and | **FCM_FMMN_FMFN** | Accepted and added. |
| 62B | 2.3.1 Indigenous Use of the land and Resources | 4) After description of the drinking water sources sentence, discuss IK on Water Quantity and flow of the area including seasonal level (**ie, Water levels were high enough that members of the Faichney family were able to routinely travel by water to preferred areas within the McClelland Lake Wetland Complex and surrounding area (FMM/FN IEG 2021)**. **Water quantity experienced included the outflow of McClelland Creek, described as an old riverbed, which was high in spring, enough to swim in during spring and summer. It was not a fast-flowing river and depending on where beavers dammed, for example upstream, the creek could also be dry at times. McClelland Creek fed into Moose Creek, which always had lots of water and a swift current. The water level of the Firebag River in spring was high, and the current was swift. After May, the southern areas of McClelland Lake were too wet for travel, and previous trapline holder Felix Beaver had to detour over Edmo's trapline (FCM Knowledge holder, IEG 2021).**; and | **FCM_FMMN_FMFN** | Accepted and added. |
| 63B | 2.3.1 Indigenous Use of the land and Resources | 5) After the sentence, "The waters in and around the MLWC provided important habitat for fish, shellfish, frogs, (spelling mistake-fir bearers) and birds, all of which were harvested by Indigenous Peoples". Then add, **Fur quality of otter and beaver also depended on having good water and ice (FCM Knowledge holder, IEG 2021).;** and**,** | **FCM_FMMN_FMFN** | Accepted and added. |
| 64B | 2.3.1 Indigenous Use of the land and Resources | 6) The last paragraph discussing vegetation, add to the first sentence, **including mosses important for water retention on the land through warmer drier months as a natural fire retardant, medicinal plants (e.g., wild mint [*Mentha arvensis*], rat root [*Acorus americanus*], sweetgrass [*Hierochloe odorata*], red willow [*Cornus stolonifera*], and diamond willow fungus [*Trametes suaveolens*], saskatoon berries [*Amelanchier alnifolia*], pin cherries [*Prunus pensylvanica*], blueberries [*Vaccinium myrtilloides*], and low-bush cranberries/mooseberries [*Vaccinium edule*]. Members explained they would pick edible and medicinal plants while in the LSA and that the area is an ideal location for picking certain medicines because of the wetland terrain. Within the LSA, a key location for harvesting medicinal plants is where the fen meets the lake. (FCM Knowledge holder, IEG 2021)**.; and | **FCM_FMMN_FMFN** | Accepted and added. |
| 65B | 2.3.1 Indigenous Use of the land and Resources | 7) Also add to the paragraph**, Where you find muskeg you find Labrador (muskeg) tea (FCM Knowledge holder, IEG 2021).;** and | **FCM_FMMN_FMFN** | Accepted and added. |
| 66B | 2.3.1 Indigenous Use of the land and Resources | 8) Third paragraph, correction is required: blueberries are not usually in mossy, wet areas. They are in more sandy areas. Also, third sentence requires correction: Suncor states, "Bark from birch and balsam growing along the Firebag River and around McClelland Lake was collected for medicinal and other uses, and poplar sap was collected near the Athabasca River." However it has been clarified by our Knowledge Holder that Poplar 'sap' is actually the inner bark of the Poplar. Balsam grows along the Firebag and Athabasca Rivers. Balsam bark blisters are collected. Birch water is collected along Firebag River. | **FCM_FMMN_FMFN** | Accepted and clarified. |

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| 67B | 2.3.1 Indigenous Use of the land and Resources | 9) It would also be useful to note that**, the trails around McClelland Lake in the 40s were only dog team trails, no cutlines were put in until the early 1970's (FCM Knowledge holder, IEG 2021).;** and<br>9a) Include text: IK holders have expressed that they are facing so many impacts from cumulative effects in the area around McClelland Lake, for example, the clearing of trees, what does it mean for the fen or changes to the fort hills landscape are going to impacts how water flows. What will the impacts be on the wall? | **FCM_FMMN_FMFN** | **9a accepted and added. 9b accepted with modifications since the cutoff wall and mitigations haven't been introduced yet "**ITK holders have expressed that they are facing so many impacts from cumulative effects in the area around McClelland Lake (for example the clearing of trees). IK holders are concerned about changes to the landscape will impact water flows." |
| 68B | (Page 2-25) Geology and Hydrostratigraphy 2.5.2.1. Overview of Pre-Mining Baseline Data | 10) first sentence of Section 2.5.2.1, **ITK holders have (spelling: *noted or not?*)** | **FCM_FMMN_FMFN** | Thanks - fixed |
| 69B | | 11) Temporal clarification is required in the first sentence regarding when sandy areas were more abundant-during pre-development conditions, or pre-mining conditions, as opposed to when.<br>11b) The IK referenced (predominantly labeled from IEG 2021) is in part mis-referenced and is not in fact from IEG 2021. Some of the IK referenced is from other meetings recorded in the Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance and Conceptual Model Draft Report dated April 12, 2021. It is recommended that each reference be cross checked across all objectives to ensure referencing accuracy. Accurate references ensure the context of quotes maintains a connection to the IK shared by knowledge holders. | **FCM_FMMN_FMFN** | Thanks, removed the temporal aspect of the geology info. Also updated the ITK references. |
| 70B | Page 2-25 | 12) Geology and Hydrostratigraphy 2.5.2.1. Overview of Pre-Mining Baseline Data discussion here of the hydrostratigraphy should also include characteristics of the surface outflow, McClelland Creek, which was noted by our Knowledge Holder as an old creekbed (IEG 2021), and in meetings described the abundance of water it had over a long period of time, as indicated by the width of the tree line and willows in some places. | **FCM_FMMN_FMFN** | **Thank you – FHEC added this:** The surface outflow from McClelland Lake, McClelland Creek, has been referred to by an ITK Holder as being an old creek bed (IEG 2021).<br>*"McClelland Creek, it varies, one year it will be dry and one year there's abundance of water. And years ago, there had seemed to be more water in that creek than the later years. And then when I say more water, probably I would say in the '50s, there was a lot more water, but then in the '60s, sometimes you can just walk across there with just your rubber boots. Sometimes, you've got to walk across, just about up to your neck because I've done that.*<br>*But I guess maybe it varies again, because it depends on the beavers' dams on the creek, but if you look at the creek bed, the last time I was there, I took a good look at it. You could see the creek bed, some places probably at a quarter mile (I won't say half a mile), but quarter of a mile wide, where you could see the line of the big trees, and then it goes down and only willows through in the lower area. You can tell that that used to be a creek bed before where the high trees and the pines, where there was no creek running through there."* (FCM ITK Holder, *March 3, 2021 workshop)* |
| 71B | Page 2-34 | 13) 2.5.3 Topography 2.5.3.1 Overview of Pre-Mining Baseline Data This discussion should also include other landscape features embedded into the landscape from a Pre-development baseline to pre-mining baseline, such as trails. Trails have been used for generations in the area and are very old. Our Knowledge Holder mentions these old dog team trails in the MLWC, throughout the north side of the lake. These may also be important features to restore to the landscape at reclamation should they be disturbed during mining activities. | **FCM_FMMN_FMFN** | Thank you, added a note about trails used for generations. |
| 72B | Page 2-66 | 14) 2.5.5.2. Hydrology Related Pre-Mining Baseline Conditions Indigenous Traditional Knowledge<br>Verify content reference: In relation to Lake levels noted from the 90s, as seen on the land, "Some have suggested that this may be related to variation in annual precipitation during this time, while others attributed fluctuations to beaver activity in the lake and tributaries." If not in IEG 2021, then what notes was it taken from? | **FCM_FMMN_FMFN** | During the March 3, 2021 meeting, A FMFN member and a FCM member pointed out the fluctuating water levels and discussed changes in weather patterns and climate change. Similarly, in the March 3, 2021 workshop, a FMFN member discussed low water levels regionally and the impact that was why there are no longer fish in the lake. FMFN and FMMN members have also explained that there are seasonal fluctuations in the water levels which are controlled by beavers in the area (IEG 2021).<br>Modified reference to: FMFN, FMMN, FCM ITK Holders March 12, 2020 workshop and IEG 2021). |
| 73B | Page 2-66 | 15) Should perhaps say, During the 1990s, **and at times since**, ITK holders noted that…<br>It was also mentioned in meeting notes (July) **that the 70's in general were a wetter period** (not sure by who KH, TAG, or Suncor). This would be in keeping with observations in the 90s of lower lake levels. Include this context if IK-related. | **FCM_FMMN_FMFN** | Accepted first edit. We are unable to find ITK reference to wetter period in 1970s. The wetter period is shown on Figure 2.5 21: Long-term Trend in Precipitation. Additional context around climate is also provided in the Conceptual Model appendix. |
| 74B | Page 2-66 | 16) "Some have suggested that this may be related to variation in annual precipitation during this time, while others attributed fluctuations to beaver activity in the lake and tributaries." This seems to be a vague and mischaracterized IK reference. Tom's report mentions beaver activity at the outflow of McClelland Creek from the lake. But not sure this IK was tied into general lake level fluctuations. Also, verify IEG reference. Barb H's quote discusses dryness of the creek related to beaver activity, not to amount of precipitation. | **FCM_FMMN_FMFN** | Please see response to item #72B |

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| 75B | (Pg 2-67) | 17) Verify reference content and timeline comparison context to PDB needed, "Some of the lakes in the MLWC area were known to have varying ice qualities during the winter months. The three lakes in a "V" form near where the Albian Sands comes close to McClelland Lake were known to have weak ice that did not freeze solid during the winter. This characteristic has been attributed to high salt content in the immediate area, as suggested by the frequent presence of deer using the ground for its salt content. The south end of McClelland Lake has also been noted as an area of weak ice, and Baby Lake and the creek near the Fort Hills area were observed to seldom freeze in winter." Please add additional text "With respect to tributaries that do not freeze over, IK holders have identified that across from Glens Cabin, on the powerline going east, on the north side is a tributary that does not freeze. It leads to a pond. This areas is already cleared with no access. | **FCM_FMMN_FMFN** | The reference came from a FMFN ITK Holder at the March 3, 2021 workshop. Added the text suggested, also from a FMMN member during the March 3 workshop. |
| 76B | (Pg 2-67) | 18) Verify reference content 'Some ITK holders have said (regarding the Athabasca R.) …This has been attributed to increased industrial activity and associated water withdrawals along the river since development began, but also to climate change and lower precipitation levels in recent years. Weaker ice has been linked to warmer temperatures and less retention of water during the winter for spring runoff. (I have not seen IK reference to warmer temperatures and precipitation levels in the region, or weaker ice on the Athabasca being attributed to these in in Tom's report) | **FCM_FMMN_FMFN** | Reference corrected and second sentence removed. This was discussed by a FMFN member during the March 3, 2021 workshop. |
| 77B | (Pg 2-67) | 19) How has long-term PDB IK informed characterization of the pre-mining baseline beyond precipitation and temperature data available from the regional stations?<br>**Include, no whiskey jack or song birds seen during fieldwork, but pelicans have been seen recently, are new to area (FCM, IEG: 12)**<br>Also has the following from Tom's Report been included: FMM/FN Industry noise could be heard from McClelland Lake bird populations have decreased, especially in the last couple decades (early 2000s). Participants expressed that they have never seen such a low number of birds in recent years, suggesting changes to bird populations outside the natural range. For example, recently when out harvesting bird eggs, a participant noticed far fewer eggs per nest then before. Other indicators that bird populations are decreasing is the absence or reduced sightings of specific bird species. Members indicated that the grey jay population has reduced, resulting in fewer sightings. Members indicated that nesting and habitat areas for birds have also been eliminated or disturbed by industry, such as nesting areas for duck, grey jay, and sandhill crane, which could help explain the absence and reduced sightings of these species. Other members recalled that they used to see many ducks when they travelled between McClelland Lake and Saline Lake, but now the area is dry and they see fewer ducks. Impacts to trails, restricted access, clearing of new paths and roads that overrun older routes or which are now confusing to navigate, increased disturbances, and increased access for recreational users and/or non-Indigenous hunters. | **FCM_FMMN_FMFN** | ITK has been incorporate throughout the baseline conditions sections.<br><br>The comment about whiskey jack has been added to Section 2.3.10.1.1 Birds: During a field visit in 2019, an FCM ITK Holder noted that they didn't observe whiskey jack or songbirds during the visit, but that pelicans had been seen recently and are new to the area (FCM 2019)."<br><br>The later content can be found in Section 2.3.10.1.1 Birds. |
| 78B | (Pg 2-72) | 20) Problematic inference regarding succession of RAMP. Please revise to imply separate monitoring programs since RAMP (which had different mandates, scopes, and criteria). | **FCM_FMMN_FMFN** | The text has been updated to reflect that the RAMP stations are now operated under the Oil Sands Monitoring (OSM) Program. As noted in the response to 79B, monitoring stations established under RAMP are typically still referred to as RAMP stations. |
| 79B | (Pg 2-75) | 21) 2.5.5.2.3Water Level Data. McClelland Lake – Recorded Data<br>Monitoring data collected by RAMP and AEP from June 1997 through October 2020 ?? Is RAMP still going or defunct, or are the other and different monitoring programs being implied (previous comments)? | **FCM_FMMN_FMFN** | In 2012, the Government of Canada and the Government of Alberta launched the Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring (JOSM). The plan was jointly managed by the two governments to strengthen existing environmental monitoring programs for air, water, land and biodiversity in the oil sands region. JOSM took over all environmental monitoring starting in 2012, while RAMP continued for a while in parallel until being folded under JOSM. The last official RAMP report was 2013, after which reporting was through JOSM, and now under the Oil Sands Monitoring (OSM) program.<br>Even though RAMP is no longer in existence, the monitoring locations that were started under RAMP are still typically referred to as RAMP stations. |
| 80B | (Pg 2-75) | 22) **(error-Barb there in Aug 2019, comment may have been from March 2020/21 meeting?)** Problems with tense being used-intimating that what has been seen Pre-Mining/currently is norm. Changes compared to since pre-development baseline. | **FCM_FMMN_FMFN** | Text updated and reference added. |
| 81B | (Pg 2-75) | 23) Verify content reference, ITK holders have noted that there are seasonal fluctuations in the water levels which are controlled by beavers in the area (beavers let old water out through their dams in the spring and in the fall they dam the lake to keep the fresh water in).<br>23b IK holders also reference that the cause of lower water levels since the 60s is cause by Industrial development in the area/region – See DRAFT MLWC-IK related to conceptual water balance (April 2021). | **FCM_FMMN_FMFN** | 23) This came from FMFN and FMMN ITK Holders, IEG 2020.<br>23b) Added: Since the 1960s, FMFN and FMMN ITK Holders have observed changes to water quantity and quality within the McClelland Lake Wetland Complex and surrounding area and expressed that water levels have gone down in the McClelland Lake area since nearby industrial projects became active (FMFN and FMMN ITK Holders, IEG 2021). |
| 82B | (Pg 2-75) | 24) How did IK inform the McClelland Lake – Model Simulated Data used to infer lake water levels over a longer time period? ie. if IK Holders noted that water levels in the lake since the 90s was generally lower than the 70's, and even lower than the 40s/50 dry period, how or was that accounted for in the model, or is simulated data preferable to real IK observations to inform integrated models on surface and sub-surface flow? | **FCM_FMMN_FMFN** | Measured lake level data dates back to the late 1990's. From that point in time until now there is overlapping lake levels, climate and IK to verify the model is reproducing observed lake levels to an appropriate degree. Before that time there is only climate data and IK. The HGS model used the available climate data to simulate lake levels before the late 90's and FHEC is scheduling workshops with the MLWC AAG to use IK to help validate the HGS model's predictions of this historical period in 2022 (among other topics for validating the HGS model with IK). IK will be used to accomplish this task, it just has not been done yet. Our apologies for any confusion. |

**Complied Comments and Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 30, 2021)**

| Table 2: SC and TAG Comments on the Revised MLWC Operational Plan (OP) (Nov 29, 2021) | | | | |
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| 83B | (Pg 2-77, 78) | 25) does not provide PDB for what was or comparison discuss varying water levels observed by IK Holders between 1960-1997, or periods where water is lower by ½ meter in last 10 years, which can make a difference to land users. | **FCM_FMMN_FMFN** | Throughout Section 2.5.5.2.3 Water Level Data, comparisons were drawn between the ITK information, the measured data and the modelled data. |
| 84B | (Pg 2-79) | 26) Revise to patterns as described more closely by ITK holders (i.e., IK has described it as higher/wetter in 70s, and lower in the 1990s on, not higher in the 1960's to 1990's and lower since). | **FCM_FMMN_FMFN** | Revised and referenced. Thank you. |
| 85B | (Pg 2-80) | 27) Reference Pre-Mining period for context-ITK holder noted that periodic flooding and times of lower water is fairly common in the MLWC, and the highwater in 2020 was part of the natural cycle. Should be stated as PM Condition and **MCFN noted that their time in McClelland Lake was only in the last 30 years**, MCFN have provided ITK that water levels in the MLWC vary – in the spring, water levels are high. Water levels remain high until mid-summer. Water levels are lower in the fall. Spring water levels depend on the amount of winter snow, ice quality and strength, and the amount of spring precipitation (affecting ice jams). Being used as 'normal' conditions without reference to previous knowledge | **FCM_FMMN_FMFN** | One of the MCFN interview reports did note that the land users interviewed had actively used the area for 30 years, but MCFN records that the area has been visited and used for cultural and spiritual practices for as long as MCFN community members can remember. |
| 86B | Pg 2-87<br>2.5.6. Surface Water and Groundwater Quality. | 28) 2.5.6.1. Introduction<br>First sentence should stop after 'Indigenous Peoples' so that the differing perspectives on use can then be honestly presented. **ITK holders would like the waterbody to have the same level of quality it once had.** (Many do not drink from it anymore, while members of the Faichney family do but only from certain places.). The ecological function of the fen serving as a filter for the water quality was also an important aspect to the MWC. Please add the following text "Water filtration services provided by the intact muskeg around McClelland Lake. This area is one of the few clean water sources left that run into the Athabasca River (via the Firebag).*"They would never be able to put that reclaimed area into the same state that it was before, there's no way...it's not possible, cause it's taking away mother nature's filter. And mother nature must have spent thousands of years creating that fen, that filter"* (M34)" (MCFN, 2019). | **FCM_FMMN_FMFN** | Accepted and revised. Quote on future state not added to the baseline section. |
| 87B | Pg 2-91 | 29) Water quality datasets collected under the long-term water quality monitoring network and other focused studies (2000 to 2019) were used to characterize pre-mining baseline conditions and define the MRV. It should be further clarified that Surface Water and Groundwater Quality Pre-Mining Baseline characterization, based on western science parameters (these were provided in brackets) did not include other quantitative or qualitative ecological cues during this time such as visual or olfactory criteria or indicators that tell a human if water might be low quality. | **FCM_FMMN_FMFN** | FHEC is open to discussion on including qualitative measures of water quality such as visual or olfactory criteria in the 2022 ESCT monitoring workshop. As it hasn't been included in the baseline programs to date, it won't be mentioned in Objective 1. |
| 88B | | 30) Additional context should be noted around *timelines*, that this *current characterization* presents a quality that is different than experienced and *used in previous PDB years, and even early Pre-Mining Conditions*, which had trusted water quality for use. This provides more specific context to support the more ambiguous statement, **"**the natural range of variation for water quality (as informed by traditional knowledge **remembered from PDB and early Pre-Mining years**) reflecting a higher quality of water then current day conditions and MRV (Section 7.3.3, Objective 6). | **FCM_FMMN_FMFN** | Timelines have been added for clarity. Pre-mining baseline refers to the period prior to mining in the MLWC watershed (current day), so kept as pre-development baseline. |
| 89B | Pg 2-108 | 31) The last statement in the second paragraph in the introduction of 2.5.7 Aquatic Resources, regarding birds flying overhead as a good indicator for presence of fish in a waterbody, should be clarified and specific attribution to a community required. | **FCM_FMMN_FMFN** | Clarified and referenced. |
| 90B | Pg2-122 | 32) Our FCM Knowledge Holders have noted that corrections are needed to the second and third paragraphs. The last sentence of the second paragraph states, "Two plants that have been highlighted as being sensitive to change include bear berries, and bulrush (IEG 2021)." Our Knowledge Holder states that bearberry is not a sensitive species and is quite hardy. Blueberries are fragile and sensitive to change. The third paragraph, from the third sentence on is generalizing and may be mixing up knowledge provided. Unless being paraphrased by other knowledge holders in the IEG 2021 report, our Knowledge Holder discussed balsam bark near the Firebag River as looking dry and so could not harvest the balsam blisters on the bark. The type of trees mentioned following the statement that Eight Lakes had been logged, is incorrect. Jackpine and some spruce is in that area and was removed. Balsam and birch are not in that area. Our Knowledge Holder would also like Pitcher plant added to the list in the first paragraph. | **FCM_FMMN_FMFN** | This information about bear berries and bulrush was shared by FMFN and FMMN ITK Holders (IEG 2020 and IEG 2021) and a reference has been added. The type of trees logged has been removed and pitcher plant added. Thank you! |
| 91B | (Pg 2-137) 2.5.9.3 Reference Site Baseline Conditions | 33) 2.5.9.3 Reference Site Baseline Conditions<br>It is concerning that Suncor would 1) put a statement about changes observed in the MLWC, and how land users are responding to those changes with whether they have confidence to continue to harvest these resources or not, in a section about the Reference sites, which has no IK 'data' on harvesting; and 2) dismiss the negative response to knowledge holders' observations given the previous statement that changes have exceeded knowledge holders' expectations. Specifically, Suncor states in the second paragraph, "While ITK holders have indicated that the condition and location of plants within an area does naturally change over time, the changes they have observed in the past few decades are beyond their expectations. Despite these changes, Indigenous Peoples continue to harvest…". As our knowledge holders have stated in meetings, they no longer have confidence in harvesting some resources in the MLWC area. This has also been stated by a few other communities' knowledge holders. To ensure accurate representation of knowledge holders' response to change and further use of resources, we recommend instead a second sentence that reflects the responses, even if disparate, to what was acknowledged in the first sentence. We suggest, "**Some Indigenous Peoples have responded to these observed changes with a lack of confidence in their continued harvest, avoiding these resources.** Despite these changes, **some other** Indigenous Peoples…". | **FCM_FMMN_FMFN** | Apologies, this content was included in the wrong section. Please see edits requested and made as part of response to 53B above. |
| 92B | (Pg 2-152)<br>Section 2.5.10.1.1 | The second paragraph of Section 2.5.10.1.1 states, "Members of Indigenous communities have observed that bird populations have decreased since the 1960s, especially during the last couple of decades. Members have indicated there has been reduced sightings, or absence, of specific bird species, such as grey jay, and have indicated that nesting and habitat areas for birds have also been eliminated or disturbed by industry. The ITK holders from one Indigenous community have noted that one of the reasons that fewer birds have been seen is that, due to lower water levels in the fen and the surrounding area, birds are less likely to stop during migration (IEG 2021)." This statement leaves out other key IK knowledge shared about why the birds have been fewer. IK holders report fewer birds because of increased human activities in the area. It is recommended that the impacts of human activities on birds be included in descriptions of pre-mining baseline conditions. Please add the additional text to the section, "IK holders have indicated other reasons that there are fewer birds in the area. For example, Fort McKay members 'shared that disturbances can impact how birds behave. | **FCM_FMMN_FMFN** | Accepted and added. Revised. |

| Table 2: SC and TAG Comments on the Revised MLWC Operational Plan (OP) (Nov 29, 2021) | | | | |
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| | | Using a Cree phrase, they described a specific bird behaviour, namely, the nervous or jittery behaviour of ducks reacting to disturbances. Members also explained that Project disturbances such as tree removal can push birds out of the area. For example, the disappearance of the culturally important and sensitive grey jay is predicted if it experiences more disturbance from development' (IEG 2020). Similarily, IK holders 'described disturbances from industrial activities such as human activities, noise, odors, and visual [also] impact animal behaviour. For example, participants explained that birds and other wildlife are sensitive to disturbances from industrial noise. Disturbances degrade the quality of habitat resulting in changes in animal behaviour and migration patterns' (IEG 2020)."<br>Also (Pg2-152), when validating the IK recommendations, FCM Knowledge Holders stated that no birds are 'landing' in the fen, so the first statement in Birds 2.5.10.1.1 should be corrected to say, "…MLWC area as plentiful and that the fen side of the lake was a 'haven' for waterfowl prior to industrial development." | | |
| 93B | Pg 2-153 | The second paragraph "ITK Holders recalled they use to see…" should be attributed to the specific community Knowledge Holder(s), as this is a specific route out of the way of some of the other communities use. | **FCM_FMMN_FMFN** | Thank you, specified FMMN and FMFN ITK holders. |
| 94B | Pg 2-154 | There needs to be clear identification of the timeframe of the ITK observation about the frogs. We recommend: "One ITK holder remembers from her child hood, during the early years of the pre-mining baseline:…" | **FCM_FMMN_FMFN** | Accepted and revised. |
| 95B | Pg 2-157 and 2-159 | Suncor states, "integration of the aquatics baseline information presented in Sections 2.5.4 through 2.5.7, as well as findings from the hydrochemical model presented in InnoTech (2021), and information provided by the ITK holders…" This implication is problematic in that there are IK content and context issues in the Aquatic section, and the introductory statement confuses presentation of IK with implied integration into the datasets and the results of this three-part 'integration'. Further, you cannot 'integrate' IK by undermining or diminishing its observation. It may be that in the last 25 years, "The lake water levels fluctuated by less than 1 m in the 1997 to 2020 dataset…" However, the IK presented in the referenced sections is clear and definitive about what land users saw and experienced, in addition to air photo evidence. As such, the first and final paragraphs require revision, which will also clarify the Section titles regarding discipline specificity (as there was no community-specific anthropologist discussing the IK observations with the hydrologists).<br>We recommend: (First Paragraph) "The following section integrates the western science data from the aquatics pre-mining baseline presented in…, as well as findings from…in InnoTech (2021). Similarly, we also include ITK references to pre-mining baseline water quantity levels for comparison and temporal trend over time." (Final paragraph) "The lake water levels fluctuated by less than 1 m in the 1997 to 2020 dataset. However air photo evidence and ITK present differing water levels in the past, (lower for a short period during the pre-development baseline) and higher levels prior to the 1990s. Higher water levels are (or WERE?) observed in winter (WHEN-BEFORE OR AFTER 1990s?), which may be due to ice jamming at the outlet, or a combination of lower evaporative losses and steady groundwater discharge over the winter." | **FCM_FMMN_FMFN** | Accepted and Revised. |
| 96B | Pg 2-157 | Our FCM Knowledge Holders remember discussing bugs at a workshop and asked why sensitive bugs like butterfly, bees, or dragon flies were not included in (ie years when no berries) section 2.5.1.1 Aerial Invertebrates | **FCM_FMMN_FMFN** | Yes, insects were discussed at one of the Indicator workshops. Went back to the Garabaldi report and added this list of bugs as examples: butterflies, bees, dragonflies, mosquitos, horseflies, damselflies and water beetles. |
| 97B | Pg 2-160 | Section 2.7 Objective 1 Summary requires revision. (First Paragraph) From "Water levels are lower, and water quality is not as pristine as it once was." To, "Water levels are lower, and water quality has left some land users unable to trust the safety of water for consumption." Further, the final paragraph needs correction in the first sentence to how PDB was also characterized by ITK as well. This is missing. We recommend, "In addition to ITK Holders knowledge and observations before the onset of oilsands industrial activity informing the Pre-development baseline conditions, PDB was also characterized through…" | **FCM_FMMN_FMFN** | Accepted and revised. |
| **3.0 Objective 2: Define Functionality – 3.1 General Comments** | | | | |
| | | NO NEW COMMENTS | | |
| **3.0 Objective 2: Define Functionality – 3.2 Adequacy of Response to Initial Recommendations** | | | | |
| 98B | Objective 2 - SC Recommendation [4] | **PARTIALLY ADDRESSED:** Noted.<br>TAG observes, however, that the usage/definition of MLWC and the surrounding watershed is inconsistent in the Introduction . It still requires better definition and consistent usage. | **TAG-Hydrology** | See response to item #1B. |
| 99B | Objective 2 - SC Recommendation [8] | **PARTIALLY ADDRESSED:** The suite of parameters may need to be revisited in future workshops as the systems (including reference ecosystems) are better understood. | **TAG-Hydrology** | See response to item #1B. |
| 100B | Objective 2 - SC Recommendation [11] | **PARTIALLY ADDRESSED:** For this reporting and agreements with SC, the response is adequate.<br>However, KJD's > 20 years experience working with lakes on the Boreal Plain, is that nutrient (P) and algal responses can be controlled by within lake processes, rather than by upstream ecosystems. The up-stream fen complex will most likely be a potential source of P to the lake and, along with in-lake processes (water levels, bioperturbation, anoxia and Fe-P dynamics), will influence algal and submerged aquatic vegetation (SAV). A reference system that expresses similar algal "bloom" cycles will help in interpreting the occurrence of blooms in McClelland Lake. We suggest considering blue-green bacteria (algae) with the plankton community monitoring as well. | **TAG-Hydrology** | See response to item #1B. |
| 101B | Objective 2 - SC Recommendation [14] | Original Recommendation<br>Basic Lake water balance should be conducted; it is a standard assessment.<br>Measurements of water levels are not sufficient. Measurements (or calculations) of changes in flow (e.g., gradients, spring discharge, streamflow) are required to evaluate water balances and any changes in where water flows<br><br>FHEC Response | **TAG-Hydrology** | See response to item #1B. |

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| | | FHEC does collect the data for lake water budget annually and will continue to do so. However, as there are difficulties in measuring aspects of it accurately due to complex and undefined inlets and outlets and due to beaver impoundments, it will not be included as an indicator for the Operational Plan.<br>**PARTIALLY ADDRESSED:** Required for modelling | | |
| 102B | Objective 2 - SC Recommendation [18] | Original Recommendation<br>Clearly define the systems that will be addressed. There is confusion of where the lake vs the patterned peatland fit in this objective. Also, in Table 2-2 (objective 1) testimonies indicate that important and values of the whole watershed, and direct use of the peatland (patterned and non-pattern) is not mentioned as much. This should be reflected in the functionality of the non-mined portion that considers more than just the peatland.<br>**PARTIALLY ADDRESSED:** See item #4 | **TAG-Hydrology** | See response to item #1B. |
| 103B | Objective 2 - SC Recommendation [26] | **NOT ADDRESSED:** Page 3-4. Change "validated by the participants" to "approved by SC". | **TAG-Hydrology** | See response to item #1B. |
| 104B | Objective 2 - SC Recommendation [27] | Original Recommendation<br>Page 3-3. Paragraph listing and describing the meeting where indicators have been discussed. This is very misleading. Having a meeting does not indicate that the advisory group endorsed your final selection. To say we met is one thing, but what was suggested should be presented, both the positive and critical statements<br><br>FHEC Response<br>This feedback is noted. Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators and some modifications have been made based on SC and TAG feedback. As well, the final list of recommended indicators that was provided by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021) was used as the basis for Objective 2.<br>**PARTIALLY ADDRESSED**: Wording is (largely?) unchanged (pages 3-3 to 3-8). "Approved by SC" is okay. | **TAG-Hydrology** | See response to item #1B. |
| 105B | Objective 2 - SC Recommendation [41] | **PARTIALLY ADDRESSED:** Repeat Concern #30 | **TAG-Hydrology** | See response to item #1B. |
| 106B | Objective 2 - SC Recommendation [49] | **PARTIALLY ADDRESSED:** The connection between the OP and other monitoring programs is not entirely clear. Here we have EPEA monitoring; elsewhere we have wildlife monitoring; there seem to be others. Perhaps it should be covered in the Introduction. | **TAG-Hydrology** | See response to item #1B. |
| 107B | Objective 2 - SC Recommendation [63] | **PARTIALLY ADDRESSED:** See comments on #11. Perhaps consider blue-green algae in plankton communities sampling. | **TAG-Hydrology** | See response to item #1B. |
| 108B | Objective 2 - SC Recommendation [66] | Original Recommendation<br>Exclusion of complementary data based on the premise that it is difficult to measure, may have insufficient pre-mining baseline datasets, may not be indicative of early change in MLWC functionality, or may not be responsive to Fort Hills Project mitigations are not valid reasons. These operations are having a massive impact on the environment and many parameters may be difficult to measure. Clear reasoning or definition of these criteria are needed. TAG disagrees on decisions to drop parameters (e.g., gradients, springs, sediment contamination, tree growth, wildlife) that they are not indicative of early change. Define the timeline. Consult experts to refine the monitoring program.<br>Table 3-3, Not clear why contaminants have been excluded, or if they examined in another context (i.e., EPEA)<br><br>FHEC Response<br>See response to items #2 and #37.<br>**PARTIALLY ADDRESSED:** Repeat concerns | **TAG-Hydrology** | See response to item #1B. |
| 109B | Objective 2 - SC Recommendation [73] | Original Concern<br>Table 3-6. Water balance for the lake is key. If you can come up with a balance for objective 1, why not maintain monitoring of this during operations? This is a standard assessment tool.<br><br>FHEC Response<br>FHEC does collect the data for lake water budget annually and will continue to do so. However, as there are difficulties in measuring aspects of it accurately due to complex and undefined inlets and outlets and due to beaver impoundments, it will not be included as an indicator for the Operational Plan.<br>**PARTIALLY ADDRESSED:** Required for numerical modelling. (Duplicate of #14) | **TAG-Hydrology** | See response to item #1B. |
| **3.0 Objective 2: Define Functionality – 3.3 New Recommendations** | | | | |
| | | NO NEW COMMENTS | | |
| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.1 General Comments** | | | | |
| 110B | Major/General Comments | ***See Major General Comments above related to***<br>• conceptual hydrogeologic model<br>• integrated hydrologic (numerical) model<br>• Water Quality Model, and, | **TAG-Hydrology** | See response to item #1B. |

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| | | • Understanding gained from updates to the conceptual models, and ensuing updates to the numerical models, for the hydrological system and the geochemical system, must be integrated into the remainder of the OP (e.g., definition of triggers, mitigation options, responses) and evaluations of both MLWC and reference ecosystems. | | |
| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.2 Adequacy of Response to Initial Recommendations** | | | | |
| 111B | Objective 3 - SC Recommendation [3] | PARTIALLY ADDRESSED<br>Still awaiting Water Quality.<br>Also, with the new and definitely improved conceptual model of water interactions, sources and pathways presented in Section 4.3.1.1 (including Figure 4.3-20), please clarify that this information has been used in other sections. It appears to not have been used in analyses and comparisons of background data and reference systems in objective 1 - background conditions | **TAG-Hydrology** | See response to item #1B. |
| 112B | Objective 3 - SC Recommendation [4] | <u>Original Recommendation</u><br>The Plain Language summary is a great way to introduce the protocols and importantly the conceptual model illustrating the holistic linkages of the system. It also provides a great opportunity to integrate IK and the sciences. Having said that, at present it merely highlights what information was or could be used but does not directly state how.<br><br>This is where a summary conceptual model that synthesizes the understanding of Western Science and IK, and illustrates the foundation for the numerical modelling, assessment, and mitigation strategies. This summary could then be informative and used by all parties. At present it presents little to inform stakeholders or scientists. It largely comes across as a "feel good" document.<br><br>**PARTIALLY ADDRESSED**<br>The summary of the conceptual model in the Plain Language Summary appears to be exactly the same as that in this Chapter and the Appendix. They must be three different summaries. | **TAG-Hydrology** | See response to item #1B. |
| 113B | Objective 3 - SC Recommendation [5] | <u>Original Recommendation</u><br>There is no summary conceptual model showing the whole system, nor a basic synthesis of the interconnectedness of flow paths and the key processes at various locations throughout the MLWC. These are required for the final assessment of the relative roles of different sources, mitigation operations and success of the cutoff wall.<br><br>Importantly a synthesis of the conceptual model is required to direct the understanding of hydrologic processes and to define the locations to measure the indicators referred to in other objectives. Currently the reader must collate and synthesize this information from individual descriptions in the appendix that is extremely long.<br><br>**PARTIALLY ADDRESSED**<br>See reply to item #4. Three different syntheses for three different audiences are required. | **TAG-Hydrology** | See response to item #1B. |
| 114B | Objective 3 - SC Recommendation [7] | PARTIALLY ADDRESSED<br>It is understood that the HGS model will be continually updated. The question is whether the results of other sections in the OP have used the most recent version of the model. Please clarify. | **TAG-Hydrology** | See response to item #1B. |
| 115B | Objective 3 - SC Recommendation [8] | <u>Original Comment</u><br>We disagree that the simulated groundwater elevations are close to the observed from the tiny map/plots and table of values and differences provided. Many core ranges don't even overlap. Importantly, the simulated water levels are systematically higher than the observed, indicating a bias in the calibration. A time series of water levels and assessments of goodness-of-fit are required for further evaluations.<br><br>**PARTIALLY ADDRESSED**<br>We await an updated version of the model. | **TAG-Hydrology** | See response to item #1B. |
| 116B | Objective 3 - SC Recommendation [10] | <u>Original Recommendation</u><br>Groundwater quality is explicitly excluded from the evaluation. Why? It was established in Objective 1 (and the Conceptual Model appendix) that groundwater quality varies and has an influence on surface-water quality.<br><br>**PARTIALLY ADDRESSED**<br>We await the water quality modelling. But, we note that in the latest version, for "objective 1 Background" integration of the conceptual model, groundwater quality associated with EHZ-HRA groups and surface water had not yet been conducted. | **TAG-Hydrology** | See response to item #1B. |
| 117B | Objective 3 - SC Recommendation [15] | <u>Original Recommendation</u><br>The recommendations in other objectives need to be reconsidered with the new data presented for Objective 3 because Objective 3 reporting came after all other objectives. Provide clear statements as to whether the conceptual model and modelling results provided in Objective 3 were used in the versions of Objectives 2, 4, 5 and 6 presented earlier this summer. Or, given that Objective 3 has only recently been provided, have these current results from Objective 3 been incorporated in the other objectives.<br><br>**PARTIALLY ADDRESSED** | **TAG-Hydrology** | See response to item #1B. |

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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | It is understood that the HGS model will be continually updated. The question is whether the results of other sections in the OP have used the most recent version of the model. Please clarify. (same as reply to [7]) | | |
| 118B | Objective 3 - SC Recommendation [22] | Original Recommendation<br>This section is very short, but cites a long appendix where the reader is to somehow envision the conceptual model. The appendix is not cited properly, and there is no summary of the processes or synthesis to allow the reader to assess, quickly and easily, the "interconnectedness" of the system with the surroundings.<br><br>**PARTIALLY ADDRESSED**<br>See replies to #4 and #5 | **TAG-Hydrology** | See response to item #1B. |
| 119B | Objective 3 - SC Recommendation [23] | Original Comment<br>TAG provided the first draft for a summary conceptual model over a year ago. We expected some progressive iterations of this and reporting of the final synthesized model. A version would have been needed to direct the numerical modelling and to allow TAG to assess the appropriateness of the numerical modelling approaches and interpretations for mitigation provided in Objectives 2 and 4.<br><br>Provide a summary of dominant flow paths and connectivity of the fen and lake to each other and the surrounding landscape.<br><br>FHEC Response<br>A summary of dominant flow paths and connectivity has been added as a part of conceptual model synthesis in appendix. All of the needed information is already in the conceptual model, it just needs to be summarized in one location<br><br>**PARTIALLY ADDRESSED**<br>Okay. But note the comments on the Conceptual Model summaries (4, 5, 22). Different summaries are required. | **TAG-Hydrology** | See response to item #1B. |
| 120B | Objective 3 - SC Recommendation [30] | Original Recommendation<br>The results from this objective (3) are quoted to be used for Objective 6. However, given that this information came long after Objective 6 was presented, please clarify whether the current information presented in Objective 3 was used, or whether some adjustments are required to finalize objective 6!<br><br>Re-evaluate other objectives considering this updated Objective 3 (once revised).<br><br>**PARTIALLY ADDRESSED**<br>It is understood that the HGS model will be continually updated. The question is whether the results of other sections in the OP have used the most recent version of the model. Please clarify. (Same as Reply 7) | **TAG-Hydrology** | See response to item #1B. |
| 121B | Objective 3 - SC Recommendation [46] | Original Recommendation<br>A summary conceptual model, with a holistic view of the interconnectivity of adjacent landscape and the fen-lake complex should be provided in the first step of model description. Then a description of illustration of how the numerical model (HGS) is used in this context can follow. This should be shown along the description in section 4.3.2.1 and linkage assessments.<br><br>**PARTIALLY ADDRESSED**<br>See replies to #4, #5, #22 and #23. | **TAG-Hydrology** | See response to item #1B. |
| 122B | Objective 3 - SC Recommendation [57] | Repeat comments related to providing a synthesis of the Conceptual model | **TAG-Hydrology** | See response to item #1B. |
| 123B | Objective 3 - SC Recommendation [62] | Original Recommendation<br>Key aspects (e.g., changes in peat properties, changes in seasonality of flows) of the system need to be considered<br><br>FHEC Response<br>The assessment is focused on the metrics that have been selected in association with the selected indicators and the primary effects related to the water management design features. Other key aspects would be part of future modelling activities (such as during future work on the water management design features) as well as included within the monitoring associated with the OP.<br><br>**PARTIALLY ADDRESSED**<br>Freezing, for instance. Incorporation in next version of HGS model is mentioned. | **TAG-Hydrology** | See response to item #1B. |

| Table 2: SC and TAG Comments on the Revised MLWC Operational Plan (OP) (Nov 29, 2021) | | | | |
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| 124B | Objective 3 - SC Recommendation [97] | Original Recommendation<br>The introduction to lakes is very simplistic even for lakes in general. This indicates the writer has a lack of understanding of the variability in lake processes and boreal plains lakes in general.<br><br>FHEC Response<br>Objective 1 provides specific information on McClelland Lake, while the information in Objective 3 is intended to be more general.<br><br>**NOT ADDRESSED**<br>The comment was not about McClelland Lake specifically. The comment was aimed at the very simplistic description of lake processes. (Section 4.3.2.4). There have been some improvements in the recent version, but descriptions of Chl-a are tied directly to nutrient dynamics, indicating these could be monitored. | **TAG-Hydrology** | See response to item #1B. |
| 125B | Objective 3 - SC Recommendation [98] | Original Recommendation<br>The variability in water depth and area of sediment exposed over a season can be significant. This is an important consideration in short-term and long-term sediment storage and surface water nutrient concentrations, trophic interaction, and the like. But this is not considered.<br><br>FHEC Response<br>Fort Hills recognizes that the suggestion is valid; however, would like to have further discussions with the TAG the SC prior to additional work being completed on this item, particularly as it pertains to reference sites. FHEC hopes to be able to table it at the workshops planned for 2022.<br><br>**NOT ADRESSED**<br>Requires Discussion | **TAG-Hydrology** | See response to item #1B. |
| 126B | Objective 3 - SC Recommendation [99] | Original Recommendation<br>General terms such as "an ion" are not acceptable. Be specific and demonstrate an understanding of the processes acting within the system.<br><br>FHEC Response<br>Fort Hills believes the information provided is sufficient.<br><br>**NOT ADRESSED**<br>Page 4-31, last paragraph. Please edit to provide clarity on what ions are being considered. | **TAG-Hydrology** | See response to item #1B. |
| 127B | Objective 3 - SC Recommendation [102] | Original Recommendation<br>A simple, linear, positive feedback between climate drying and vegetation succession is assumed throughout. The multitude of positive, and importantly negative feedbacks between water balance – storage relationships, hydroperiod, peat properties and vegetation are not considered<br><br>Further evaluation of feedback mechanisms is required. A simple, linear, positive feedback between climate drying and vegetation succession is assumed throughout. The multitude of positive, and importantly negative feedbacks between water balance – storage relationships, hydroperiod, peat properties and vegetation are not considered<br><br>Further evaluation of feedback mechanisms is required.<br><br>FHEC Response<br>Fort Hills recognizes that the suggestion is valid; however, would like to have further discussions with the TAG the SC prior to additional work being completed on this item, particularly as it pertains to reference sites. FHEC hopes to be able to table it at the workshops planned for 2022.<br><br>**NOT ADRESSED**<br>Requires Discussion | **TAG-Hydrology** | See response to item #1B. |
| 128B | Objective 3 - SC Recommendation [120] | **NOT ADDRESSED**<br>Page 4-32: This is similar to other studies that also found wetter portions of rich fens were dominated by Scorpidium scorpioides (e.g., Slack et al. 1980), indicating that these preferences have not changed over time. I still find this sentence irrelevant - why would the preference of one species in natural settings change over 40 (that is by comparing Slack 1980 with Vitt report 2020)? Change the following sentence as extracted from text: An ecological series along a moisture gradient in a fen with higher Sphagnum prominence than the patterned portion of the MLWC includes Sphagnum angustifolium -> S. magellanicum -> S. fuscum -> Aulacomnium palustre -> Tomentypnum falcifolium as conditions go from relatively wet to relatively dry (Vitt et al. 1975); these species all occur within the non-patterned portion of the MLWC with >10% cover - To this in italics: Within the non-patterned portion of the MLWC with higher Sphagnum prominence (>10% cover), one can find similar ecological series along a moisture gradient as previously reported by Vitt et al. 1975: Sphagnum angustifolium -> S. magellanicum -> S. fuscum -> Aulacomnium palustre -> Tomentypnum falcifolium as conditions go from relatively wet to relatively dry. It reads much better that way in term of giving context. | **TAG-Vegetation** | Thank you, this change has been made in the document. |

**Complied Comments and Recommendations by the SC and TAG on Revised Operational Plan provided to Suncor (Nov 30, 2021)**

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| 129B | Objective 3 - SC Recommendation [121] | Original Recommendation<br>Use the recent advances in the science of climate change potential impacts on peatlands to formulate the MLWC risk assessment to peat accumulation<br><br>FHEC Response<br>Recent climate model results were added.<br><br>PARTIALLY ADDRESSED<br>Ok but it is not clear what means 1) this part of the following sentence: resulting in bryophyte desiccation, and thus, increased organic matter accompanied by changes in plant community composition. How can you increased organic matter (per se) in a peatland? Some descriptive terms are missing. And 2) furthermore information (sentence) could be added after (Munir et al. 2015): Another aspect to be aware of is that mining in the MLWC watershed could maybe not affect the average water table level but could results in greater yearly to weekly water table fluctuations. Greater water table fluctuations are know to increase peat decomposition (Kim et al. 2021). Here is the complete reference to add: KIM, Jinhyun, ROCHEFORT, Line, HUGRON, Sandrine, et al. Water table fluctuation in peatlands facilitates fungal proliferation, impedes Sphagnum growth and accelerates decomposition. Frontiers Earth Science, 2021, vol. 8, p. 579329. | **TAG-Vegetation** | The text has been clarified to address the first recommendation. Kim et al. 2021 was cited to address the second recommendation. |
| 130B | Objective 3 - SC Recommendation [123] | Original Recommendation<br>As recommended above for WT limits – do a literature review more specifically around the most abundant and sentinel species as identified by Vitt and House (2020) and report the findings in a table format and discuss how it can inform better the response of a potential change in water chemistry.<br><br>FHEC Response<br>Did not include a table as there was limited literature on exact limits for the species found in the patterned fen. Even Vitt and House (2020) discussed ranges in the zones where the species were found, but not ranges that species can withstand. Thus, a table may have been misleading if it was based on where species were found, not their limits. Other papers also discuss species in terms of a gradient of what was found at those sites, but that also doesn't provide a limit of tolerance. Additionally, European fen information was left in as some information can still be used for this (e.g., if a species thrived/did not thrive when exposed to certain water quality conditions or water levels).<br><br>**PARTIALLY ADDRESSED:** Still even with uncertainties - which can be indicated in a table - a table format would greatly help to follow and decode the lengthy paragraphs about potential vegetation response - an approach should be work upon a next progress report - it will help with interpretation later. | **TAG-Vegetation** | Two tables have been added:<br><br>(i) bryophyte moisture preferences and response to water table fluctuations; and<br>(ii) surface water quality preferences for plant species with high fidelity to ecohydrology zones 1 and 2 and response to altered water quality regime.<br><br>These tables may be developed further in the future. |
| 131B | Objective 3 - SC Recommendation [25, 26, 28 and 111] | **NOT ADDRESSED**: We asked that Objective 3 ensure that baseline information informed through IK in Objective 1 be integrated through Objective 3 as well as the conceptual and numerical models and in keeping with the 2018 proposal, namely:<br>The following excerpt is from the 2018 Operational Plan Proposal, page 34 (emphasis added):<br>*2.3.1 Integration of Traditional Knowledge*<br>*The following information has been added to the Proposal in response to comments from the Sustainability Committee asking how Traditional Knowledge can be used to inform model development.*<br>*The baseline information (including Traditional Knowledge)* ***collected as part of Objective 1 will be used to develop and calibrate the surface water and groundwater model****.*<br>*Examples of how Traditional Knowledge can be used to inform the model development includes knowledge of the connectivity of McClelland Lake with smaller lakes in the vicinity, natural variability of water levels in the lake, information on lake ice dynamics, lake inflows, and lake outflows. These types of Traditional Knowledge will be important to inform our understanding of surface and groundwater systems and together used to better formulate the conceptual model and corroborate model outputs.*<br>The integration of IK throughout this objective will need to be validated to ensure it was applied in the right context to inform the Plan as well as to be consistent with the IK shared in Objective 1. Notably, we recommend that pages 17 to 23 of the original draft Conceptual Model Appendix serve as an example for the rest of the Appendix, as well as the rest of the plan.<br>As suggested in the response to recommendation 28, model refinement based on IK observational data can be a workplan moving forward. We recommend that this be added as a future commitment in the OP. | **FCM_FMMN_FMFN** | A commitment has been captured in the Introduction to conduct water modelling workshops – for further refinement of conceptual, water quality and water quantity models. It is hoped that MLWC AAG and others can assist in incorporating IK into the MLWC models in 2022/23. |
| 132B | Objective 3 - SC Recommendation [25] | **NOT ADDRESSED**: We asked that given Objective 1 is still under revision to better integrate IK it will be important to be able to link the Objective 1 baseline information with Objective 3 with respect to baseline and other IK that has been shared and documented. See also comments and recommendations with respect to the Conceptual Model Appendix. *See detailed comments (2018 Operational plan P. 34)<br><br>Page 22 of Appendix F last paragraph "Indigenous Knowledge holders have also noted that MLWC water levels have historically fluctuated and attribute these fluctuations as being *caused by seasonal weather and natural cycles that result in ice jams, frost heave, high water and periodic flooding*, and that these fluctuations, *help cleanse the land and waters in the MLWC replacing stagnant waters, and scrubbing out riverbanks and creek beds*. - need to include that beaver plays an important role in regulating levels, and members feel that beavers will be impacted as per IK shared in IEG baseline pg 26 (IEG 2021). In relation to the IK statement made above, Suncor needs to: 1) maintain the representative number of authorship and individuality of the IK statements being made. IK shared by Knowledge Holders is additive. This statement was made by one knowledge holder therefore its attribution to multiple people is not accurate; and 2) it is about the NRV in general of natural cycles of *seasonal* weather and how its | **FCM_FMMN_FMFN** | Information has been added about beavers as per Recommendations below.<br>1) added community who shared knowledge<br>2) Added content suggested about industrial projects.<br>3) Suggest this is something we can explore during upcoming meetings related to IK integration into water models. Currently, western science does not support this finding at MLWC given the setting. |

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| | | effects are integral to the function and health of the MLWC. However, Suncor seems to be conflating the general intent of this comment with what other Knowledge Holders have observed regarding specific water levels being low in the last several decades, as being one in the same and a normal occurrence within overall historical fluctuations. This lower water level observed since at least the 90s, discussed in Objective 1 and 3 is discussed by Knowledge Holders.<br>Appendix F Section 5 – Discusses IK and the fluctuation of water levels. The Conceptual model implies that this is a natural change. However, members are very clear that this is as a result from effects of Industrial development. "Members expressed that water levels have gone down in the McClelland Lake area since nearby industrial projects became active (IEG 2021)"; and 3) Has Suncor examined potential similar effects to water levels in the reference lakes during these times, and where is that data?<br>Appendix F Section 5 – Some quotes are provided to inform the Conceptual model, however, there was a lot of information that was not added. For example, information about vegetation and its relation to water levels, as well as water odours. For example, "I found out it [McClelland Lake] was low. It was not as—not where the water used to be. You can tell by the land where the water used to be." Barb noted cat tails where they weren't before. "For one thing, how far the cattails—I can't remember cattails in that area. But I noticed that there was a lot of cattails. There was, like—just like a little channel where it never used to be a little channel. Used to be, like, water was right up to the—to pretty well the main ground where you could just step from the main ground into your boat." (See MLWC-IK related to conceptual water balance (April 2021), IEG (2021)). This information is important to fully articulate the how input from members has been used to inform the Conceptual model.<br><br>Please reconcile language used in Objective 1, 2.5.5.2.3 Water Level Data, Page 2-79 and 3 regarding times of dry and wet periods. In Objective 1, 2.5.5.2.3 Water Level Data, Page 2-79 Suncor captures clearly what several ITK holders have described in the McClelland Lake area, "Based on simulated water data for the past 75 years for McClelland Lake (Figure 2.5-28(a), the water levels have varied within a meter and with patterns described by ITK holders (ie, lower in the 50s, higher in the 60s to 90s, and lower since). However, in Objective 3 Appendix F Conceptual Model these conditions seem to shift, saying the area is getting drier from at least the 70s (pg 21, and 235), contrary to the wetter period from 70's described in Objective 1. | | |
| 133B | Objective 3 - SC Recommendation [26] | **NOT ADDRESSED**: With respect to the Conceptual Model Appendix: pages 17 – 23 is well done and should set the example for the rest of this appendix (e.g. geology, topography, etc.). The integration of IK and its use in informing the discussion on pages 17-23 should serve as a model for the entirety of the plan with respect to integration and demonstration of how IK informed the content. The Conceptual Model should be informed by all the IK that was shared by IK holders. Please see Specific Recommendations on Appendix F 2021 MLWC Conceptual Model Report which details where IK has not been included to inform the discussion toward integration and demonstration of how IK informs the Conceptual Model. | **FCM_FMMN_FMFN** | Acknowledged. Specific recommendations on Appendix F have been addressed. |
| 134B | Objective 3 - SC Recommendation [28] | **NOT ADDRESSED**: With respect to the HGS Model Appendix: as stated in the Plain Language Summary, IK still needs to be integrated into the content of the appendix. It is recommended, as noted above, that the example provided on pages 17 – 23 be used as a guide. Suncor states most of the direct IK integration is found in the conceptual model appendix and this conceptual understanding is the basis for the HGS Model. However, 1) it is not clear how the IK in the conceptual model influenced dataset selection, at certain times of the year for example, ie, how the spring freshet influences the hydrology of the system; also, 2) the Conceptual Model should be informed by all the IK that was shared by IK holders. Please see Specific Recommendations on Appendix F 2021 MLWC Conceptual Model Report which details where IK has not been adequately included to inform the discussion toward integration and demonstration of how IK informs the Conceptual Model. | **FCM_FMMN_FMFN** | FHEC respectfully disagrees that IK needs to be integrated into the HGS model appendix. Efforts have been made to integrate IK as much as possible into the conceptual model and plain language summary appendices that go hand-in-hand with the HGS model. FHEC has committed to updating the models and hopes the AAG can assist in incorporating IK (both observational data and model validation). IK was not used to guide choosing datasets used in the HGS model. **All** available and relevant hydrological and geological and vegetative data was used in the construction of the HGS model (HGS data types used from site to site are quite similar but the details vary greatly). MLWC IK was used to help interpret these data to place them in their proper context within the MLWC setting |
| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.3 New Recommendations** | | | | |
| | | **Comments on Objective 3: Water Quality Report and Appendix are expected December 03, 2021.**<br>- Conceptual Water quality modelling portion of the report provided November 23, 2021<br>- Water Quality Report and Appendix provided November 26, 2021 | | |
| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.4 Recommendations on Appendix F** | | | | |
| 135B | General Comment | References for IK was either not there or incomplete. No reference to the time or location or context to which the IK was shared. This is important to aid in understanding how the IK is related to the topic and very important to its 'integration'. Input from members needs to be brought together with the context of how and why that information is shared. Understanding that the Conceptual Model will undergo future iterations to further understand and characterize the system, we recommend that in the collection of IK, whether through the ESCT program or in topic-specific workshops and meetings, that the context to the information shared is more robustly documented and provided to reflect the scope of the knowledge shared/experienced. Please also provide references for the shared IK in the plan as well as for any future work where IK is documented. | **FCM_FMMN_FMFN** | Accepted and revised. |
| 136B | Page 25 – 41 6. section 1.2.2: Factor 02: Bedrock Geology | The conceptual model does provide a brief sentence about observations of limestone outcrops, however, more information about the geology is provided and should be included to inform the Conceptual model. See table 2 in Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance & Conceptual Model. It is suggested to add the following additional text: "IK holders provided input on subsurface geology along the Firebag River valley and noted that it continues deep beneath McClelland Lake and fen, 'I know there's a lot of limestone through there. Now the water, course, is sitting on this limestone. It doesn't fall through the limestone, maybe some places. And there's clay in there too, and water don't go through clay..... [underneath the fen] There's water. Because I know the limestone from there runs right to Fort McMurray, past Fort McMurray. The | **FCM_FMMN_FMFN** | Accepted and revised. |

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| | | furthest north I've seen it was at the Firebag, …It could be further north yet too, but I know the Firebag. So the water then, it's sitting... Okay, it's limestone, tar sand, water, and the floating muskeg on top'." | | |
| 137B | Page 43-44: | There is no reference to IK that was shared about soil particularly around observations around soil. We recommend that the following text is added to describe soils from the knowledge shared and documents in the Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance & Conceptual Model: "Members have shared IK around sandy soils types that influence runoff or infiltration. For example:<br>*Yeah, because it's right in the middle of the sand hills, right? And all through here, even here where we're sitting right here [pothole lake by Victor Amiot's cabin], this is all sand hills right through. And for miles this way, right up to Firebag, I think there's sand hills*. (Barb Faichney in HEG 2017).<br>"*It's nice to kill Moose over here (north/east side) cause it's sandy*" (Glen Faichney in HEG 2017).<br>*And, with respect to the bottom of McClelland Lake, "...But I know from boating around, the bottom is like quicksand. Maybe it's because it just sits there for so long, turn everything in to quicksand, that part is dangerous too. We would get in trouble if went too far in to the lake*." (Barb Faichney March 3, 2021)<br>It is also recommended that additional IK with respect to soils is collected as part of the ESCT Program to further inform the model and characterization of the system going forward. | **FCM_FMMN_FMFN** | Accepted and revised. |
| 138B | Page 41-42 | There is no reference to IK that was shared about surficial geology particularly around observations around clay, sand, silt, muskeg. We recommend that the following text be added in this section: "Members has shared IK around clay, sand, and muskeg including *At McClelland Lake we would cross, but that would be December and January and more on the north side – from around where the boat launch is now, across on the higher country – pretty well straight across there*. (Barb Hermanson March 03, 2021).<br>And, with respect to limestone clay: *I know there's a lot of limestone through there. Now the water, course, is sitting on this limestone. It doesn't fall through the limestone, maybe some places. And there's clay in there too, and water don't go through clay..... What about the fen? What's underneath the fen? There's water. There's tar sand under the fen and then the limestone? Because I know the limestone from there runs right to Fort McMurray, past Fort McMurray. The furthest north I've seen it was at the Firebag, and I could be wrong. It could be further north yet too, but I know the Firebag. So the water then, it's sitting... Okay, it's limestone, tar sand, water, and the floating muskeg on top. That's the way I'm picturing it*. (Barb Hermansen March 03, 2021)".<br>It is also recommended that additional IK with respect to surficial geology is collected as part of the ESCT Program to further inform the model and characterization of the system going forward. | **FCM_FMMN_FMFN** | Accepted and revised. |
| 139B | Page 44- 45 | There is no reference to IK that was shared about topography. We recommend that the following text be included under this section: "IK has been provided with respect to topographic and landscape changes including traditional trails and access routes. Increasing anthropogenic linear disturbances and physical barriers. This is important not only for characterizing the pre-development and pre-mining conditions as well as for closure and reclamation planning.<br>*FCM Knowledge Holders have said cutlines were made in the early 1970s, following and significantly widening, the old dog team trails around areas of McClelland Lake that were made before mining in the region (FCMA Knowledge Holder, [July 2019] Interviews; IEG 2021:6,10).*<br>*With the increased competition for resources and opening of roads to allow access by outsiders, habitation sites have been damaged through vandalism, theft, garbage dumping, and illicit activities* (IEG, 2021).<br>*Participants have already observed changes to transportation network within the McClelland Lake Wetland Complex and surrounding area. Members are concerned about their continued ability to travel within the area, as they have already felt the effects of restricted access to traditional routes due to gates and fences. They have witnessed the clearing of new paths and roads that overrun older routes or which are now confusing to navigate, increased disturbances, and increased access for recreational users and/or non-Indigenous hunters. Currently, members are still able to travel within the fen and on McClelland Lake, but often use trails via the north end of the watershed to access the fen and the lake. This is because industry has already created disturbances in the south of the watershed, preventing them from using the area the way they would like*. (IEG, 2021).<br>IK holders have also said that changes to the topography will also have impacts on how sound travels and visual disturbances. (IEG, 2021)<br>In addition to the above addition in the plan, we also recommend that topographic information is collected as part of the ESCT program. | **FCM_FMMN_FMFN** | Accepted and revised. |
| 140B | Page 45-48 | There is no reference to IK that was shared about land cover. Appendix F indicates that vegetative cover has influence on the hydrological functionality within the MLWC watershed. With respect to IK, please include the following text: Members have expressed the linkage of water levels and quality to vegetation. Members expressed that water levels are critical for understanding the health of the McClelland Lake Wetland Complex and surrounding area. Changes in water quantity can include changes to the lake and stream levels, vegetation, and/or flow connectivity within and surrounding the fen (IEG 2021).<br>*There are more willows growing where it is drier on the trapline. Sphagnum moss is important for water retention on the land through warmer drier months and a natural fire retardant. "You know, water doesn't do any good unless there's something there to bind it together to keep it moist during the dry periods, you know? ..... Well, you let it dry out, it's dead. That's it. So that moss gives it a buffer zone. Not a buffer zone, but a slow release of moisture over dry periods. So you drain the stuff out, it dies. Then you have one—peat moss, it's—when it's dry, it's a bad fire hazard, but when it's wet, keep it wet, you got a natural fire barrier*." (FCMA Knowledge Holder, March 3, 2021)<br>Pre-mining Baseline: *On another extensive visit to the area in 2009, Barb noted the condition of the balsam trees on the Firebag River bank. This was used as a place by Barb and her mother for harvesting balsam bark medicine. "At that time the balsam trees weren't big, as I could remember. Now they were—they're growing, they're big ones. But the bark looks dry. Don't look like the way a balsam bark should look. Balsam bark is kind of smooth and then there's bumps, pebbles where the pitch is in, eh. I looked at it and I said, well, the roots reach the river, so they can't be dry, like with no water.* | **FCM_FMMN_FMFN** | Accepted and revised. |

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| | | *But what was in the water that made the tree like that, is what I thought. Those trees didn't look right. They just looked like they were—I didn't take the bark because it didn't look healthy. Who knows where I got to go now for balsam bark."*<br>*Barb Hermansen returned to the trapline area, currently owned by Victor Amiot, several times for periods of time in the 1990s. "I found out it [McClelland Lake] was low. It was not as—not where the water used to be. You can tell by the land where the water used to be." Barb noted cat tails where they weren't before. "For one thing, how far the cattails—I can't remember cattails in that area. But I noticed that there was a lot of cattails. There was, like—just like a little channel where it never used to be a little channel. Used to be, like, water was right up to the—to pretty well the main ground where you could just step from the main ground into your boat."*<br>*On another extensive visit to the area in 2009, Barb noted the condition of the balsam trees on the Firebag River bank. This was used as a place by Barb and her mother for harvesting balsam bark medicine. "At that time the balsam trees weren't big, as I could remember. Now they were—they're growing, they're big ones. But the bark looks dry. Don't look like the way a balsam bark should look. Balsam bark is kind of smooth and then there's bumps, pebbles where the pitch is in, eh. I looked at it and I said, well, the roots reach the river, so they can't be dry, like with no water. But what was in the water that made the tree like that, is what I thought. Those trees didn't look right. They just looked like they were—I didn't take the bark because it didn't look healthy. Who knows where I got to go now for balsam bark."* (FCMA IK Holder, March 3, 2021).<br>Harebell (Blue-eyed grass?) is an important medicinal plant and a good indicator found in high ground/sandy soils. Indigenous people carefully harvest the root of this plant - the length of the root is an indicator of how low the water table is. (IK Holders, March 3, 2021) | | |
| 141B | Page 72-127 13-19, 21. Section 1.3.2, 3, 4, 5, 6, 7, 8,10,12,14,15,16,17,19: | There is no reference to IK that has been shared across the indicated sections. Understanding that the Conceptual Model will undergo future iterations to further understand and characterize the system, we recommend that additional IK is collected through either the ESCT program or in topic-specific workshops and meetings. | **FCM_FMMN_FMFN** | A table of commitments for future work with the SC has been included in Table 1.7-1 in the Introduction. Included in this table is FHEC's intention to have MLWC AAG and others can assist in incorporating IK into the MLWC HGS models in 2022/23 . |
| 142B | Page 128-135. Section 1.3.9: | HRA 09: McClelland Lake: The Conceptual Model states, "Indigenous Knowledge holders of the area have observed that discharge from the lake into McClelland Creek can be quite different year-to-year, consistent with available recorded data. Water can also discharge from the lake as outgoing groundwater discharge into the muskeg deposits downstream of the lake". We recommend that the following text be added for additional clarity for this section: Members feel within the year-to-year variation, since the 1960s, the water levels have lowered, "McClelland Creek, it varies, one year it will be dry and one year there's abundance of water. And years ago, there had seemed to be more water in that creek than the later years. And then when I say more water, probably I would say in the '50s, there was a lot more water, but then in the '60s, sometimes you can just walk across there with just your rubber boots. Sometimes, you've got to walk across, just about up to your neck because I've done that" (FCMA Knowledge Holder, [March 3, 2021] TK Integration in Conceptual Water Balance April 12 2021). Water at the outflow also depended on beaver activity, "But I guess maybe it varies again, because it depends on the beavers' _dams on the creek," (FCMA Knowledge Holder, [March 3, 2021] TK Integration in Conceptual Water Balance April 12 2021). It is recommended that the following IK be included to inform the conceptual framework. Recommended text would include: "McClelland Creek, it varies, one year it will be dry and one year there's abundance of water. And years ago, there had seemed to be more water in that creek than the later years. And then when I say more water, probably I would say in the '50s, there was a lot more water, but then in the '60s, sometimes you can just walk across there with just your rubber boots. Sometimes, you've got to walk across, just about up to your neck because I've done that" (FCMA Knowledge Holder, [March 3, 2021] TK Integration in Conceptual Water Balance April 12 2021). Water at the outflow also depended on beaver activity, "But I guess maybe it varies again, because it depends on the beavers' _dams on the creek," (FCMA Knowledge Holder, [March 3, 2021] TK Integration in Conceptual Water Balance April 12 2021)." IK holders have expressed that there used to be a beaver lodge at the landing and now that beaver lodge is gone. Knowledge holders don't know where the beaver went.<br><br>The quote provided in the Conceptual framework p129 does not reflect an actual quote. There is no reference as noted on an earlier comment, "*Indigenous Knowledge holders have noted that the McClelland Creek has less flow than what is used to be. They were there for a field visit in 2019. Land users believes it is due to the lower lake levels and beaver are not on the creek as there is no water. McClelland Creek runs into Moose Creek. They used to have to cross the creek on a beaver dam, but now it's dry*." Please restructure as paraphrased text. | **FCM_FMMN_FMFN** | Paraphrased quote deleted. Accepted and revised. |
| 143B | Page 144- 152, 22. Section 1.3.11 | HRA 11: South Wetland – to McClelland Lake: This section does reference some IK that is to inform the Conceptual model reflecting on the muskeg deposits. These references are provided without any reference of when, where the information was shared. Further, it is recommended that the IK provided include all the IK shared about this topic. Please include the following text to this section. "With respect to muskeg deposits, IK has provided understanding of how water moves through the wetland complex and the relationship between the wetland and hanging muskeg. "*It's a muskeg, but under that muskeg, the muskeg goes on clayish type layer, but under it there's water. The water travels all under there... traveling under and through the muskeg. And it's very dangerous to walk through. If you fall in, nobody ain't never going to find you, you're gone. So it's a very dangerous game to play, to go out there.... It's floating but it's connected. It's connected with all the rest of the pieces around the fen, but it's still got water under it. Remember where my mom's cabin was? Okay, my mom's cabin... If you stayed on the left side of the road going down there, you're fine. But if you went to the right side, the right side is where the hanging muskeg starts. If you were to get stuck there, you dig yourself out about four feet and then you hit straight water. And it's like that all over (AAG Meeting Notes Sept 13).* | **FCM_FMMN_FMFN** | Accepted and revised. |
| 144B | Page 161- 168. 24. Section 1.3.13 | HRA 13: Unnamed Lake: This section reports on Baby McClelland Lake as unnamed. Please relabel to Baby McClelland Lake. It is recommended that all names, those registered and Indigenous/local be used to communicate lake details after confirmation by community members. This should be updated across the Operational plan as appropriate and respectful.<br>This section also outlines water flows to and from Baby McClelland Lake. IK holders have articulated knowledge about water flows, ice formation, and connectivity. It is recommended that the following text is added "IK holders indicated that some of the area around Baby Lake that does not fully | **FCM_FMMN_FMFN** | Unnamed Lake labels will not be revised in the relevant figures for the OP at this time but it is recognized that this lake is referred to as Baby Lake or Baby McClelland Lake by Community members and also internally by Fort Hills Project personnel. Fort Hills also (now) recognizes that calling this feature Unnamed Lake can be viewed as disrespectful by Community |

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| | | freeze" (March 3, 2021; Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance & Conceptual Model). "[*the area south/east of McClelland Lake, including Baby Lake] my dad, my mom, they would never let us walk alone, we had to carry a stick, because of all the hanging* **muskeg** *in there. It hangs - about 4 feet of ground, then straight water underneath. then it was that thick clay. .... but there's lots of other places like that.... My grandfather used to say, if we sunk in that muskeg, we weren't coming back up, which I think it's true. Because when I went fire fighting after I grew up, you can see after where the muskeg gets burned, that its deep. Because ,we were on fire watch we had to put out smoldering ashes and stuff. Yeah. And there it was, you could see that in some places, it [muskeg] was like about eight feet deep... Well, I guess there is some danger in not listening to your mum and dad anyways (March 3, 2021 Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance & Conceptual Model). We've always been told that Baby Lake is connected through the stream and wetlands, but it is also connected to McClelland Lake by groundwater* (March 3, 2021; Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance & Conceptual Model). | | members. As noted previously in this response document, conceptualization of the MLWC will continue beyond the OP submission. As part of this continuing process, the name of the lake will be changed back to Baby McClelland Lake. FHEC did not mean to be disrespectful, and this oversight will be corrected in future and ongoing work.<br><br>Text added as recommended. |
| 145B | Page 201-209, 29. Section 1.3.18 | HRA 18: Fort Hills East: this section references IK about the deep muskeg and safety concerns. It's unclear of all the IK shared about this topic is incorporated into this section. It is recommended that the following text be added: A Fort McKay knowledge holder (FMFN, March 3, 2021) shared information about the relationship between deep muskeg in the area and wildfire "[the area south/east of McClelland Lake, including Baby Lake] my dad, my mom, they would never let us walk alone, we had to carry a stick, because of all the hanging muskeg in there. It hangs - about 4 feet of ground, then straight water underneath. then it was that thick clay. .... but there's lots of other places like that.... My grandfather used to say, if we sunk in that muskeg, we weren't coming back up, which I think it's true. Because when I went firefighting after I grew up, you can see after where the muskeg gets burned, that its deep. Because, we were on fire watch we had to put out smoldering ashes and stuff. Yeah. And there it was, you could see that in some places, it [muskeg] was like about eight feet deep... Well, I guess there is some danger in not listening to your mum and dad anyways" (March 3, 2021; Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance & Conceptual Model). | **FCM_FMMN_FMFN** | Apologies but there is no muskeg in HRA 18 nor reference to deep muskeg in the cited section. FHEC is not sure which HRA this comment is actually referring to. |
| 146B | Page 227- 234, 32. Section 1.3.21 | HRA 21: McClelland Lake Outlet: This section describes the variation of McClelland Lake and McClelland Creek outflow. IK holders have reflected on this variation in the context that over the years since before the 50s water volume was greater than in the 60s to now. It's recommended that this be represented in the Conceptual Model by reporting on IK shared. We recommend that the following be added to this description "McClelland Creek, it varies, one year it will be dry and one year there's abundance of water. And years ago, there had seemed to be more water in that creek than the later years. And then when I say more water, probably I would say in the '50s, there was a lot more water, but then in the '60s, sometimes you can just walk across there with just your rubber boots. Sometimes, you've got to walk across, just about up to your neck because I've done that." | **FCM_FMMN_FMFN** | Accepted and revised. |
| 147B | Page 236, 33. Section 1.4 | Synthesis: The 2021 MLWC Conceptual Model: The third paragraph is a quote provided with no context or reference. This quote appears to be connected to spiritual aspects of the Lake and region and doesn't seem appropriate here. It is recommended that this quote be deleted. IK is also provided related to fluctuations in water levels. Please add the following text: *IK holders also identified that within these fluctuations, the levels are generally getting lower. It is recommended that this IK should be added to inform all relevant aspects of the "Pre-development, water levels were high enough that members of the Faichney family regularly were able to travel by water to preferred hunting sites or other preferred areas within the McClelland Lake Wetland Complex and surrounding area. Since the 1960s, participants have observed changes to water quantity and quality within the McClelland Lake Wetland Complex and surrounding area. Members expressed that water levels have gone down in the McClelland Lake area since nearby industrial projects became active.*" | **FCM_FMMN_FMFN** | **Accepted and added.** |
| **4.0 Objective 3: Assess Potential Impacts of Mine Development – 4.5 Recommendations on Appendix G - Plain Language Report** | | | | |
| | | NO NEW COMMENTS | | |
| **5.0 Objective 4: Design and Contingency Mitigation – 5.1 General Comments** | | | | |
| | | NO NEW COMMENTS | | |
| **5.0 Objective 4: Design and Contingency Mitigation – 5.2 Adequacy of Response to Initial Recommendations** | | | | |
| 148B | Objective 4 - SC Recommendation [3] | Original Recommendation<br>The title of the Objective is: "Establish Necessary Design Features and Contingency Mitigation Measures". The section contains very little information on alternatives for Contingency Mitigation Measures; Section 5.5 is three short paragraphs. The section does contain appreciable information on the (necessary) Design Features, at least from a conceptual and timing perspective. Overall, these seem suitable (although TAG does offer some preliminary comments below). But, how is it operated? How are the necessary flow rates (magnitudes and timing) determined? How frequently are they adjusted? How are snowmelt and storm events accounted for? How are the appropriate volumes determined? And where are they applied? How does operation relate to monitoring and modelling? Objective 6 indicates feedback from monitoring (and triggers) will only occur every quarter. Is that sufficient? When is the model updated? How does operation relate to observations from Reference Ecosystems?<br><br>In summary, this section of the Operational Plan does not provide sufficient information on how the system will actually be operated.<br><br>***Recommendation:***<br>Provide descriptions of how the system will be operated, including linkages to modelling, monitoring and variations in climatic inputs.<br><br>The (conceptual) design figures are informative and help with understanding the design; however, the captions provide too little information.<br><br>FHEC Response | **TAG Hydrology** | See response to item #1B. |

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| | | See Section 5.4.5, Operating Philosophy, has been added to Objective 4<br><br>**PARTIALLY ADDRESSED:** The description is improved. The overall concept is thin at this stage, but a commitment to workshops is appropriate. Work in progress | | |
| 149B | Objective 4 - SC Recommendation [14] | Original Recommendation<br>Section 5.2 (Fig 5.2-1 to 4): Volumes are provided, these could also be reported as depth (mm) on the other axis. This helps greatly in interpretation of the range and confirms the region/area of concern.<br><br>Are these volumes to be added to only the Fen proper or the fen and Lake? It appears that only the fen is of concern; the lake should also be considered.<br><br>FHEC Response<br>- The volumetric information cannot be directly translated to fen water depth in mm in the same figures, because the fen water level has a complex non-linear relationship to the water inflow to the fen. The effects on the fen and McClelland Lake water levels without the proposed water resupply mitigation are described in Section 4.3.2.1.3 under Objective 3 (e.g., the McClelland Lake water level could be reduced by up to 1 m without the proposed water resupply operation).<br>- Water resupply to the system will occur as described in detail in Section 5.4.2.3: During construction of the working platform (short-term), distribution at the outlet of each pumping system would be a spray to not cause erosion; deliver the water from the water storage pond to the fen after platform constructed (long-term). Water supply is applied to the fen. However, since the inflow to the lake is mainly through the fen and the effect will indirectly help with the lake water level. Reference to McClelland Lake is added in the text to make it clear for addressing the second comment.<br><br>**NOT ADDRESSED:** The request has been misinterpreted. For each volumetric flowrate, provide normalized flux by dividing the volumetric rate by the associated area. This corresponds to standard practise for hydrologic budgets. | **TAG Hydrology** | See response to item #1B. |
| 150B | Objective 4 - SC Recommendation [24] | Original Recommendation<br>Section 5.3. Figure 5.3-2 to -4, covers 2025 to 2029:<br>· Industrial runoff is used as a source water pond, then fed into the fen. It is not clear how water quality can be maintained by just using a pond.<br>· The working platform for the cut off wall dissects the wetland in 2029, and it appears that the infrastructure is not in place to compensate for blockage of flow from above the platform. How will water flow in the fen below the platform be maintained until the pipes are set up in 2034 (Figure 5.3-5)? If no infrastructure, then what assumptions are made about the fen maintaining water levels?<br><br>FHEC Response<br>Water quality of muskeg drainage and overburden dewatering water is discussed in Table 5.2-1. In addition, Section 5.2.3 includes the following statement: "The FHEC plans to continue its evaluation of the above-mentioned water resupply sources, including confirmation of any water treatment requirements, as well as potential use of FHUC Quaternary aquifer water particularly during the initial water resupply period."<br>· Note 9 is added in Figure 5.3-4 regarding the water pumping and distribution system.<br><br>**PARTIALLY ADDRESSED**: "plans to continue its evaluation". More work is required. | **TAG-Hydrology** | See response to item #1B. |
| 151 | Objective 4 - SC Recommendation [25] | Original Recommendation<br>Figure 5.3-5 & 6: There is 8 years from building the platform and placing in the cut-off wall. The area of "muskeg" drained for the earlier years seems quite small.<br>· Is it assumed there will be no runoff generated from the remaining fen, and thus little water and flooding at the working platform? This may not be the case. Is there any provision for transferring, storing etc. the water that may be generated from the peatland (muskeg) above the working platform?<br><br>FHEC Response<br>The remaining fen upstream of the working platform will continue to generate runoff until it is mined out. Management of this runoff upstream of the working platform by pumping over the platform, is described in Section 5.4.2.3.<br><br>**PARTIALLY ADDRESSED:** "Flexibility in design and how to move water from above the working platform and delivered to the surface of the un-mined wetland has been discussed in concept. Final method to be considered | **TAG Hydrology** | See response to item #1B. |
| 152B | Objective 4 - SC Recommendation [26] | Original Recommendation<br>Figure 5.3-7. By 2037, using water from overburden dewatering – will this match the chemistry of water generated near the surface of the peat?<br>· FHUC – pump water from Aquifer 4. How will this impact the stream that drains into the McClelland Lake? What does the modelling indicate is the proportional source of the stream to the Lake maintenance? The x-section FIg 5.4-7 indicates that withdraw from Aquifer 4 may impact this inflow stream. | **TAG Hydrology** | See response to item #1B. |

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| | | FHEC Response<br>Work continues to determine the quality of the overburden water and its treatment requirements, if any. There is current uncertainty in how pumping AQ 4 will influence stream/spring flows. FHEC is planning a pumping test taking place in winter 2021/2022 to attempt to partially instrument the spring(s) to answer this exact question.<br><br>**PARTIALLY ADDRESSED:** Further work required | | |
| 153B | Objective 4 - SC Recommendation [29] | Original Recommendation<br>Conceptual Closure – Fig 5.3-9. The original source will be modified. Once Objective 3 is completed, the assumptions on runoff and connectivity may be further addressed. At present it appears that final plan will have reduced the contributing area to the top part of the fen that direct water into the non-mined portion<br>· The overall catchment area has been reduced, but importantly the proportion of peatland (contributing areas) to forest upland has been reduced. The soil texture and vegetation structure of the forest must be presented, and hopefully is pine on sandy soil rather than aspen. If not this configuration of the headwater catchment may produce too little runoff<br>· The patterned fen on the northwest. It us unclear if there will be enough water to maintain the pattern ecosystem. With an overburden dump, and water injection, will the "oligotrophic" groundwater source that generated this peatland ecosystem be maintained?<br>· The overburden dump. Runoff arrows are drawn as if this forested site will generate runoff. The assumptions are likely not to hold. It is likely to have low average runoff, and high flow infrequently (Devito et al. 2012). Such flow regimes are not conducing to fen development<br><br>FHEC Response<br>North External Dump (NED) will be reclaimed with predominantly jackpine on the plateau, and with jackpine, trembling aspen and birch on the slopes. Appropriate shrub species will be selected at the time of planting. The inclusion of NED in the closure watershed is important to maximize water supply to MLWC while still directing flow from End Pit Lakes away from the watershed. Keeping the NW section of the wall in place during closure helps to maintain the water levels within MRV. The area closest to NED sees the largest change in water levels. FHEC will continue to develop improvements to the closure plan and welcomes further input from TAG and the SC in doing so.<br><br>**PARTIALLY ADDRESSED:** Pending model updates and refinement of the OP and ensuing programs. | **TAG Hydrology** | See response to item #1B. |
| 154B | Objective 4 - SC Recommendation [37] | Original Recommendation<br>Toe ditch – in Fig 5.4-4. Seems to be located above the swamp ecohydrologic areas. Could provide an excellent experiment<br><br>FHEC Response<br>Fort Hills respectfully disagrees with this recommendation, the OP is a very long document and the use of acronyms will help significantly in reducing its length, and repetitiveness. That said, NED is the North External Dump and is in the list of acronyms<br><br>**ADEQUATELY ADDRESSED:** Reply does not apply to this comment. :)<br>For this comment a detailed reply was not expected; the observation was that there might be unexpected results from this implementation. FHELP might want to re-evaluate the design. | **TAG Hydrology** | See response to item #1B. |
| 155B | Objective 4 - SC Recommendation [28 and 31] | **PARTIALLY ADDRESSED**: We asked how IK informed the closure landscape and drainage plan and how, if at all, it resembles the pre-disturbance land and waterscape to return the area for traditional use and cultural practices. This will need to be validated to ensure it was applied in the right context to inform the Plan. Section 5.1.2 outlines at a high level how information from the SC, TAG and AAG were brought into the closure landscape plan and drainage system. It does this by outlining the series of meetings, and some specific discussions where input was provided. However, it remains unclear how IK informed the closure landscape and drainage plan. It is recommended that IK used to inform the closure landscape plan and drainage system be outlined in more detail. If this cannot be done in the plan at this time, we recommend that a commitment is made in the plan to work closely with the SC and AAG to collect IK specific to the closure reclamation and drainage plans for the MLWC. | **FCM_FMMN_FMFN** | A table of commitments for future work with the SC has been included in Table 1.7-1 in the Introduction. Included within this table is the commitment to SC work continuing through operation and reclamation, including ongoing SC engagement on the reclamation plans for the MLWC watershed. |
| 156B | Objective 4 - SC Recommendation [45] | **NOT ADDRESSED**: We asked about Section 5.5 (Contingency Measures) and were referred in the response to this recommendation to Section 5.2.1 that provides a general statement preceding the objective of the mitigations: *Traditional land users have guided that the continued supply of the appropriate water is imperative to sustain the non-mined portion of the fen.*<br>This statement along with Sections 5.5 to 5.7 will need to be validated to ensure that the IK shared has been applied appropriately. Based on our IK review, from a content perspective, our recommendation still stands: *This section should discuss the possibility of multiple functional gaps potentially occurring simultaneously; or for malfunctions to effect one or more of the proposed mitigations. This section should also include an adaptive management plan or framework to account for unanticipated systems challenges or failures.* Section 5.1.2 outlines at a high level how information from the SC, TAG and AAG informed this section. It does this by outlining the series of meetings, and some specific discussions where input was provided. We recommend that there is a commitment in the plan to work to further develop the ESCT program and through that program, together with other monitoring (e.g. primary indicators), collect information and data to inform not the contingency measures but also adaptive management within the response framework. | **FCM_FMMN_FMFN** | A table of commitments for future work with the SC has been included in Table 1.7-1 in the Introduction. Included within this table is the commitment to support further discussions and workshops on the ESCT program with the intention to initiate the program in 2022. |

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| **5.0 Objective 4: Design and Contingency Mitigation – 5.3 New Recommendations** | | | | |
| 157B | Page [5-3] | The first paragraph of 5.1.2 states "The Indigenous communities have shared with FHEC their understanding of these connections and the importance of the supply of appropriate water to the non-mined portion of the MLWC to maintain its functionality." It is unclear what 'supply of appropriate water' means in this context. It is recommended that additional information through the ESCT program to help inform the characterization of the system and the mitigations such as water resupply sources and that this be articulated as a commitment in the plan. | **FCM_FMMN_FMFN** | A table of commitments for future work with the SC has been included in Table 1.7-1 in the Introduction. Within the Table is the commitment to work staged engineering mitigation plans (eg. water source, cutoff wall, resupply system) in collaboration with the SC and its advisory groups. |
| **6.0 Objective 5: Develop an Effects Monitoring Program – 6.1 General Comments** | | | | |
| | | NO NEW COMMENTS | | |
| **6.0 Objective 5: Develop an Effects Monitoring Program – 6.2 Adequacy of Response to Initial Recommendations** | | | | |
| 158B | Objective 5 - SC Recommendation [11] | Original Recommendation<br>The comments and suggested improvements for Objective 1 and 2 must be incorporated first, to direct and modify the effects monitoring program. Problems associated with monitoring baseline conditions, and lack of key parameters in Objective 1 and 2, greatly decrease the effectiveness of the monitoring program proposed in Objective 5. Furthermore, the details of Objective 3 (the conceptual and numerical models) and Objective 4 (the proposed modifications to the system) are required to understand what should be monitored and where, and to what degree the system might be expected to vary. That is, use the outcomes of Objectives 3 and 4 (including parallel work on Reference Ecosystems) to target monitoring locations. This reporting on the Objective 5 design is so high level that the effectiveness, robustness, and rigor of the science in this program cannot be evaluated at this time. More details and all the background information are required.<br><br>FHEC Response<br>FHEC acknowledges that the out of sequence review was challenging and hopes that the additional time given to review the document as a whole will help show how it fits together.<br><br>**PARTIALLY ADDRESSED:** Incorporate new information from conceptual model and modelling in Objective 3 into this objective and others. | **TAG-Hydrology** | See response to item #1B. |
| 159B | Objective 5 - SC Recommendation [16] | Original Recommendation<br>The information provided on monitoring of the reference systems (Audet, Gypsy Gordon) does not allow the advisory panels to assess the effectiveness of the site location or parameter election, and thus effectiveness in general. Some consideration of HRA integrated with EHZ is required for the reference sites, and comparison with equivalent type sites in MLWC and Lake are required to effectively assess/trigiger early warning signals and correctly interpret the BACI design. Description of this in some detail is needed. Without such detail it appears that only a simple, general idea has been conceived and is being presented, with the intent to "work it out later". Without careful consideration of the nuances required to direct an early warning system and to assess changes at both the reference sites and MLWC, there could be serious misinterpretation and incorrect actions.<br><br>FHEC Response<br>FHEC acknowledges that more information is required for the reference sites and is committed to progressing this work in 2022. See responses to items #7, #8 and #15 on Objective 1.<br><br>**NOT ADDRESSED**: Further work required. | **TAG-Hydrology** | See response to item #1B. |
| 160B | Objective 5 - SC Recommendation [29] | Original Recommendation<br>There is insufficient information on earlier objectives and how they tie into this objective. The advisory committee cannot make informed decision on the effectiveness of Objective 5 without reviewing Objectives 3 and 4 (i.e., Objectives 1 and 2 are not enough).<br><br>FHEC Response<br>See response to item #11<br><br>**PARTIALLY ADDRESSED:** Incorporate new information from conceptual model and modelling in Objective 3 into this objective and others. | **TAG-Hydrology** | See response to item #1B. |
| 161B | Objective 5 - SC Recommendation [52] | Original Recommendation<br>Page 6-5 and Table 6-1. Some maps showing the sampling at the reference sites are required. Page 6-5. Monitoring will be at randomly selected points. Why not target specific points that the conceptual models and numerical models (i.e., the integrated analyses) indicate will be most susceptible?<br><br>FHEC Response<br>Citations to Objective 1 figures showing reference site monitoring locations were added in Section 6.2.2.2. Instead of using randomly selected grid points, we are now planning to sample either the full or partial grid; partial grid sampling includes five points recommended by Dale Vitt as having potential to show early effects. Please see updated text in Section 6.2.2.1.<br><br>**PARTIALLY ADDRESSED:** Final site selection in reference catchments are still a work in progress | **TAG-Hydrology** | See response to item #1B. |

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| 162B | Objective 5 - SC Recommendation [57] | Original Recommendation<br>Climate. The NOP is unique, provide recharge to the sand aquifer important for the MLWC and Lake. A climate station should be on this HRA.<br><br>FHEC Response<br>11 climate stations are already in use including an ET tower at NOP north. Additionally, we have snow surveys in the watershed. FHEC feels that climate is adequately covered and does not support adding more climate stations.<br><br>**PARTIALLY ADDRESSED:** Is this STN01/SC10? (Figure 2.5-15) Is it representative of the pine barrens? The estimate of recharge from ET likely differs considerably on FHUC. | **TAG-Hydrology** | See response to item #1B. |
| 163B | Objective 5 - SC Recommendation [59] | Original Recommendation<br>Page 6-10, Table 6-3: The range in settings of the sample locations, and an estimate of the integrated HRA/EHZ of each that can be compared with those on the MLWC and Lake need to be used to allow for direct comparison and interpretation of the BACI etc.<br><br>FHEC Response<br>FHEC recently did work to define EHZs at reference sites and this work shows that the reference sites are good for vegetation and chemistry and additional work may be required for hydrology and hydrogeology. The reference sites can be used to detect climate change/regional effects. FHEC has been unable to date to find a reference site in the area more similar to MLWC. FHEC is committed to examining the option of adding groundwater monitoring at the Audet Lake Wetland Complex (via hand driven piezometers) starting in 2022.<br><br>**PARTIALLY ADDRESSED:** Monitoring at reference ecosystem sites, with conceptual models that relate to MLWC, are crucial. Clearly define / defend what areas of Audet and Gypsy-Gordon can be used for the different patterns fens (EHZ1 and EHZ2) and lake in MLWC | **TAG-Hydrology** | See response to item #1B. |
| 164B | Objective 5 - SC Recommendation [61] | Original Recommendation<br>Pages 6-11 to 6-12, No mention of water levels and gradients (i.e., flow rates) (except as part of a multivariate correlation). What about the interpretations?<br><br>FHEC Response<br>Analytical approaches for water levels (groundwater and surface water) provided in discipline sections; the Analytical Approach section was intended to provide an overview of analyses used by more than one discipline.<br><br>**NOT ADDRESSED:** TAG members do not understand the response. | **TAG-Hydrology** | See response to item #1B. |
| 165B | Objective 5 - SC Recommendation [79] | Original Recommendation<br>Surface water levels and chemistry of the EHZ 2, 4 and 5 that receive water from the NOP, and those receiving water from the Fort Hills should be monitored and compared through time.<br><br>What happens if the measurements are outside of the 4 mm difference? Are the data discarded and you end up with a progressively smaller dataset? Or, otherwise? That is, how are corrections to be made?<br>Why delete data for an entire period if the datalogger is found dry. Why not interpret the data to determine which data are still useful/good?<br><br>FHEC Response<br>Please see updates in text: If the difference in water level elevation surveyed from two or three benchmarks is more than 0.004 m, the survey will be repeated until the difference is within acceptable range (i.e., 0.004 m or less).<br><br>**PARTIALLY ADDRESSED:** TAG is curious how these surveys will be completed and how a precision of 0.004 m will be achieved. It seems ambitious for differential GPS. How good are the benchmarks (e.g., for variation on soft ground)? | **TAG-Hydrology** | See response to item #1B. |
| 166B | Objective 5 - SC Recommendation [82] | Original Recommendation<br>See comments on Objectives 1 and 2. Growth rates of trees indicate hydrologic change, and should be measured<br><br>FHEC Response<br>Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators. After the July 19, 2021 meeting a number of items on the Objective 2 Indicator Selection flow chart were modified based on TAG and SC feedback and shared and modified during the Aug 25, 2021 and Sept 7, 2021 meetings. There was confusion around the box asking the question "if there sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if its an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to | **TAG-Hydrology** | See response to item #1B. |

| Table 2: SC and TAG Comments on the Revised MLWC Operational Plan (OP) (Nov 29, 2021) | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| | | determine their effectiveness in future. A future workshop with the TAG to discuss vegetation is planned for 2022 and this can be discussed at that forum.<br><br>**NOT ADDRESSED:** Tree ring data contain the prerequisite pre-mining data/responses. Therefore there are baseline data. TAG does not understand the reticence to consider this analysis technique. Further discussion is deferred to TAG Vegetation. | | |
| **6.0 Objective 5: Develop an Effects Monitoring Program – 6.3 New Recommendations** | | | | |
| 167B | **General Comment** | Sampling frequency is based largely on seasonal measures or is even less frequent. This is not frequent enough to effectively track and interpret potential changes in functionality that may occur that are out of the ordinary and effectively set triggers. There are numerous continuous recorders that can be downloaded remotely. Key locations should be instrumented, downloaded weekly, and the data examined to anticipate potential problems, such as drawdown of water tables in peat or changes in surface-water chemistry. | **TAG-Hydrology** | See response to item #1B. |
| 168B | Table 6.2-2 | Table 6.2-2 (Proposed Monitoring Locations … [Reference Complexes])<br>No groundwater monitoring locations are proposed. (Objective 5)<br>These omissions are significant shortcomings to the OP. The data are required. How can robust conceptual models be developed and comparisons to MLWC be performed without these data? (See General Comments on reference ecosystems.) | **TAG-Hydrology** | See response to item #1B. |
| **7.0 Objective 6: Develop Response Framework – 7.1 General Comments** | | | | |
| | | NO NEW COMMENTS | | |
| **7.0 Objective 6: Develop Response Framework – 7.2 Adequacy of Response to Initial Recommendations** | | | | |
| 169B | Objective 6 - SC Recommendation [3] | Original Comment<br>Reference ecosystems (and associated monitoring sites) are not adequately considered for groundwater and surface-water levels (e.g., Table 7.2-2 and elsewhere). See TAG comments on previous objectives.<br>Modelling. For MLWC (and surrounding area), plus Reference Ecosystems.<br>Where are comparisons to the numerical model incorporated into the analysis? That is, actual data need to be compared to prior model predictions. Do they agree or are they diverging? What is the action if they are diverging? That is, what happens if the outcomes demonstrate that the understanding of the system is incorrect? One possible outcome is that triggers and responses must be re-evaluated. This eventuality does not seem to be considered<br><br>FHEC Response<br>Reference Ecosystems: See the response to Objective 1, item #8.<br>Modelling: the text of Objective 6 has been clarified to incorporate more of the adaptive nature of the response framework including re-evaluating triggers and responses through time.<br><br>**NOT ADDRESSED:** Mixed concerns.Reference systems still require work (discussed elsewhere).<br>TAG cannot see where the modelling questions are addressed. Note that the question did not concern the BACI "model" (analysis); it concerned the numerical (HGS) model. | **TAG-Hydrology** | See response to item #1B. |
| 170B | Objective 6 - SC Recommendation [12] | Original Recommendation<br>"A trigger is defined as a level that indicates changes are occurring, but triggers are set early enough that significant adverse effects have not yet occurred."<br>This is an assumption based on prior interpretations of the system with a limited amount of data. It is misleading to cast this as a definitive statement.<br>***Recommendation:***<br>Clarify the inherent assumption in the design basis (i.e., the definition of a trigger).<br><br>FHEC Response<br>Triggers are directly linked to quantitative pre-mining baseline and reference site data. Triggers will be refined until ditching and draining activities begin in the MLWC watershed. Please see text in Section 7.2.1.3.<br><br>**PARTIALLY ADDRESSED:** Also need to be based on expected responses (e.g., understanding and modelling) | **TAG-Hydrology** | See response to item #1B. |
| 171B | Objective 6 - SC Recommendation [25] | Original Recommendation<br>As above, consider more frequent analyses to develop a proactive management system. Increase the frequency after implementing management responses.<br>Table 7.2-2. ALWC, and GGWC are only mentioned for surface-water quality and vegetation. It appears that groundwater and surface-water levels are to never be monitored in any Reference Ecosystem.<br>***Recommendation:***<br>Develop a robust monitoring program for the Reference Ecosystems. Adaptive management requires adaptive monitoring (and evaluation).<br>FHEC Response<br>FHEC has added additional text around the data analysis frequency. | **TAG-Hydrology** | See response to item #1B. |

| Table 2: SC and TAG Comments on the Revised MLWC Operational Plan (OP) (Nov 29, 2021) | | | | |
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| | | Basic EHZ's have been generated for both reference sites. It is also acknowledged that both sites placed much greater emphasis on having similar vegetation to that of MLWC than consideration of site hydrology. The shallow flow system at MLWC derives all of its incoming flows from precipitation with no apparent regional water inputs. The patterned fens at the MLWC also sit in groundwater discharge zones supplied from the surrounding landscape. These conditions also exists at the reference sites (although the potential for regional inputs at both sites needs to be anayzed further once more data is available). In my FHEC's opinion, an argument could be made that, based on available information, the reference sites are hydrological comparable to the MLWC. FHEC is committed to further examining the reference sites post-submission<br><br>**NOT ADDRESSED:** Requires further evaluation of reference ecosystems (including GW monitoring) with development of a conceptual model. Perhaps evaluation with a numerical model. | | |
| 172B | Objective 6 - SC Recommendation [30] | Original Recommendation<br>"The natural range of variability of groundwater relates to surface water variability."<br>This statement is not true; it is reversed from reality. The natural range of variability of groundwater is directly related to precipitation, including snowmelt, inputs into the groundwater system. Surface water variability is related to the same inputs, plus groundwater discharge to surface water (often in some delayed fashion).<br>"Level 1 trigger: two standard deviations above/below the mean for gradients across the sand/peat interface AND surface water levels at nearby monitoring locations that exceed the surface water hydrology Level 1 trigger."<br>TAG does not understand the rationale for the AND criterion. Surface water is dependent on groundwater, not the other way around. Revise. Presumably a change in gradient direction would be elevated in importance relative to magnitude; the trigger is silent on direction.<br>Recommendation<br>Correct the statement and adjust the triggers accordingly.<br>Include changes in gradient direction (in addition to magnitude) in the triggers.<br><br>FHEC Response<br>The statement on groundwater and surface water relationship was not meant to imply dependence. However, it has been revised in the document. The vertical gradient trigger should NOT include direction explicitly. Most of the GW gradients in the fen area are right around neutral, and can fluctuate around neutral (positive and negative), as detailed in Objective 1. If a change in direction is a trigger, these wells have the potential to exceed the trigger often, and for results that are within the normal range for the well pair. What is important is when the size of the gradient exceeds historic values. If the gradient in a well pair is always upward, using the historic range will cause a trigger if it flips to downward automatically; for wells that fluctuate, fluctuation that is within the normal range is allowable.<br><br>**PARTIALLY ADDRESSED:** Okay. Suitable for locations where the gradients fluctuate in direction. Not suitable for places where they have a consistent direction. Differentiate between the two cases discharge/.recharge vs. flow through. Different conceptual models. | **TAG-Hydrology** | See response to item #1B. |
| 173B | Objective 6 - SC Recommendation [38] | Original Recommendation<br>The Level 2 trigger has three AND conditions, meaning that four conditions must occur before triggering a response (recall, there is no real response for a Level 1 exceedance). This appears to require an excessive number of conditions to be met prior to implementing changes.<br>Recommendation<br>Justify the multiple AND conditions in the Level 2 trigger.<br><br>FHEC Response<br>The responses to a Level 1 trigger are meaningful and consist of elevation of monitoring effort to the confirmation and investigation of cause tier, and development of a monitoring response plan. Briefly, the objectives of the monitoring response plan are to (1) address key uncertainties (2) explore relationships among metrics, (3) explore modelling results where applicable, (4) identify potential mitigation, and (5) review and refine triggers. Therefore, a Level 1 trigger would initiate a set of actions that are non-trivial, and useful to prepare for mitigating potential continued increasing trends. Two additional conditions are included in the Level 2 trigger: exceedance of the regional normal range, and indicator value above 75% of the benchmark. The first of these is an appropriate condition for a Level 2 trigger, because it indicates an additional change of a meaningful magnitude, which is unusual for the region. The last condition in the Level 2 trigger is tied to benchmarks, based on the rationale that water quality changes might be acceptable if they do not affect functionality or biodiversity of the wetland. An increased concentration resulting from a development that is at 75% of the benchmark is not expected to result in adverse toxicological effects, but indicates a level of concern that requires mitigation to reverse the trend before the benchmark is reached.<br>**PARTIALLY ADDRESSED:** This seems too arbitrary and complicated. Perhaps there should not be a generic rule at the top of the evaluation. Perhaps each site should be evaluated within the context of its hydro(geo)logic position, sources and pathways. What is the expected (range of) behaviour? Then good triggers (with the generic ones as a backup) could be defined. | **TAG-Hydrology** | See response to item #1B. |
| **7.0 Objective 6: Develop Response Framework – 7.3 New Recommendations** | | | | |
| | | NO NEW COMMENTS | | |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | | | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG Response** | **Fort Hills Follow up response** |
| 1 | General comments | The OP is not ready. Work to date is inadequate to move to the Operational Plan. Great progress has been made and Suncor is on a good trajectory. Suncor should be ready to proceed in a few years. TAG does not support proceeding at this time. Suncor must postpone. | **TAG** | FHEC has received an extension to the OP submission deadline from Sep 30, 2021 to Dec 15, 2021 to allow more time for SC/TAG review, response to SC/TAG findings and incorporation of recommendations where applicable. FHEC respectfully disagrees with the assessment that the OP requires a few years of work to be ready for submission. Responses have been prepared for all SC/TAG findings, which will be reviewed alongside a compiled draft OP in October through November 2021. FHEC requests that this finding be revisited once all responses and the compiled OP draft have been reviewed in full. | | X | | If the commitments for further work can be considered sufficient and appropriate to call the OP complete, then this item is addressed; however, there are a number of outstanding issues to be addressed by the future commitments. TAG still suggests that it may take a year or two to complete work on reference ecosystems, collect more baseline data, update modelling, and evaluate monitoring/trigger requirements. The amount of water quality work required is unknown.<br>Ultimately it is up to the regulator to accept the OP. Perhaps the regulator will accept that these deficiencies can be rectified in the near future. | A table of commitments to future work are now included in the Introduction section (Table 1.7-1). FHEC recognizes that there is more work to be done on the items listed here by TAG but does believe this work can be completed in the timeframe required prior to implementation of the OP. |
| 2 | General comments | TAG is still waiting for meaningful responses to previous TAG concerns, including for the hydrology.<br><br>Many of the key points listed below have been commented on in previous drafts; TAG awaits responses from SUNCOR. The report has much more, and very relevant information, but it appears rushed, and the synthesis of the information is limited, particularly at this late stage of the assessment. | **TAG** | Fort Hills acknowledges delays in responding to prior TAG findings, which resulted in duplication of some findings through review of the OP. Responses to TAG findings were provided July 12th and July 22nd, 2021. Fort Hills also acknowledges the short review cycle for this portion of the OP and will address any duplicate findings as required. Given these challenges, Fort Hills has agreed to provide responses to SC/TAG for all findings alongside another round of review of the full document prior to submission. | X | | | | N/A |
| 3 | General comments | Attendance at meetings does not indicate agreement. Don't intimate that TAG (or others) agreed when we raised concerns that have yet to be addressed. A table of how disagreements were considered would help | **TAG** | Noted. Objective 1 has been reviewed to identify and if applicable, improve how meetings are discussed or agreement was implied. | X | | | Not in Objective 1. Appears to have been moved to Introduction. Improved, although now it does not highlight many of the direct contributions that TAG suggestions have made … . IK is better woven into the entire document. | The Introduction outlines the work shared and produced through meetings with the SC and has noted "The materials shared and produced through these meetings, workshops and reports have been used and the feedback received has been considered and integrated throughout the OP in the appropriate Objective. FHEC is grateful for the feedback provided and collaborative nature of the SC and would like to acknowledge that the sharing of knowledge and participation in meetings is not to be construed as community members or technical advisors endorsing or supporting mining operations in the MLWC, nor full endorsement for the materials presented during the meetings." SC (including TAG and AAG) input has been recognized throughout the OP, most prominently in the acknowledgements, introduction, Objective 2, Objective 3 and Objective 4. An example of how SC recommendations that were not incorporated is the SC recommended indicators that have not been included at this time - this is transparently identified and rationale provided in Objective 2. |
| 6 | General Comments | Some final interpretation and integration of the surface flows and focused groundwater in the fen is required (more comments below). Integration into a cohesive and coherent conceptual model of the surrounding connections and maintenance of the fen and lake is still required. Providing a conceptual model is imperative for effective assessment and mitigation of the potential impacts of operations, helping direct sampling locations for initial and rapid change detection, and for selecting and interpreting reference systems | **TAG** | The Conceptual model appendix of Objective 3 addresses this, apologies that this was not provided in time for the review of Objective 1. | | X | | The conceptual model is greatly improved. However, the synthesis of the Conceptual Model should not be repeated three times verbatim - the three times need to be tailored to the three different audiences (Layperson in the Plain Language Summary; an overview for the general reader in Objective 3; detailed for the specialist in the Conceptual Model appendix). | These three summaries have been customized to better tailor them towards the three distinct audiences. |
| 7 | General Comments | BACI - This is a very important part of the short and long-term assessment of operations activity, and has receive one small paragraph. I find it incredibly naive to state that the reference system does not have to have the same hydrogeological characteristics (SUNCOR simply state "characteristics"). This assumes linearity and time invariance in the response to disturbance vs other drivers. Thus it implies that finding areas with similar vegetation will have the same connectivity – the vegetation integrates both the hydrogeology and hydrology as well as the geochemistry of the substrate and processes occurring along the flow paths. Assumptions of linearity and time invariance have been shown to not hold in sub-humid Boreal Plains or the Foothills (Holecek 1988, Devito et al. 2005, Goodbrand 2021-in review).<br>There is considerable work in regions with complex difference in storage and the threshold responses to climate and disturbance due to subtle differences in hydrogeology can greatly complicate BACI relationships, as the result of different timing or lag and thresholds of the reference vs MLWC. Simple transformation will not be able to deal with this. Long term pre and post data is required, but it must include enough climate variability to assess non-linearity. A systematic analysis of the reference and MLWC sites and conceptualization of similar connections and controls is required and sites within the reference selected accordingly. | **TAG** | It is agreed that an ideal reference site would have similar hydrogeological characteristics as those found at MLWC. FHELP has generated EHZ's for both reference sites and have also produced some preliminary conceptual analysis (hydrological) of these sites, please see the attached memo. Both sites have some basic surface water data collected but no groundwater data. FHELP believes that these sites are good reference sites in terms of looking at chemistry/vegetation responses to regional climate conditions, Audet and Gypsy Gordon are located in the similar climate regime, as such their responses to the climate variation would be similar. | | X | | Work is progressing on defining, monitoring and understanding reference ecosystems. Further work is required and this work is included in "future commitments".<br>The Gypsy Gordon complex is not in the same climatic zone, so cautious interpretations are required. | Agreed that further work is required. A table of commitments to future work including the reference sites are now included in the Introduction section (Table 1.7-1). |
| 8 | General Comments | Reference system: Good to see these sites have been incorporated into the report. But this is incomplete and needs further description to assess the applicability of the locations to infer possible changes to WL and EHZs. Analyses parallel to MLWC is required, and if only certain selected parameters or locations are used, then a justification is also required. The current selection of references (Audet and Gipsy-Gordon) seems based largely on vegetation. Some estimate of the EHZ and what groundwater conditions is necessary. Different sites can have the same vegetation and patterns but respond to combinations of different water balances and geologic settings. The hydrogeology setting will largely determine the response to climate and other external controls vs operations. Selecting a patterned fen fed by an upstream lake is not likely to respond to climate variation in the same way as a fen that is fed by the surrounding landscape, and then flows into a lake. The important hydro-geologic connections should be replicated between the reference and MLWC as much as possible. Some estimate of the EHZ and what type of HRA or groundwater connectivity occurs at the surface and groundwater sites will help in the interpretation of the chemistry. Water level data should be collected, and gradients calculated, at these locations to compare with MLWC. | **TAG** | Basic EHZ's have been generated for both reference sites, please see the attached memo. It is also acknowledged that both sites placed much greater emphasis on having similar vegetation to that of MLWC than consideration of site hydrology. The shallow flow system at MLWC derives all of its incoming flows from precipitation with no apparent regional water inputs. The patterned fens at the MLWC also sit in groundwater discharge zones supplied from the surrounding landscape. These conditions also exists at the reference sites (although the potential for regional inputs at both sites needs to be analyzed further once more data is available). In my FHEC's opinion, an argument could be made that, based on available information, the reference sites are hydrological comparable to the MLWC. FHEC is committed to further examining the reference sites post-submission. | | | X | Further work is required.<br>Vegetation is not a good indicator of landscape connectivity, which will influence system responses to climate and land use. Groundwater evaluations are required in addition to the surface water studies. Geochemical interpretations will help with understanding groundwater flow regimes and similarities with MLWC. | Agreed that further work is required and FHEC is committed to workshops in 2022 with the TAG and the SC on the reference sites. See the commitments Table in the Introduction (Table 1.7-1). It is acknowledged the reference sites need more work in terms of hydrological characterization and how that maps back to processes at MLWC. This will be a focus of effort in 2022. |
| 9 | General Comments | Figures and tables. Still many do not provide enough information (legends, caption description etc.) to allow the reader to interpret the information provided. | **TAG** | FHEC has reviewed the figures and made edits to the legends where appropriate. Much of the information required to interpret figures and tables is provided in the text. | X | | | TAG far prefers "beefier" captions that explain a figure without excessive reference to the text; however, we realize these are personal preferences of scientists. We need to agree to disagree on this style preference. | Noted, thank you. |
| 10 | General Comments | There is no new information in the Operational Plan Objective 1 that would help evaluate how the wildlife program will inform the assessment of ecosystem functionality in the future. In their responses to TAG's Concerns and Recommendations, Suncor assures that they will work with TAG on further refinement of the wildlife monitoring. We look forward to discussions and reviews of the wildlife monitoring program in the near future, but we cannot provide further detailed comments here.<br><br>In their responses to TAG's Concerns and Recommendations, Suncor also notes that they will "develop a suite of indicators to assess functionality (Objective 2) as well as a develop an environmental effects monitoring program (Objective 5). " We note that wildlife has been excluded from both Objective 2 & Objective 5. | **TAG** | FHEC recognizes the importance of wildlife to the ecosystem and to the SC. The Fort Hills Wildlife Monitoring and Mitigation program is seperate from the Operational Plan and will remain seperate. The TAG has had much involvement in the wildlife monitoring at MLWC and has had much input to the program as it is designed today. The SC will receive updates the wildlife program and data at the same cadence as the Wildlife Monitoring Rerport reporting and the TAG/SC will have an opportunity to participate when the program changes. As well, Fort Hills has commited to a wildlife workshop with the TAG and SC in early 2022. | | | X | Wildlife is a separate monitoring program. | A table of commitments to future work, including a workshop on the wildlife monitoring at MWLC, are now included in the Introduction section (Table 1.7-1). |
| 11 | General Comments | Defining functionality of the ecosystem in the MLWC is the overarching task that Suncor was to perform and Suncor appears to strive towards fulfilling this task. However, it is unclear to us how an ecosystem's functionality can be determined when wildlife is not considered. Site-wide monitoring programs have been developed to monitor for mitigation success using qualitative and incidental observations. Systematic and statistically rigorous monitoring was developed for the fen only. While Suncor intends to continue the monitoring done to date in the fen as part of the site-wide monitoring program, it is unclear how that program will inform the functionality assessment when it is performed outside the Operational Plan. In particular, under the Operational Plan Objective 2, Suncor does not consider wildlife to be suitable indicators. How can Suncor assess the functionality of the ecosystem when top-down, cascading, and bottom-up effects are not considered? TAG does not believe it is possible. | **TAG** | See the response to Item #10. | | | X | Wildlife are an integral component of an ecosystem. | Agreed and that is why Fort Hills has a fulsome wildlife monitoring program, including at MLWC. A table of commitments to future work, including a workshop on the wildlife monitoring at MWLC, are now included in the Introduction section (Table 1.7-1). |
| 12 | General Comments | On the point of community concerns, TAG does not in any way intend to comment on the need for, or the validity of, what communities desire to be included in a monitoring program. We simply add our views from a western scientific perspective that may assist to address community concerns. | **TAG** | Noted. We look forward to the wildlife workshop in 2022 with TAG and AAG participation. | X | | | | N/A |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | | | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG Response** | **Fort Hills Follow up response** |
| 44 | | The data collected on Reference "sites" are insufficient for moving forward. Baseline historical data are required to develop the necessary conceptual models and to assess changes. | **TAG** | FHEC acknowledges that more information is required for the reference sites. See responses to items #7, #8 and #15. | | X | X | See replies to 7 and 8.<br>Baseline hydrology, hydrogeology and geochemistry have not been started. Reference sites with ecosystems remain to be defined. | Programs to collect this baseline data are being developed in conjunction with reference site characterization. It is hoped that FHEC can work with TAG in early 2022 to refine and begin to execute these programs. |
| 47 | 2-11 | fig 2-4. Really interesting data. Units are required | **TAG** | The figure has been modified. | X | | | Now 2.3-3 | N/A |
| 49 | 2-13 | 2.3.2.4. stated … likely do to climatic and increased loading from anthropogenic activities . What would the anthro-activities be, dust? Is this significant. | **TAG** | This information was pulled directly from the Innotech (2020) report. They were likely referencing well known increases in air emissions but no further details were provided in the report. | X | | | | N/A |
| 52 | 2-14 | in general the shallow section of the lake, that covers 2/3 the area, has not been considered | **TAG** | Sediment coring for paleolimnology purposefully targets the deepest portion of the lakes as sediments tend to migrate to and accumulate in the deepest areas over time. The littoral areas are shallow and often well oxygenated; therefore, sediment column in the littoral area can easily be disturbed by wind driven waves and benthic animals, making it unsuitable for a paleo study. | | | X | How do you reconcile the history of the shallow ledge of the lake, 2/3 of the lake? This is required | The sediment cores archived the past conditions in the whole water body of the lake and its watershed under historical climate conditions. However, there are limitations to the paleolimnological approach and we cannot reconstruct the history of the shallow areas of the lake. FHEC is not planning to continue the paleo study or collect sediment cores from the shallow areas of the lake. The Effects Monitoring program does not rely on the paleolimnological study results and includes the shallower areas of the lake. |
| 53 | 2-14 | Figure 2-7 highlights how different 2/3 of the lake is. Some data should be collected for the more littoral areas | **TAG** | See response to item #52. | | | X | This is not a response to specifics in this question. | Apologies if we misinterpreted the question as it appeared to be specifically related to the paleo study. Water quality data has been collected from the shallow areas of the lake. The shallow areas of the lake have been included in the effects monitoring program, see Figure 6.2-1 in Objective 5. |
| 56 | 2-16 | On other – EHZ's. This is a top down approach. Seems that the EHZ's are more vegetation-soil zones. These largely respond (with eventually some feedbacks and controls) to flow path connectivity, water tables, and chemistry (nutrients) controlled by the hydro-geologic setting and geology and substrate type. I suggest integrating with hydrogeology or HRA's, use as two layers. And eventually apply to reference systems | **TAG** | Section 1.3 (Figure 30 and Table 4) in the Obj 3 Conceptual model appendix discusses this and provised a discussion and concordance between the EHZs and the HRAs. | | X | | The comments in Objective 3 indicate this is considered. However, the basic analyses of the water quality data in Section 2.5 Objective 1 still require that the EHZ's associated with NOP source water be plotted, analyzed and considered in later sections as being independent of the FH source water. Currently they are lumped and potentially inflate the natural variability. This has implications in determining water treatment of injected/inserted water supplies to various portions of the pattern fen. | This will be conducted as a part of the future work that is included in the Commitments Table in the Introduction (Table 1.7-1). |
| 58 | 2-20 | Figure 2-11. Surface flow seems to be biased just to the more western side. There is evidence of focused flow (likely groundwater discharge) on south-eastern portion in at least two locations. These seem to be missing | **TAG** | This figure has been removed, please refer to Figure 30 in the Objective 3 Conceptual Model appendix. | X | | | | N/A |
| 61 | | EHZ's and HRA, the discussion states how these two delineated areas are different. Does this mean SUNCOR will have two different systems to assess the impact and effectiveness of mitigations? This will be very cumbersome. Clearly these two can be integrated to define regions of unique vegetation and soils with different surrounding connectivity. These can be used in the conceptual model. The EHZ are essentially what Devito et al. (2005, 2012) define as HU's, and they layer on top of the HRAs. The EHZ's vegetation and soils develop in response to the regional-local hydrogeology and hydrology which interact with geology and substrate type (with some feedbacks) to influence WT, flow path and chemistry (nutrients). The HRA helps define these with EHZ's. Using the HRA's helps to define the EHZ 1 and 2, but importantly helps with defining the location of the source of water. Integration of EHZ's and HRA should be conducted to come up with units to define for mitigation and monitoring | **TAG** | Section 1.3 (Figure 30 and Table 4) in the Obj 3 Conceptual model appendix discusses this and provides a discussion and concordance between the EHZs and the HRAs. | | X | | see comments for #56 | The HRA footprints largely subdivide the defined EHZ's (and also cover the entire watershed). Suncor will not be using two different systems to assess mitigation impacts and effectiveness in the long term. In the long term, these assessments will be based solely on the HRAs alone and the EHZ data groupings of parameters like chemistry and water level will need to be ported over to HRA data groupings. This will not be done for the OP submission but will occur as the work advances. |
| 68 | | Techniques for analyzing changes in hydrology are not apparent. Later, water levels are specified as the metric. However, changes in flow are also necessary. Consequently, gradients, spring flowrates and streamflow will be required. How will changes be assessed? | **TAG** | The purpose of Objective 1 is to define baseline conditions these recommended considerations are discussed further in Objective 2. | X | | | | N/A |
| 67 | 2-24 | BACI. If you are trying to determine the effect of land-use or operation (impacts) vs climate and other natural variability, similar hydrogeologic settings are required as responses may have non-linear and hysteresis controls associated with different hydrological flow paths, and soils and bedrock storage thresholds. This needs to be considered | **TAG** | See the response to item #7. | | | X | See also reply to 8. | Agreed. In 2022, it is planned that the Fort Hills MLWC technical team will get to work with the TAG to further refine expected hydrological responses at each HRA as a function of climate conditions and other potential stressors, including anthropogenic stressors. Consideration of these non-linear thresholds will need to be part of this process and it is hoped that TAG can help guide this. |
| 72 | | Figure 2-14 to 2-16. Great transects and information. One transect between A and B would help in interpreting the potential for focused groundwater discharge sites where patterning starts, close to the south-east or base of Ft Hills.] AQ3 (and AQ4) likely pinch out and are sources of constant discharge. Has this entered the discussion of connectivity? Perhaps it should. | **TAG** | FHEC agrees with the TAG interpretation regarding AQ3 and AQ4. Within the watershed, the springs act as drains for these aquifers. All the rest of the excess groundwater heads towards the Firebag within the aquifers. | X | | | | N/A |
| 80 | | Table 2.4. Excellent TK. Anyone tried to locate these springs on a map? This would really help in the conceptual model. | **TAG** | Noted. Please see section 1.4.2 of the Conceptual Model appendix (Objective 3) for mapped (major) spring locations at MLWC (Figure 186) | X | | | | N/A |
| 81 | | It curious why a map of the watershed and nearby, relevant surrounding area, with important landscape and sampling information, is not provided. Perhaps this is in an earlier introductory section. It would be nice to evaluate this information for content and would be a benefit in this first section, objective one. | **TAG** | See Figure 1-1 in the Introduction Section (Section 1.0) | | X | | Somewhat constrained to the Fort Hills mine. Consider extending it to encompass the model domain so that the bounding rivers are shown. | Figure 1.1-1 shows the full extent of the MLWC watershed, which is an appropriate scale for the OP, as it is intended to focus on potential mining effects within the non-mined portion of the MLWC. |
| 82 | | The interpretation of fig 13-19 is very informative. These new data and hydrogeological interpretation allow for the advancement of the conceptual model. For the fen, it appears that the Fort Hill's recharge AQ3 and AQ4 which pinch out at the base. These two aquifers likely provide the focused recharge at the two main locations on the southeast side. Extrapolation is required between transects A and B, but the Clay Till 1 thins here. A transect that incorporates the potential focused groundwater discharge location is advised. These two discharge locations are the likely source of the two pattern fen flow systems. Note that these where not included in the surface water analyses and need to be incorporated. | **TAG** | See figure 30 in Objective 3 Conceptual Model Appendix to see the 2 locations being discussed. FHEC has provided a x-section through the patterned fen and the big hydraulic window and another at the other big spring located to the west of that location. FHEC respectfully disagrees that these locations are likely the sources both patterned fens, it is likely that they are just the source for the bigger, southern patterned fen (EHZ 2 or HRA 01). | X | | | | N/A |
| 83 | | The Lake, some interpretation of hydrogeological data and catchment data is still required, but it looks like SUNCOR's understanding is greatly improved over the past 2 years. However, some clear finalized conceptual model of landscape-lake connections is still required. The transects mentioned above show quite well that coarse veneer substrate in the southern "cabin" creek catchment generates considerable recharge and flow (also noted in traditional knowledge). | **TAG** | Please see Figure 31 in the Objective 3 Conceptual Model Appendix. | X | | | | N/A |
| 84 | | Surface flow in the fen seems biased to the northern side which interacts with northern sand recharge area. Incorporation of the potential diffuse flow and focused discharge from Ft Hills is required. | **TAG** | The diffuse FHUC flows are being generated from the HRA 08 (conifer swamp). The concentrated flows are being generated from the springs (incuding the big hydraulic window). | X | | | | N/A |
| 85 | 2-39 | Simply stating that you can not use the water levels because one baro is down is not acceptable. The water level trends over time are important. Some alternative is required. Barometric pressure is standard on all met sites, use these, there a several in the area. And in the future, will you ensure you have several baro-recorders in the MLWC? | **TAG** | FHEC now has a complete barometric data set with no gaps over the observational period where we have water level data. This barometric data has been used to correct obviously uncorrected water levels.<br>FHEC will also look into having multiple barometric recording devices on site. | X | | | | N/A |
| 86 | | Figure 2-20: It is not clear of the relevance of this information presented this way to the overall objective 1. This is detail that clutters rather than directs the discussion. Some interpretation of the potential direction of groundwater flow in the lake should be provided | **TAG** | FHEC interprets the lake to receive groundwater from the north, south and west. Groundwater leaves the lake on the east side see figure 31 in the Conceptual Model Appendix. | | | X | Response must be for a different question. Figure 2-20 (now Figure 2.5-8) was a plot of barometric pressure over time. It is still not clear that this figure is necessary. | The figure has been removed, thank you. |
| 87 | | Table 2-5: Very interesting data, but it is not clear how this is interpreted. This is an average from a range of wells, presumably with different depths below the surface. Is not depth BG a way to standardize this? Also, time periods for measurements are needed to compare across and within sites. Were these collected at the same time? | **TAG** | FHEC will not change this in the Objective 1 write up – in this objective, the elevation context makes sense as we are comparing wells within and wells outside of the fen on the same tables. However, for Objective 5, with the selected monitoring wells for integrated wetland monitoring, we have edited the table today to show mbgs for these wells. | X | | | Also note for Table 2.5-1, right most column. Min should be Max. | Agreed correction made in the document. |
| 88 | | Ft Hill upland complex – noting a variation of 1.13 m in WT in sand is quite large. Where is this well? | **TAG** | See response to item #82 | | X | | | This is well FH17-WR409-SN1. This is noted in Table 2.5-1, as the well with the max range in the FHUC surface sand wells. There is also a note in the table regarding this water level and that there appears to be an artificial drawdown event causing this large range. |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG Response** | **Fort Hills Follow up response** |
| 89 | 2-64 | Page 2-64: Reference Sites: It is more than unfortunate that no groundwater data have been collected at the reference sites. Assessment of potential groundwater connectivity must be conducted with regional and local landscape position, and attempts to duplicate sites at MLWC. Baseline groundwater data and conceptual models are required to understand the reference systems and to interpret changes between reference systems and MLWC | **TAG** | See response to item #7. | | | X | See also reply to 8. | Hydrological conceptual models are being developed for the reference sites as the TAG is aware. This work is still in early stages and should be further along than it is and FHEC also acknowledges this. Part of this ongoing work will be to collect (and monitor) groundwater. |
| 92 | 2-73-2-74 | Figures 2-30. Perhaps a comparison using the same dates would also be appropriate to fully test the spatial variability between sites | **TAG** | The data are compared for the same time period in Figure 2-30a. | X | | | | N/A |
| 96 | 2-77 | Fig 2-34. Less snow in open. This likely depends on the size of the opening, and the sampling strategy. Were lakes used? Did transects incorporate the edges of openings to include saltation? If not than this is an underestimate | **TAG** | For clarity, the "Open" area only includes the McClelland Lake and Baby Lake and the Fen and other wetland areas that may be conceptualized as "Open" are generally treated as "Flat Low Lying" which generally has some of the higher SWE proportions. To date the approach for lakes in the MLWC has been to conduct a transect on the lake that represents the windblown (majority) area of the lake. This transect as with all others is comprised of 40 depth measurements along with 4 density measurements. This would represent the "Open" portion and majority of the lake area reasonably well. The comment from TAG asks if the sampling incorporated the Lake, yes, and edges, in this case no. However, this was considered in the design. The lake edge, if we assume a 120 metre buffer on the perimeter would account for less than 10% of the total area of the lakes in the MLWC so any edge effect would be an order of magnitude lower in representation than the predominant portion of the Lake. Also, a sampling strategy to adequately measure this edge effect along the perimeter of McClelland Lake with wind direction and fetch taken into consideration would be possible but would require more sampling time and helicopter days to accomplish, and therefore was not included for the marginal gain to the overall program. | X | | | Now Figure 2.5-22. A solid reference to the methods would help; Hatfield 2019?. | Hatfield 2019 cites RAMP 2018. |
| 100 | 2-82 | P 2-82, and elsewhere. Simulating Lake water levels. There are years, that represent a large portion of the simulation period, where simulated and observed do not match very well or at all. This challenge / problem needs to be resolved. Is it just errors in precipitation estimates? | **TAG** | As discussed with the TAG on Oct 7, the issue is Fort Mac Airport data not picking up convective storms occurring at MLWC. This can be fixed by using local climate forcing data in the HGS model instead. This fix has already been tested. Please refer to Figures 6-7 and 6-8 in Section 6.2.5 in the HGS modelling appendix for Objective 3 | X | | | | N/A |
| 103 | 2-86 | (figures 2-41) What time period is this for?It can't be the average if there is a change in storage | **TAG** | Figure caption updated | X | | | | N/A |
| 105 | | NRV - Information is provided and the tradition knowledge is extremely helpful. But this information does not seem to be summarized, and actual parameters or measures are not provided to allow the reader to assess the assumptions (i.e., the "reasonableness") of the variability. For example, it is clear the shallow portion (2/3rds) of the lake dries out, but this was over 150 years ago and presumably in a very different climate. Is this range included? If so how? | **TAG** | Information from the paleo work, airphotos from the 1950's, and from the ITK that has been shared that lake levels were at times much lower than at present, that is part of the NRV. FHEC is using the MRV for the effects monitoring program, which in this case is more conservative. | | X | | | Follow up comments not provided by TAG; assuming previous response is adequate. |
| 110 | 2-94 | Surface water sampling locations. EHZ 1 and 4 are poorly represented, and likely reflect main sources of groundwater from NOP. The transition (4) should be sampled | **TAG** | FHEC has recently installed two shallow wells that are in or near the EHZ 1 and 4 areas which should hopefully, together with measured water levels in the lake, help to provide insight of groundwater heads and exfiltration water magnitude and intensity from those zones | X | | | | N/A |
| 112 | 2-105 | Table 2-25 and figure 2-50 Reference sites. Some estimate of the EHZ and HRA should be attempted in comparing the Reference site water quality with the reference sites. | **TAG** | See response to item #7. | | | X | See also reply to 8. HRAs not defined for reference sites. | Agreed, more work is needed including defining the HRAs. More data is needed before the HRAs can be properly delineated. Once that is accomplished the reference site features (like chemistry) can be mapped back to the MLWC. |
| 145 | 2-165 | The Integration section (Section 2.6), including the new Innotech work (Figure 2-63) seems brief and incomplete, although it might be worked into the conceptual model (yet to be received). | **TAG** | Due to this series of comments, this entire section has been updated in the text of the document to add clarity. | | X | | "aquatics baseline information presented in Sections 2.5.4 through 2.5.7". The use of the modifier "aquatics" seems odd. The referenced sections include GW, SW, water quality and aquatics. This section appears to be out of place; it seems to form part of the conceptual model (as written) but is presented in isolation. | Removed "aquatic" from the text. |
| 146 | 2-165 | Reference ecosystems are required, with integrated hydrology, vegetation, wildlife. TAG notes that some wildlife and vegetation work has been done, but no hydrology. | **TAG** | See response to item #7. | | | X | See also reply to 8. Reference ecosystems are required. | Please refer to the response to item #112 |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG Response** | **Fort Hills Follow Up Response** |
| 4 | | The objective is to define the functionality. This appears to be a very general high-level report. The MLWC itself would appear to be the non-mined portion of the wetland that is a combination of non-patterned and patterned fen. Clear definition of this as the only area of interest should be made, but the function of the lake should also be considered throughout. | **TAG** | See figure 1-1 in Section 1: Introduction for the delineation of the spatial boundaries for the Operational Plan. Condition 3.11 of Fort Hill's Water Act Approval 151636-01-00 (as amended) requires that an operational Plan be developed for the sustainability of the non-mined portion of the MLWC, which includes McClelland Lake. As such monitoring programs are focussed on this area. | | X | | Noted.<br>TAG observes, however, that the usage/definition of MLWC and the surrounding watershed is inconsistent in the Introduction . It still requires better definition and consistent usage. | FHEC has reviewed to ensure consistent use of terms across the OP. |
| 5 | | The large littoral or shallow areas of the lake seem to be ignored but provide lots of services (or functions). The pre-mining condition or function of other areas in the groundwater and topographic watershed that are relevant to maintaining the function should be included. This is needed to direct mitigation measures, predict effects of operations and maintain function of the MLWC. | **TAG** | Water quality is measured in the shallow areas of the lake, and the deeper portion of the lake has been added as per previous TAG suggestions. | X | | | | N/A |
| 6 | | Only a high-level summary of drivers to direct indicator selection, and effects monitoring is provided. A clear list with detail of potential (later)and realized impacts is needed. Fig 3-1 is a crude generalization, and does not appear to include the lake nor the adjacent forests. It is not clear, or justification not adequate (i.e. not indicative of early change) | **TAG** | The figure provided was used because as has been approved and recommended by the SC. | X | | | Okay for this purpose. | N/A |
| 7 | | For "Indicator Selection Criteria" (Figure 3-3 and elsewhere), the criterion should be "... measure of wetland functionality OR important to indigenous land users". Consider both WS and TK perspectives rather than forcing them to coincide. | **TAG** | See response to Item #2 | X | | | | N/A |
| 8 | | It is apparent from the justifications provided for including or excluding parameters to detect change presented in earlier workshops, and decisions on the applicability of many techniques and indicators are based on the lack of understanding or time constraints/ practical considerations of the SUNCOR team. This is not only frustrating but dangerous and may hinder developing trust with stakeholders. | **TAG** | See response to Item #2 | | X | | The suite of parameters may need to be revisited in future workshops as the systems (including reference ecosystems) are better understood. | FHEC has committed to future work with the TAG and SC on the monitoring programs as shown in Table 1.7-1 in the Introduction. |
| 9 | | Contaminants are a major concern throughout the AOS and is extremely limited in this report. Perhaps much of the contaminant monitoring will be conducted in the EPEA approval, but no information is provided in this report to allow us to evaluate this. It should not be dropped from the discussion in this report. All protocols, locations, and measurements in the EPEA assessment should be included, and then noted that it will be conducted in other programs. | **TAG** | The environmental effects monitoring program for MLWC is not intended to be a regional monitoring program, it meant to capture effects of the Fort Hills Project on the non-mined portion of the MLWC. While it is unclear what TAG is referring to under the term contaminants, many of the parameters that would typically be considered as contamination, such as hydrocarbons, are included in the water quality portion of the environmental effects monitoring program under complimentary data. | X | | | Covered under a different program. | N/A |
| 10 | | Also, this section (Objective 2) reports that all the committees and their members met repeatedly to discuss indicators - this is true. But it does not say what the final recommendations were by members, and if a final meeting was conducted to agree on the final decision to include or exclude parameters. This reduction of indicators was conducted by SUNCOR and is not agreed upon by all advisory committees. A more scientific reason for exclusion or parameters is needed. | **TAG** | Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators and some modifications have been made based on SC and TAG feedback. As well, the final list of recommended indicators that was provided by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021) was used as the basis for Objective 2. Ultimately, the classification of indicators and where they sit within the framework of monitoring for Fort Hills is a Suncor decision but has been made using the list of indicators and other recommendations provided by the SC. The rationale behind why some have not been included is provided in the text of Objective 2 and also in this response document. | X | | | | N/A |
| 11 | | Chl-A is not necessarily an effective measure of lake health in systems that are naturally prone to eutrophication. Boreal Plains lakes are nutrient rich to start with and this will cycle greatly within years and between years Chl-A should not supersede or be used as a surrogate for potential contamination by organics and metals. Some measure of contaminants with in the biota, and in the sediments are required to assess the potential effect of operation on the ecosystems. For determining surface water and lake contamination, similar measures directed for groundwater should be included in the lake and its sediments. Some measure of contaminants within the sediments of the lake is probably the only way for early detection within the lake and general area. The reasons for dropping these measures are not adequate. | **TAG** | The sedimentation rates at McClelland Lake are relatively low due to the extensive fen complex located up-gradient of the lake, which also suggests that any watershed changes associated with Fort Hills mining operation will manifest in the fen complex before any changes can be detected in the lake (e.g. water quality, sediment quality). Sediment samples collected by conventional surficial sediment sampling methods (e.g. Ekman or Ponar) may represent decades of sediment accumulation at one location due to the penetration depths and homogenization of sediment samples within the top layer, and therefore, may not be able to distinguish any short-term changes in sediment quality. Sediment quality samples are not planned to be collected from the lake as they are not early indicators of change and data is not needed to aid in the interpretation of other indicator metrics. The SC agreed via their shared recommendations on indicators (Final Approved Short Early Warning Indicators and Methods, May 29, 2021). | | X | | For this reporting and agreements with SC, the response is adequate.<br>However, KJD's > 20 years experience working with lakes on the Boreal Plain, is that nutrient (P) and algal responses can be controlled by within lake processes, rather than by upstream ecosystems. The up-stream fen complex will most likely be a potential source of P to the lake and, along with in-lake processes (water levels, bioperturbation, anoxia and Fe-P dynamics), will influence algal and submerged aquatic vegetation (SAV). A reference system that expresses similar algal "bloom" cycles will help in interpreting the occurrence of blooms in McClelland Lake. We suggest considering blue-green bacteria (algae) with the plankton community monitoring as well. | Plankton communities often show seasonal succession and large seasonal and interannual variations in composition and abundance in response to changing habitat conditions (e.g. light, water temperature, nutrient availability, dissolved oxygen, food supply) as well as in-lake hydrodynamic and ecological processes (e.g. mixing, predation). Due to the inherent natural variability in plankton communities, it would require many years of baseline data collection in order to detect meaningful changes and distinguish any impacts of mining. |
| 13 | | summary to indicators, and effects monitoring- A clear list with detail of potential (later) and realized impacts is needed but not provided. Fig 3-1 is a crude generalization, and does not include the lake nor the adjacent forests | **TAG** | See response to item #6. | X | | | | N/A |
| 14 | | Basic Lake water balance should be conducted; it is a standard assessment.<br>Measurements of water levels are not sufficient. Measurements (or calculations) of changes in flow (e.g., gradients, spring discharge, streamflow) are required to evaluate water balances and any changes in where water flows | **TAG** | FHEC does collect the data for lake water budget annually and will continue to do so. However, as there are difficulties in measuring aspects of it accurately due to complex and undefined inlets and outlets and due to beaver impoundments, it will not be included as an indicator for the Operational Plan. | | X | | Required for modelling. | A water balance for the lake is conducted annually as part of the ongoing hydrological monitoring of the MLWC. FHEC collects the needed data and this data is used in the HGS modelling and yes there is uncertainty in some of the data collected. |
| 18 | 3-1 | Clearly define the systems that will be addressed. There is confusion of where the lake vs the patterned peatland fit in this objective. Also, in Table 2-2 (objective 1) testimonies indicate that important and values of the whole watershed, and direct use of the peatland (patterned and non-pattern) is not mentioned as much. This should be reflected in the functionality of the non-mined portion that considers more than just the peatland. | **TAG** | See response to Item #4 | | X | | See item #4. | See the updated response to item #4. |
| 23 | 3-1 | Potential spills are listed in the second paragraph, but there is no detail of the constituents of these spills. This detail should be provided and is key for deciding what indicators to use. The organo- and metal contaminants may be, or perceived to be, a significant constituent of these spill. This is not addressed in the lake, or in the forests. The potential contaminants should be listed. | **TAG** | Potential spills would be as a result of construction of the design features, would be local to the area, and standard construction mitigation measures (such as site isolation, spill prevention) and construction monitoring will be employed and detailed in future construction plans. | X | | | | N/A |
| 26 | 3-3 | "Validated" and "verified" are strong terms. TAG has not validated the proposed indicators. Several recommended by TAG are still missing. See comments elsewhere | **TAG** | Your feedback is noted, thank you. The term validated was used to refer to documents that had been approved at the SC and verified was used in the context of that specific workshop. | | | X | Page 3-4. Change "validated by the participants" to "approved by SC". | Agreed, change made. |
| 27 | 3-3 | Page 3-3. Paragraph listing and describing the meeting where indicators have been discussed.This is very misleading. Having a meeting does not indicate that the advisory group endorsed your final selection. To say we met is one thing, but what was suggested should be presented, both the positive and critical statements | **TAG** | This feedback is noted. Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators and some modifications have been made based on SC and TAG feedback. As well, the final list of recommended indicators that was provided by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021) was used as the basis for Objective 2. | | X | | Wording is (largely?) unchanged (pages 3-3 to 3-8). "Approved by SC" is okay. | Noted. |
| 30 | 3-7 | Difficult to measure or insufficient baseline data are not valid reasons to omit a metric. Make the important measurements happen, perhaps by bringing in outside expertise or by modifying the measurement techniques. Suncor has the time to look at environmental changes within the scope of the project, even if measurements are only started now | **TAG** | See response to item #2. | | X | | | Noted FHEC is committed to holding workshops to discuss monitoring with the SC as shown in Tabel 1.7-1 of the Introduction section. |
| 33 | 3-5 to 3-6<br>Table 3.1 | Table 3-1: In discussing and describing the lake, definition or characterization two different regions, littoral shallow zone (2/3rd of lake) and deeper section should be provided, and indicators for each considered. | **TAG** | See response to Item #5. | X | | | Okay. Monitoring added. | N/A |
| 37 | 3-7 | Page 3-7, last line. It does not seem reasonable to fully review Objective 2 without having Objectives 5 and 6 at hand. | **TAG** | Fort Hills has agreed to provide another round of review of the complete OP document by the SC and the TAG. | X | | | | N/A |
| 38 | 3-7 | Figure 3-3, first box. Should be an OR criterion rather than AND | **TAG** | This box has been revised. | X | | | | N/A |
| 40 | 3-7 | Attendance at meetings does not indicate agreement. Don't intimate that TAG (or others) agreed when we raised concerns that have yet to be addressed. A table of how disagreements were considered would help. | **TAG** | See response to item #2 above. Fort Hills has had several meetings to review responses on drafts from the SC and the TAG and it committed to providing responses back with the full draft of the document. These responses from FHEC will encapsulate any items on which consensus was not achieved. | X | | | | N/A |
| 41 | 3-7 | Difficult to measure or insufficient baseline data are not valid reasons to omit a metric. Make the important measurements happen, perhaps by bringing in outside expertise or by modifying the measurement techniques. Suncor has the time to look at environmental changes within the scope of the project, even if measurements are only started now. | **TAG** | This has been updated based on feedback. See the response to Item #2. | | X | | Repeat concern (#30) | Noted see updated response to item #30. |
| 49 | 3-9 | 3.3.2.3. Site-Wide Operational Monitoring Data . The EPEA monitoring is mentioned. This is all well and good, but there is not enough detailed information provided for the committees to evaluate what is being done. State clearly what is being done, and then note (asterisk) and say it will be covered in EPA monitoring. This should include monitoring of contaminants in both the reference and MLWC and lake | **TAG** | Parameters that would be considered contaminants (PAHs, hydrocarbons, etc.) are being monitored in water in the non-mined portion of MLWC and the reference sites as complimentary data in the OP monitoring program as stated in Objective 2. Other EPEA monitoring requirements are clearly stated within those separate programs and will remain there so as to not have overlap between the programs. | | X | | The connection between the OP and other monitoring programs is not entirely clear. Here we have EPEA monitoring; elsewhere we have wildlife monitoring; there seem to be others. Perhaps it should be covered in the Introduction. | FHEC has many monitoring programs that may be able to inform each other. They aren't formally connected per say but if an investigation of cause were to occur because a trigger was reached, FHEC would look at data from other monitoring programs, as appropriate, to aid in determining cause. |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG Response** | **Fort Hills Follow Up Response** |
| 58 | 3-10, Figure 3-4 | Fig 3-4: summary of selected parameters – see main comments.<br><br>Sediments (and top predator- bio-accumulation) should be measured for a representative organo- and metal-contaminants, as in groundwater sampling | **TAG** | The sedimentation rates at McClelland Lake are relatively low due to the extensive fen complex located up-gradient of the lake, which also suggests that any watershed changes associated with Fort Hills mining operation will manifest in the fen complex before any changes can be detected in the lake (e.g. water quality, sediment quality). Sediment samples collected by conventional surficial sediment sampling methods (e.g. Ekman or Ponar) may represent decades of sediment accumulation at one location due to the penetration depths and homogenization of sediment samples within the top layer, and therefore, may not be able to distinguish any short-term changes in sediment quality. Sediment quality samples are not planned to be collected from the lake as they are not early indicators of change and data is not needed to aid in the interpretation of other indicator metrics. Our understanding is that this was discussed and agreed to at the SC based on recommendations approved by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021). | X | | | | N/A |
| 59 | 3-11, Table 3-2, | Water levels and quality in McClelland Lake are important; measure them on the shelf, which represent about 2/3 the area of the lake and is important habitat for stakeholders. | **TAG** | Water quality in shallow areas of the lake and lake water levels are being measured. Details are provided in Objective 5. | X | | | Added monitoring stations (deep and shallow for lake). | N/A |
| 60 | 3-11, Table 3-2, | Need contaminant monitoring as an indicator of changes and health. | **TAG** | See response to item #49. | X | | | | N/A |
| 63 | Table 3-2 | Table 3-2: Chl-A is a terrible parameter to use on Boreal Plains lakes - they are nutrient rich to start with. This will cycle greatly within years and between years. For water quality look at blue-green algae (others?) and sediments or for bioaccumulation. | **TAG** | See response #11 above. | | X | | See comments on #11. Perhaps consider blue-green algae in plankton communitie sampling. | Plankton communities often show seasonal succession and large seasonal and interannual variations in composition and abundance in response to changing habitat conditions (e.g. light, water temperature, nutrient availability, dissolved oxygen, food supply) as well as in-lake hydrodynamic and ecological processes (e.g. mixing, predation). Due to the inherent natural variability in plankton communities, it would require many years of baseline data collection in order to detect meaningful changes and distinguish any impacts of mining. |
| 66 | | Exclusion of complementary data based on the premise that it is difficult to measure, may have insufficient pre-mining baseline datasets, may not be indicative of early change in MLWC functionality, or may not be responsive to Fort Hills Project mitigations are not valid reasons. These operations are having a massive impact on the environment and many parameters may be difficult to measure. Clear reasoning or definition of these criteria are needed. TAG disagrees on decisions to drop parameters (e.g., gradients, springs, sediment contamination, tree growth, wildlife) that they are not indicative of early change. Define the timeline. Consult experts to refine the monitoring program. Table 3-3, Not clear why contaminants have been excluded, or if they examined in another context (i.e., EPEA) | **TAG** | See response to items #2 and #37. | | X | | Repeat concerns. | FHEC believes the responses to previous items #2 and #37 is an adequate response. As noted, FHEC is committed to holding workshops to discuss monitoring with the SC as shown in Tabel 1.7-1 of the Introduction section. |
| 73 | | Table 3-6. Water balance for the lake is key. If you can come up with a balance for objective 1, why not maintain monitoring of this during operations? This is a standard assessment tool. | **TAG** | FHEC does collect the data for lake water budget annually and will continue to do so. However, as there are difficulties in measuring aspects of it accurately due to complex and undefined inlets and outlets and due to beaver impoundments, it will not be included as an indicator for the Operational Plan. | | X | | Required for numerical modelling. (Duplicate of #14) | Please refer to reply for #14 |
| 74 | | Measurements of water levels are not sufficient. Measurements (or calculations) of changes in flow (e.g., gradients, spring discharge, streamflow) are required to evaluate water balances and any changes in where water flows | **TAG** | Gradients are currently included as complementary data; water balance in lake not included because it is difficult to accurately measure outflow. | X | | | | N/A |
| 75+A104:A7:I116 | | Table 3-6: Excluding examining lake sediments:It should be made much clearer on the science used to rationalize this? This seems to be at odds with standard impact assessments. Following sediment contamination is a standard way to follow potential impacts.<br>If there is contamination via dry fall, or unknown inputs this is the primary way to detect this. Also define "Early change". Increase in contamination over 10-20 years is a "early" signal to long-term problems | **TAG** | See response to item #58 above. | X | | | | N/A |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 3 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG response** | **Fort Hills Follow Up Response** |
| 3 | General comments: Incomplete – further review is required | This represents a preliminary review of a first draft of the most important objective, Obj 3. There is a tremendous amount of work presented in this objective. However, there was considerable delay in receiving this document, and limited time to review given the scope of work and length. In addition, the appendices with the crucial information to assess are over 400 pages. All sections on water quality, modelling and otherwise, are missing from this draft.<br><br>Surface-water quality modelling is not ready to report. How can this assessment be completed without a robust discussion on water quality? It can't.<br><br>A more detailed review can be provided once the Objective 3 section is complete. | **TAG - Hydrology** | Noted thank you. FHEC will provide the water quality modelling results as per our schedule discussed at the October 7th meeting with the SC. | | X | | Still awaiting Water Quality.<br>Also, with the new and definitely improved conceptual model of water interactions, sources and pathways presented in Section 4.3.1.1 (including Figure 4.3-20), please clarify that this information has been used in other sections. It appears to not have been used in analyses and comparisons of background data and reference systems in objective 1 - background conditions. | Please see follow up response to item #7 |
| 4 | General comments: IK Integration | The Plain Language summary is a great way to introduce the protocols and importantly the conceptual model illustrating the holistic linkages of the system. It also provides a great opportunity to integrate IK and the sciences. Having said that, at present it merely **highlights what information was or could be used but does not directly state how**.<br><br>This is where a **summary conceptual model that synthesizes the understanding of Western Science and IK, and illustrates the foundation for the numerical modelling, assessment, and mitigation strategies.** This summary could then be informative and used by all parties. At present it presents little to inform stakeholders or scientists. It largely comes across as a "feel good" document. | **TAG - Hydrology** | Accepted. The plain language summary will be updated to include how the info was used to build the conceptual model and the HGS model. It will be redesigned to be an actual summary (at a very high level) of how water and nutrients cycle through the system, how the HGS model was applied and a generic (because details may change as engineering advances) description of the mitigation strategy | | X | | The summary of the conceptual model in the Plain Language Summary appears to be exactly the same as that in this Chapter and the Appendix. They **must be** three different summaries. | Thank you, FHEC has tailored the 3 summaries to the intended audiences. |
| 5 | General comments: Summary Conceptual model is required | There is no summary conceptual model showing the whole system, nor a basic synthesis of the interconnectedness of flow paths and the key processes at various locations throughout the MLWC. These are required for the final assessment of the relative roles of different sources, mitigation operations and success of the cutoff wall.<br><br>Importantly a synthesis of the conceptual model is required to direct the understanding of hydrologic processes and to define the locations to measure the indicators referred to in other objectives. Currently the reader must collate and synthesize this information from individual descriptions in the appendix that is extremely long. | **TAG - Hydrology** | Accepted. An enhancement of the conceptual model synthesis will be made in the conceptual model appendix of Objective 3. This information is summarized again within the main body of Objective 3 (Section 4.3.1) and in the plain language summary. Hopefully these 3 syntheses will be sufficient for everyone's needs | | X | | See reply to item #4. Three different syntheses for three different audiences are **required**. | Please see response to #4 |
| 6 | General comments: Incomplete – further review is required | In the text the direct citation of important sections in the appendix (appendices?) referred to in the main document are not provided. This is difficult to follow and provide a thorough assessment. As stated above, this is a rather preliminary draft that is difficult to fully assess in a short period of time. Recognizing the timing and the stage of the draft (but incredible amount of work), the expectation is that Suncor will submit a revised draft for consideration. | **TAG - Hydrology** | These citations have been updated to point to the appropriate Appendix. | X | | | | N/A |
| 7 | General Comment | It appears that the conceptual model came after the model development. This is opposite to the standard approach, although we do recognize the iterative nature of these assessments. We anticipate that Suncor will complete the iterative step (i.e., update the numerical model to agree with the conceptual model) soon. Related to the last statement, are the references to using the current model for indicators and mitigation used in objective 2 and 4 (and likely 5 and 6). It is not clearly stated whether Suncor used the current model results for their interpretation and actions indicated in the other objectives, or whether these results are new and the interpretation and actions need to now be applied. At a minimum the other objectives require adjustments to correspond to the new information contained in the new models. | **TAG - Hydrology** | The MLWC HGS model is a multi-generational model wherein the conceptual model has been progressively updated and then the HGS model was updated. For the MLWC OP, the HGS model used the most current conceptual understanding as of EOY 2020. The 2021 MLWC conceptual model includes new info not considered at the EOY 2020. However the conceptual/numerical work will continue after the OP submission and continue to use the methodology have used all along. The next build of the MLWC HGS model (currently underway in October 2021) is using the 2021 conceptual model as its basis. The primary updates are Aspen AET rates assigned in the Fort Hills and how long and how hard the ground freezes. The climate forcing data is also being examined to mitigate the simulated vs observed lake levels deviation from 2005-2009 (Fort Mac airport data did not record the convective storms that occurred at the MLWC). JP showed the TAG that swapping in Bitumount climate data fixed the issue with simulated lake levels. The TAG also suggested looking at Mildred Lake data too which will be done. Drafts of the conceptual model were used in writing the other objectives. | | X | | It is understood that the HGS model will be continually updated. The question is whether the results of other sections in the OP have used the most recent version of the model. Please clarify. | The 2020 MLWC HGS output was available for processing and analysis in spring and early summer of 2021. The reporting and interpretation of those results was passed to FHEC over the summer of 2021 as a series of progressively more complete drafts. A similar story for the conceptual model. Partial drafts were provided to others as the writing progressed. The newest conceptual and HGS info is largely being reflected in the remaining OP objectives. It is fully expected that refinement of the conceptual and HGS models will continue after the OP submission. This does assume that alignment across the entire MLWC OP, based largely on Objective 3 findings, will tighten up substantially over the next few years and the SC will be part of this process. |
| 8 | General Comment | We disagree that the simulated groundwater elevations are close to the observed from the tiny map/plots and table of values and differences provided. Many core ranges don't even overlap. Importantly, the simulated water levels are systematically higher than the observed, indicating a bias in the calibration. A time series of water levels and assessments of goodness-of-fit are required for further evaluations. | **TAG - Hydrology** | There is a slight over pressurization bias in the deeper Quaternary aquifers making up the FHUC (silt sand aquifers 1-4). The bias is much less pronounced for the groundwater levels under the fen (surface sand aquifers) and peatlands. This continues to be addressed in the HGS updates. | | X | | We await an updated version of the model. | An update to the 2020 MLWC HGS model is currently underway. TAG is aware of the larger changes (ET rates in FHUC, freezing intensity and climate forcing). This is an interim update and is currently undergoing PEST calibration. The 1st PEST iteration results indicate that increasing AET targets for the FHUC is bringing down that over pressurization in those deeper units. Hopefully that trend continues. A rebuild of the HGS model is planned for later in 2022. FHEC is anticipating 1-2 modelling and conceptual workshops can be held in advance of the 2022 HGS rebuild to get TAG input before the model is finished being designed and built. |
| 9 | General comments: Simulated Water management system scenarios | We need to know how management of the system was simulated (i.e., fen resupply and OW injection wells, in particular) and how that relates to implementation. Digging into the Aquanty appendix the resupply and injection rates are stated to be specified as differences between the R1 and R0 model simulations. That approach assumes ideal knowledge of different realizations. How will they be determined in practise when there is only the one reality? | **TAG - Hydrology** | To support designing the mitigation system, historical climate data needed to be used and it is agreed that this allows perfect knowledge of the system response. In operating the system, the weather will not be known in advance and so a different methodology would need to be used. This methodology would need to combine knowledge of historical system states and responses, field data (e.g., water levels) and modelling. Water resupply volumes would need to be forecasted and rolling adjustments to these forecasts would need to be made. It is possible that machine learning could be used to help support operation of the system. FHELP will not be solely relying on historical climate data and the HGS model to operate the water resupply system | X | | | The details of the "Operating Philosophy" (new Section 5.4.5) help lay the groundwork for this issue. It is understood that the details will need to be developed later. | N/A |
| 10 | General Comment | Groundwater quality is explicitly excluded from the evaluation. Why? It was established in Objective 1 (and the Conceptual Model appendix) that groundwater quality varies and has an influence on surface-water quality. | **TAG - Hydrology** | Groundwater quality is included as an input to the EFDC model, but EFDC is a surface water quality model. Groundwater quality modelling will be conducted as it pertains to the injection system during future design work of that system and this work will be advanced post-submission. | | X | | We await the water quality modelling. But, we note that in the latest version, for "objective 1 Background" integration of the conceptual model, groundwater quality associated with EHZ-HRA groups and surface water had not yet been conducted | Groundwater water quality modelling for the MLWC site will be conducted starting in 2022. Options/model platforms for doing so are currently being explored. FHEC is hoping to draw on TAG experience to land on an optimal approach. As the MLWC water quality conceptual model continues to be refined (as part of the overall MLWC conceptual model efforts), the influence that GW water quality has in each HRA and on surface water will be clarified. This work is ongoing. |
| 11 | General comments: Readability | The Conceptual Model and HGS Model appendices were neither searchable nor bookmarked. This made TAG's review more difficult than it needed to be. Numerous pages in the Conceptual Model appendix required rotation. That said, the appendices were not reviewed; they were only used as a resource for several specific questions. They can be reviewed once the Objective 3 section is revised. | **TAG - Hydrology** | This has been corrected. | X | | | | N/A |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 3 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG response** | **Fort Hills Follow Up Response** |
| 15 | 4-1 | The recommendations in other objectives need to be reconsidered with the new data presented for Objective 3 because Objective 3 reporting came after all other objectives. Provide clear statements as to whether the conceptual model and modelling results provided in Objective 3 were used in the versions of Objectives 2, 4, 5 and 6 presented earlier this summer. Or, given that Objective 3 has only recently been provided, have these current results from Objective 3 been incorporated in the other objectives. | **TAG - Hydrology** | See response to item #7. | | X | | See reply to Item #7. | Please see follow up response to item #7 |
| 22 | General Comment | This section is very short, but cites a long appendix where the reader is to somehow envision the conceptual model. The appendix is not cited properly, and there is no summary of the processes or synthesis to allow the reader to assess, quickly and easily, the "interconnectedness" of the system with the surroundings. | **TAG - Hydrology** | A summary of the conceptual model is now provided in Section 4.3.1. | | X | | See replies to #4 and #5. | Please see response to #4 |
| 23 | TAG Input | TAG provided the first draft for a summary conceptual model over a year ago. We expected some progressive iterations of this and reporting of the final synthesized model. A version would have been needed to direct the numerical modelling and to allow TAG to assess the appropriateness of the numerical modelling approaches and interpretations for mitigation provided in Objectives 2 and 4.<br><br>Provide a summary of dominant flow paths and connectivity of the fen and lake to each other and the surrounding landscape. | **TAG - Hydrology** | A summary of dominant flow paths and connectivity has been added as a part of conceptual model synthesis in appendix. All of the needed information is already in the conceptual model, it just needs to be summarized in one location. | | X | | Okay. But note the comments on the Conceptual Model summaries (4, 5, 22). Different summaries are**required**. | Please see response to #4 |
| 30 | 4-2 | The results from this objective (3) are quoted to be used for Objective 6. However, given that this information came long after Objective 6 was presented, please clarify whether the current information presented in Objective 3 was used, or whether some adjustments are required to finalize objective 6!<br><br>Re-evaluate other objectives considering this updated Objective 3 (once revised). | **TAG - Hydrology** | See response to item #7 | | X | | See reply to Item #7. | Please see follow up response to item #7 |
| 46 | 4-4 | A summary conceptual model, with a holistic view of the interconnectivity of adjacent landscape and the fen-lake complex should be provided in the first step of model description. Then a description of illustration of how the numerical model (HGS) is used in this context can follow. This should be shown along the description in section 4.3.2.1 and linkage assessments. | **TAG - Hydrology** | Succinct explanations of how the overall system works together are provided in the plain language summary and conceptual model appendix. A summary of the conceptual model is now provided in Section 4.3.1. | | X | | See replies to #4, #5, #22 and #23. | Please see response to #4 |
| 47 | General comment | The term "hydrogeology and surface water assessments" is used throughout. It should be clarified whether this is based on the conceptual model, numerical model, or both. | **TAG - Hydrology** | The final paragraph in Section 4.3 indicates that the quantitative risk assessment is based on the numerical integrated surface water and groundwater flow model and the EFDC surface water quality model. | X | | | | N/A |
| 48 | 4-5 | Section 4.3.2.1.1 (Linkage Assessment): all the information should be clearly referred to on the conceptual model and map of the locations. | **TAG - Hydrology** | Fort Hills believes that this information is provided in numerous locations in the document already. With the full document available, this should help eliminate the need for the requested changes. | X | | | The recent conceptual model, with appendices, is sufficient. Please clarify the use in the modelling and other objectives | N/A |
| 49 | General comment | Table 4.3-2, and elsewhere. The order of the wells is alphabetical, which is essentially random. Group into eco-hydrologic units and provide descriptive labels so the reader can follow the interpretation. | **TAG - Hydrology** | Tables 4.3-2, 4.3-3, 4.3-4 and 4.3-5 have been updated to group the wells in EHZ. | X | | | Thank you! | N/A |
| 50 | General comment | Well names: Throughout, the name should make it clear whether this refers to a well or a piezometer, and what the average depth of the screen is for piezometers. This is required to interpret the effectiveness of the measurement in indicating surface and or groundwater. | **TAG - Hydrology** | Tables 4.3-2, 4.3-3, 4.3-4 and 4.3-5 have been updated to clearly delineate between wells and piezometers, as well as the average depth of the screen. | X | | | | N/A |
| 51 | Page 4-5 | Figure 3-1 is cited; TAG assumes this is Figure 4.3-1 | **TAG - Hydrology** | Correct - this has been updated in the text. | X | | | | N/A |
| 52 | Page 4-8 | Simulated pre-mining baseline. It is extremely difficult to follow this section and assess the approach and interpretation of the findings. | **TAG - Hydrology** | Fort Hills would like to further understand this comment, as it is not clear where the confusion is coming from. | X | | | The details behind this comment are lost; perhaps we meant a different section. | N/A |
| 53 | Page 4-23 | Climate change. There are several typos in this section, please correct.<br><br>**Finish editing and updating the draft report** | **TAG - Hydrology** | This section has been updated and typos have been corrected. | X | | | | N/A |
| 54 | Page 4-24 | Figure 4.3-6. Are the lines for min and max to designated ground surface? Please define. | **TAG - Hydrology** | The dashed lines indicate the minimum and maximum simulated water level using historical climate condition as input. | X | | | Now Figure 4.3-7. | N/A |
| 55 | Page 4-25. | ".. risk assessment is elevation." Clearly define what elevation, and what measurement properties or statistical summaries were or would be used. | **TAG - Hydrology** | Paragraph has been updated to clarify that the metric used is the change in elevation of groundwater levels. | X | | | | N/A |
| 56 | General | App ***, Append *** appendix ***, section *** should not be presented in a draft to TAG. This objective relies on these citations, thus this objective is not finished.<br>Provide complete references to appended material. | **TAG - Hydrology** | These references have been updated. | X | | | | N/A |
| 57 | General | Provide a synthesis of the Conceptual Model. | **TAG - Hydrology** | See the response to item #46 | | X | | Repeat. | Please see response to item #4. |
| 58 | General | Provide details on the Water Quality modelling | **TAG - Hydrology** | This will be provided as per the schedule provided in the October 7th SC meeting. | | | X | | These have been provided on November 26th, 2021. |
| 62 | 4-5 | Key aspects (e.g., changes in peat properties, changes in seasonality of flows) of the system need to be considered | **TAG - Hydrology** | The assessment is focused on the metrics that have been selected in association with the selected indicators and the primary effects related to the water management design features. Other key aspects would be part of future modelling activities (such as during future work on the water management design features) as well as included within the monitoring associated with the OP. | | X | | Freezing, for instance. Incorporation in next version of HGS model is mentioned. | Assessment of the HGS results continues in the ongoing engineering work on the design features. including items such as the impact that any peat consolidation may have on the flow system. This is done both with the HGS model and with professional judgment and field data. Shallow flow pattern alterations due to development is part of the ongoing engineering work that is currently underway and will continue post OP submission. |
| 97 | General Comment | The introduction to lakes is very simplistic even for lakes in general. This indicates the writer has a lack of understanding of the variability in lake processes and boreal plains lakes in general. | **TAG - Hydrology** | Objective 1 provides specific information on McClelland Lake, while the information in Objective 3 is intended to be more general. | | | X | The comment was not about McClelland Lake specifically. The comment was aimed at the very simplistic description of lake processes. (Section 4.3.2.4). There have been some improvements in the recent version, but descriptions of Chl-a are tied directly to nutrient dynamics, indicating these could be monitored. | As mentioned in Objective 2, nutrients may be monitored in McClelland Lake as complementary data to support the interpretation of the primary effect indicator metric (i.e., chlorophyll a) because of the relationship between nutrient concentrations and primary productivity. |
| 98 | General Comment | The variability in water depth and area of sediment exposed over a season can be significant. This is an important consideration in short-term and long-term sediment storage and surface water nutrient concentrations, trophic interaction, and the like. But this is not considered. | **TAG - Hydrology** | Fort Hills recognizes that the suggestion is valid; however, would like to have further discussions with the TAG the SC prior to additional work being completed on this item, particularly as it pertains to reference sites. FHEC hopes to be able to table it at the workshops planned for 2022. | | | X | Requires discussion. | FHEC agrees that more discussion is required and is committed to discussing in workshops planned for 2022. |
| 99 | General Comment | General terms such as "an ion" are not acceptable. Be specific and demonstrate an understanding of the processes acting within the system. | **TAG - Hydrology** | Fort Hills believes the information provided is sufficient. | | | X | Page 4-31, last paragraph. Please edit to provide clarity on what ions are being considered. | Reworded to refer to the toxicity from water quality parameters in general and the toxicity modifying effect from ions. |
| 102 | 4-27-4.32 | A simple, linear, positive feedback between climate drying and vegetation succession is assumed throughout. The multitude of positive, and importantly negative feedbacks between water balance – storage relationships, hydroperiod, peat properties and vegetation are not considered<br><br>Further evaluation of feedback mechanisms is required. | **TAG - Hydrology** | Fort Hills recognizes that the suggestion is valid; however, would like to have further discussions with the TAG the SC prior to additional work being completed on this item, particularly as it pertains to reference sites. FHEC hopes to be able to table it at the workshops planned for 2022. | | | X | Requires discussion. | FHEC agrees that more discussion is required and is committed to discussing in workshops planned for 2022. |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 4 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG Response** | **Fort Hills Follow Up Response** |
| 3 | General | The title of the Objective is: "Establish Necessary Design Features and Contingency Mitigation Measures". The section contains very little information on alternatives for Contingency Mitigation Measures; Section 5.5 is three short paragraphs. The section does contain appreciable information on the (necessary) Design Features, at least from a conceptual and timing perspective. Overall, these seem suitable (although TAG does offer some preliminary comments below). But, how is it operated? How are the necessary flow rates (magnitudes and timing) determined? How frequently are they adjusted? How are snowmelt and storm events accounted for? How are the appropriate volumes determined? And where are they applied? How does operation relate to monitoring and modelling? Objective 6 indicates feedback from monitoring (and triggers) will only occur every quarter. Is that sufficient? When is the model updated? How does operation relate to observations from Reference Ecosystems?<br><br>In summary, this section of the Operational Plan does not provide sufficient information on how the system will actually be operated.<br><br>Recommendation<br>Provide descriptions of how the system will be operated, including linkages to modelling, monitoring and variations in climatic inputs.<br><br>The (conceptual) design figures are informative and help with understanding the design; however, the captions provide too little information. | **TAG - Hydrology** | See Section 5.4.5, Operating Philosophy, has been added to Objective 4. | | X | | The description is improved. The overall concept is thin at this stage, but a commitment to workshops is appropriate. Work in progress. | Noted, thank you. FHEC has now included a commitments table in the Introduction section (Table 1.7-1) to capture these. |
| 14 | Figures 5.2-1 to 5.2-4<br>5-4 to 5-7 | Section 5.2 (Fig 5.2-1 to 4): Volumes are provided, these could also be reported as depth (mm) on the other axis. This helps greatly in interpretation of the range and confirms the region/area of concern.<br><br>Are these volumes to be added to only the Fen proper or the fen and Lake? It appears that only the fen is of concern; the lake should also be considered | **TAG - Hydrology** | - The volumetric information cannot be directly translated to fen water depth in mm in the same figures, because the fen water level has a complex non-linear relationship to the water inflow to the fen. The effects on the fen and McClelland Lake water levels without the proposed water resupply mitigation are described in Section 4.3.2.1.3 under Objective 3 (e.g., the McClelland Lake water level could be reduced by up to 1 m without the proposed water resupply operation).<br>- Water resupply to the system will occur as described in detail in Section 5.4.2.3: During construction of the working platform (short-term), distribution at the outlet of each pumping system would be a spray to not cause erosion; deliver the water from the water storage pond to the fen after platform constructed (long-term). Water supply is applied to the fen. However, since the inflow to the lake is mainly through the fen and the effect will indirectly help with the lake water level. Reference to McClelland Lake is added in the text to make it clear for addressing the second comment. | | | X | The request has been misinterpreted. For each volumetric flowrate, provide normalized flux by dividing the volumetric rate by the associated area. This corresponds to standard practise for hydrologic budgets. | Thanks for the clarification and now it is understood what is being asked: As the TAG is aware, the Objective 4 mitigation plan presented in the OP is conceptual in nature and the engineering work to fill in/finalize the mitigation details is ongoing. Workshops on this objective are planned with the TAG on this topic post-OP submission. FHEC will break the non-mined portion of the fen up into an injection zone and a SW resupply zone and divide the relevant applied resupply volumes by the concomitant surface areas when presenting future mitigation concepts to the TAG and others. This work will not be done for the OP but will be done for ongoing mitigation work to facilitate ongoing analysis of effectiveness of the proposed mitigation options. |
| 24 | Figures 5.3-2 to 5.3-4 | Section 5.3. Figure 5.3-2 to -4, covers 2025 to 2029:<br>• Industrial runoff is used as a source water pond, then fed into the fen. It is not clear how water quality can be maintained by just using a pond.<br>• The working platform for the cut off wall dissects the wetland in 2029, and it appears that the infrastructure is not in place to compensate for blockage of flow from above the platform. How will water flow in the fen below the platform be maintained until the pipes are set up in 2034 (Figure 5.3-5)? If no infrastructure, then what assumptions are made about the fen maintaining water levels? | **TAG - Hydrology** | · Water quality of muskeg drainage and overburden dewatering water is discussed in Table 5.2-1. In addition, Section 5.2.3 includes the following statement: "The FHEC plans to continue its evaluation of the above-mentioned water resupply sources, including confirmation of any water treatment requirements, as well as potential use of FHUC Quaternary aquifer water particularly during the initial water resupply period."<br>· Note 9 is added in Figure 5.3-4 regarding the water pumping and distribution system. | | X | | "plans to continue its evaluation". More work is required. | FHEC agrees that more work is required, including a workshop on water source with the TAG in 2022, see Commitments Table in the Introduction section (Table 1.7-1). |
| 25 | Figures 5.3-5 & 5.3-6 | Figure 5.3-5 & 6: There is 8 years from building the platform and placing in the cut-off wall. The area of "muskeg" drained for the earlier years seems quite small.<br>• Is it assumed there will be no runoff generated from the remaining fen, and thus little water and flooding at the working platform? This may not be the case. Is there any provision for transferring, storing etc. the water that may be generated from the peatland (muskeg) above the working platform? | **TAG - Hydrology** | The remaining fen upstream of the working platform will continue to generate runoff unitil it is mined out. Management of this runoff upstream of the working platform by pumping over the platform, is described in Section 5.4.2.3. | | | X | "Flexibility in design and how to move water from above the working platform and delivered to the surface of the un-mined wetland has been discussed in concept. Final method to be considered | Agreed, FHEC will be sharing this work with the SC and the TAG as the design matures. |
| 26 | Figure 5.3-7 | Figure 5.3-7. By 2037, using water from overburden dewatering – will this match the chemistry of water generated near the surface of the peat?<br>· FHUC – pump water from Aquifer 4. How will this impact the stream that drains into the McClelland Lake? What does the modelling indicate is the proportional source of the stream to the Lake maintenance? The x-section Fig 5.4-7 indicates that withdraw from Aquifer 4 may impact this inflow stream. | **TAG - Hydrology** | Work continues to determine the quality of the overburden water and its treatment requirements, if any. There is current uncertainty in how pumping AQ 4 will influence stream/spring flows. FHEC is planning a pumping test taking place in winter 2021/2022 to attempt to partially instrument the spring(s) to answer this exact question. | | X | | Further work required. | Agreed. These issues are both currently part of the ongoing engineering work for the mitigations. FHEC is anticipating working through the details of these issues with the TAG. |
| 29 | Conceptual Closure – Fig 5.3-9 | Conceptual Closure – Fig 5.3-9. The original source will be modified. Once Objective 3 is completed, the assumptions on runoff and connectivity may be further addressed. At present it appears that final plan will have reduced the contributing area to the top part of the fen that direct water into the non-mined portion<br>• The overall catchment area has been reduced, but importantly the proportion of peatland (contributing areas) to forest upland has been reduced. The soil texture and vegetation structure of the forest must be presented, and hopefully is pine on sandy soil rather than aspen. If not this configuration of the headwater catchment may produce too little runoff<br>• The patterned fen on the northwest. It us unclear if there will be enough water to maintain the pattern ecosystem. With an overburden dump, and water injection, will the "oligotrophic" groundwater source that generated this peatland ecosystem be maintained?<br>• The overburden dump. Runoff arrows are drawn as if this forested site will generate runoff. The assumptions are likely not to hold. It is likely to have low average runoff, and high flow infrequently (Devito et al. 2012). Such flow regimes are not conducing to fen development | **TAG - Hydrology** | North External Dump (NED) will be reclaimed with predominantly jackpine on the plateau, and with jackpine, trembling aspen and birch on the slopes. Appropriate shrub species will be selected at the time of planting. The inclusion of NED in the closure watershed is important to maximize water supply to MLWC while still directing flow from End Pit Lakes away from the watershed. Keeping the NW section of the wall in place during closure helps to maintain the water levels within MRV. The area closest to NED sees the largest change in water levels. FHEC will continue to develop improvements to the closure plan and welcomes further input from TAG and the SC in doing so. | | X | | Pending model updates and refinement of the OP and ensuing programs. | Noted thank you. |
| 30 | **General** | The overall engineering design seem reasonable, but this is TAG's area of expertise. It is the timing and location that should match with the conceptual understanding of hydrologic connectivity and if and how the operations interact with these engineered features. | **TAG - Hydrology** | Noted | X | | | There was a (significant) missing word in TAG's original response: "… this is NOT TAG's area of expertise." | Noted thank you. |
| 37 | 5.4.2.4 Fort Hills Upland Complex Water Interception Ditch | Toe ditch – in Fig 5.4-4. Seems to be located above the swamp ecohydrologic areas. Could provide an excellent experiment | **TAG - Hydrology** | Fort Hills respectfully disagrees with this recommendation, the OP is a very long document and the use of acronyms will help significantly in reducing its length, and repetitiveness. That said, NED is the North External Dump and is in the list of acronyms | X | | | Reply does not apply to this comment. :)<br>For this comment a detailed reply was not expected; the observation was that there might be unexpected results from this implementation. FHELP might want to re-evaluate the design. | Apologies yes this response was to another comment. Thank you for the feedback. |
| 46 | No page number | Insufficient detail (options) provided. | **TAG - Hydrology** | Noted. | | | | | N/A |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 5 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG Response** | **Fort Hills Follow Up Response** |
| 11 | General comments on Objective 5 | The comments and suggested improvements for Objective 1 and 2 must be incorporated first, to direct and modify the effects monitoring program. Problems associated with monitoring baseline conditions, and lack of key parameters in Objective 1 and 2, greatly decrease the effectiveness of the monitoring program proposed in Objective 5. Furthermore, the details of Objective 3 (the conceptual and numerical models) and Objective 4 (the proposed modifications to the system) are required to understand what should be monitored and where, and to what degree the system might be expected to vary. That is, use the outcomes of Objectives 3 and 4 (including parallel work on Reference Ecosystems) to target monitoring locations.<br>This reporting on the Objective 5 design is so high level that the effectiveness, robustness, and rigor of the science in this program cannot be evaluated at this time. More details and all the background information are required. | **TAG - Hydrology** | FHEC acknowledges that the out of sequence review was challenging and hopes that the additional time given to review the document as a whole will help show how it fits together. | | X | | Incorporate new information from conceptual model and modelling in Objective 3 into this objective and others. | It is unclear at this time what the TAG feels is missing from the monitoring program. However, FHEC has committed to workshops with the TAG and SC on monitoring in 2022 and suggest that TAG table it there. |
| 12 | General comments on Objective 5 | Revisit Objective 5 after modifying Objectives 1 and 2. A major gap in the effects monitoring is failing to assess how the operations (i.e., Objective 4) may affect different source areas, the flow paths and substrate geology interaction that influences the water chemistry moving to and through the MLWC and lake. The effects of operations are contingent on how they interact with sources of water to MLWC and the lake. This is controlled by the hydrologic setting (i.e., the HRA). Using a representative EHZ is inadequate because it only provides information on similar types of vegetation and water levels present. Integration of the EHZs with the HRAs will be necessary to direct sampling locations. | **TAG - Hydrology** | Recommendations that were incorporated in to previous Objectives have been carried through subsequent Objectives as necessary. The integration of the EHZs with the HRAs has been considered and is discussed in the Conceptual Model Appendix of Objective 3. Different source areas, flow paths and substrate geology have taken in to consideration when choosing monitoring locations and the text has been updated to reflect that. As the design features move from a conceptual plan to detailed engineering, monitoring plans can and will evolve to include more locations as necessary. Also, please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4. | X | | | Improved monitoring network noted. | Thank you. |
| 13 | General comments on Objective 5 | The same EHZ on the south and north side of the MLWC receive different types and flow paths of water and chemistry. Thus, both sides should be monitored for all EHZs. For example, a selection in EHZ4 on the south (base of Ft Hills) is not representative on the potential impacts of different operations that occur on the north. Both sides should be monitored as there are different operation procedure occurring on the north and south watershed. EHZ 1, 2 and 4 that receive waters from NOP require better characterization<br>and monitoring. | **TAG - Hydrology** | Both sides will be monitored as part of the early warning monitoring program. The "early warning monitoring zones" shown on Figure 6-3 were meant to delineate where further early warning monitoring will occur in the future once the location of the design features is better understood. There are many suitable locations in those areas that have sufficient baseline data and additionally, locations will continue to be examined in future, for example during the 2021 field season, and during the 2021/2022 drilling programs. Points that were shown on Figure 6-3 were not the only locations that will be included going forward. However to address the question, water level monitoring locations have been expanded to capture flow from NOP. Please see updated figure and text. | X | | | Improved monitoring network noted (now Figure 6.2-1). The figure is also improved. | Thank you. |
| 14 | General comments on Objective 5 | AQ3 and 4 are likely sources for the mineral-rich pattern fen portion, these should be included in the monitoring program. Currently, effective monitoring of all possible impacts by operations and mitigation strategies has not been proposed. | **TAG - Hydrology** | See response to item #13 and additionally, FHEC has added locations in the FHUC to capture these areas as recommended. These were added under item#58 below. Please see updated figure and text. | X | | | | N/A |
| 15 | General comments on Objective 5 | A detailed list of possible and perceived impacts should be provided (see comments on Objective 2) and monitoring placed into the context of addressing these potential impacts. | **TAG - Hydrology** | The reader should be pointed back to the driver-stressor-response section in Objective 2. The impact pathway diagram provided there was recommended and approved by the SC. The diagram also shows the full suite of potential impacts and where they are addressed (OP vs. other site-wide monitoring vs. ESCT). The primary effects indicators to be included in the OP are further discussed at the beginning of Section 6.2. | X | | | | N/A |
| 16 | General comments on Objective 5 | The information provided on monitoring of the reference systems (Audet, Gypsy Gordon) does not allow the advisory panels to assess the effectiveness of the site location or parameter election, and thus effectiveness in general. Some consideration of HRA integrated with EHZ is required for the reference sites, and comparison with equivalent type sites in MLWC and Lake are required to effectively assess/trigger early warning signals and correctly interpret the BACI design. Description of this in some detail is needed. Without such detail it appears that only a simple, general idea has been conceived and is being presented, with the intent to "work it out later". Without careful consideration of the nuances required to direct an early warning system and to assess changes at both the reference sites and MLWC, there could be serious misinterpretation and incorrect actions. | **TAG - Hydrology** | FHEC acknowledges that more information is required for the reference sites and is committed to progressing this work in 2022. See responses to items #7, #8 and #15 on Objective 1. | | | X | Further work required. | Agreed further work is required on the reference sites. FHEC is committed to progressing this work with the TAG and the SC in 2022 and has included this in the Commitments Table in the Introduction (Table 1.7-1). |
| 29 | 6-1 | There is insufficient information on earlier objectives and how they tie into this objective. The advisory committee cannot make informed decision on the effectiveness of Objective 5 without reviewing Objectives 3 and 4 (i.e., Objectives 1 and 2 are not enough). | **TAG - Hydrology** | See response to item #11. | | X | | See our response to item #11 | Please see the FHEC response to item #11. |
| 30 | 6-1 to 6.2 | Page number [ 6-1], Here, as in objective 2, it is misleading to indicate that many workshops where conducted and this justifies or validates the direction taken in this objective. There were many workshops, but finalization of the monitoring program was not completed, and in addition this report does not act on many of the recommendations that were made<br><br>Last paragraph page 6-2 (and first paragraph of Section 6.2): Effectively dropping the committee's recommendations and choosing a convenient subset. SUNCOR requires much better justification than what is provided here | **TAG - Hydrology** | Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss comments on draft sections of the OP and many modifications have been made based on SC and TAG feedback. As well, the final list of recommended indicators that was provided by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021) was used as the basis for Objective 2 and subsequently the effects monitoring under Objective 5. Ultimately, the classification of indicators and where they sit within the framework of monitoring for Fort Hills is a Suncor decision but has been made using the list of indicators and other recommendations provided by the SC. The rationale behind why some have not been included is provided in the text of Objective 2 and also in this response document. | X | | | Improved wording is now included in the Introduction. Thank you. | Noted. |
| 51 | 6-3 to 6.4 | Page number [6-3 and 4, Fig 6-2]. This is so high level as it provides little information on the potential impacts of operations and the effectiveness or robustness of the monitoring program. | **TAG - Hydrology** | A brief description of potential impacts (furhter detail in Objective 3) and water management design features (further detail in Objective 4) was added for additional context; however, now that the reader has all Objectives, this may not seem like such a large gap. | X | | | | N/A |
| 52 | 6-5 | Page 6-5 and Table 6-1. Some maps showing the sampling at the reference sites are required. Page 6-5. Monitoring will be at randomly selected points. Why not target specific points that the conceptual models and numerical models (i.e., the integrated analyses) indicate will be most susceptible? | **TAG - Hydrology** | Citations to Objective 1 figures showing reference site monitoring locations were added in Section 6.2.2.2. Instead of using randomly selected grid points, we are now planning to sample either the full or partial grid; partial grid sampling includes five points recommended by Dale Vitt as having potential to show early effects. Please see updated text in Section 6.2.2.1. | | X | | Final site selection in reference catchments are still a work in progress | See the response to item #16. |
| 53 | 6-2 | For sampling location outside of the MLWC and the lake, consideration of the source of water (aquifer, etc.) and connection or flow path to the MLWC, as well the geochemistry are considered. As for monitoring the wetland, it appears that EHZ are used as representative zones, but these do not integrate<br>the difference in sources. Thus, for early warning or long-term monitoring more sites that integrate EHZs with HRAs are required. | **TAG - Hydrology** | See the responses to items #13 and #14 - Please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4. | X | | | Additional monitoring locations are noted. | Thank you. |
| 54 | 6-6 to 6.9 (Similar recommendation in General comments) | Non-mined portion of the MLWC. The same EHZ on the south and north side of the MLWC receive different types and flow paths of water and chemistry. Thus both sides should be monitored for all EHZ, a selection in EHZ4 on the south (base of Ft Hills) is not representative on the potential impacts of different operations that occur on the north. Both sides should be monitored as there are different operation procedure occurring on the north and south watershed | **TAG - Hydrology** | See responses to items #13 and #14. | X | | | | N/A |
| 55 | 6-6 to 6.9 | Groundwater and surface water. A location in EHZ 1 and 2 mid-way between the wall and the lake would represent "average "condition with less influence from the wall and the lake. The north side EHZ 4 and 5 water sampling and water level recording is required to assess the potential of dewatering in the NOP. Base of Ft Hill EHZ 6 sampling is required. This is likely a significant surface water generating area for the MLWC | **TAG - Hydrology** | See the responses to items #13 and #14. | X | | | | N/A |
| 56 | 6-6 to 6.9 | Potential linkages and controls of water level and water quality from AQ3 and 4 should be included in the monitoring | **TAG - Hydrology** | See the responses to items #13 and #14. Note please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4. | X | | | | N/A |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 5 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG Response** | **Fort Hills Follow Up Response** |
| 57 | 6-6 to 6.9 | Climate. The NOP is unique, provide recharge to the sand aquifer important for the MLWC and Lake. A climate station should be on this HRA. | **TAG - Hydrology** | 11 climate stations are already in use including an ET tower at NOP north. Additionally, we have snow surveys in the watershed. FHEC feels that climate is adequately covered and does not support adding more climate stations. | | X | | Is this STN01/SC10? (Figure 2.5-15) Is it representative of the pine barrens? The estimate of recharge from ET likely differs considerably on FHUC. | Visual examination of the landscape surrounding STN01 SC-10 (air photos) indicates it is located among pines that have been affected by wildfire so it can be reasonably assumed its climatic measurements are representative of the pine barrens on the NOP. STN01/SC10 and STN03 can represent the climate conditions for the NOP. Monitoring data presented under Objective 1 showed that there is little variation in precipitation and temperature measured at these climate stations |
| 58 | 6-9 to 6-10 | Page number [ 6-9], Table 6-2. Number the sites so Table 6-2 and Figure 6-3 may be integrated and interpreted. Comments on table<br>• AQ4 and AQ3 on southwest slopes of Ft Hills should be characterized<br>• Integrated Monitoring<br>• Changes in water levels mid-way between the wall and lake in EHZ 1 and 2 would be a more effective location to determine average/overall changes in these EHZ, The north side and south side receive different waters, different source and flow path and different chemistry. So, the representative HRA should be included with the EHZ. Water levels in EHZ 4, 5 and 6 on both the north and south should be included<br>• Grid based. Please justify the random selection. For effective monitoring you should follow the same location to detect change<br>• Lake. Why is vegetation not considered? This is confusing. The shallow areas represent 2/3 of the lake and the littoral is very important habitat. The shoreline vegetation should be monitored. | **TAG - Hydrology** | The early warning monitoring locations have been revised based on this feedback, thank you. Please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4.<br><br>Please see response to #52 regarding revised grid sampling plan. These changes have been made to the grid sampling program based on several pieces of TAG feedback.<br><br>In terms of littoral vegetation recommendations, please see the response to Item #3 above. | X | | | | N/A |
| 59 | 6-10 | Page 6-10, Table 6-3: The range in settings of the sample locations, and an estimate of the integrated HRA/EHZ of each that can be compared with those on the MLWC and Lake need to be used to allow for direct comparison and interpretation of the BACI etc. | **TAG - Hydrology** | FHEC recently did work to define EHZs at reference sites and this work shows that the reference sites are good for vegetation and chemistry and additional work may be required for hydrology and hydrogeology. The reference sites can be used to detect climate change/regional effects. FHEC has been unable to date to find a reference site in the area more similar to MLWC. FHEC is committed to examining the option of adding groundwater monitoring at the Audet Lake Wetland Complex (via hand driven piezometers) starting in 2022. | | X | | Monitoring at reference ecosystem sites, with conceptual models that relate to MLWC, are crucial. Clearly define / defend what areas of Audet and Gypsy-Gordon can be used for the different patterns fens (EHZ1 and EHZ2) and lake in MLWC | See the response to item #16. |
| 60 | 6-9 to 6-10 | Conceptual models of the reference systems are required to properly place monitoring locations. | **TAG - Hydrology** | See response to item #60. | | X | | This is 60; perhaps 59? | Apologies yes 59 |
| 61 | 6-11 to 6-12 | No mention of water levels and gradients (i.e., flow rates) (except as part of a multivariate correlation). What about the interpretations? | **TAG - Hydrology** | Analytical approaches for water levels (groundwater and surface water) provided in discipline sections; the Analytical Approach section was intended to provide an overview of analyses used by more than one discipline. | | | X | TAG members do not understand the response. | Surface Water Hydrology Section (i.e., Section 6.3.2) already provided description of existing flow and water level monitoring and recommended additional monitoring locations to capture variation of water level across the fen. |
| 78 | Hydrogeology 6-12 to 6-15 | Relative changes in water levels between points must be evaluated. This provides a measure of changes in flow.<br><br>Page number [ 6-13] Table 6-4. Using groundwater monitoring wells for representative EHZ is not adequate. The watershed monitoring outside the MLWC seems fine (except AQ3 and 4 could be better characterized), but the sampling within the MLWC needs modification to assess difference in source to the north and southern portions<br><br>Table 6-5: EHZ 1 and 4 within NOP HRA are very important and should be included.<br><br>Page 6-13. TAG does not understand this statement: " A total of eight two locations with a total of 16 four wells are proposed."<br><br>*Permanent, Integrated Wetland Monitoring*<br>Climate: Eight existing climate stations<br>Groundwater level / Surface water hydrology / Groundwater quality / Surface water quality / Vegetation: • Two fully integrated locations for groundwater levels, surface water hydrology, groundwater quality, surface water quality, and vegetation; ○ Two existing groundwater well locations with two wells each; ○ Two new surface water hydrology locations at existing groundwater locations; ○ Two new surface water quality locations; ○ Two existing vegetation locations[M]; • Ten locations for surface water quality and vegetation; ○ Ten[M] new surface water quality locations; ○ Ten existing vegetation locations[M].<br>*Grid-based Wetland Monitoring*<br>~~Groundwater level~~: ~~Not applicable~~<br>~~Groundwater quality~~: ~~Not applicable~~<br>~~Surface water hydrology (water table)~~ / ~~Surface water quality~~: ~~Subset of eight randomly selected grid locations (three in EHZ 1 and five in EHZ 2) for each survey event~~<br>Vegetation:<br>*Lake Monitoring*<br>Surface water hydrology: Two existing locations for surface water hydrology on shore<br>Surface water quality and aquatic health: One composite sample + depth profiles[M] within lake<br>Groundwater quality: Not applicable<br>Vegetation: Not applicable<br><br>• LIBDC 2021-08-10 12:53:24<br>• ~~Subset of eight randomly selected grid locations (three in EHZ 1 and five in EHZ 2)~~ for each survey event for water table, surface water quality and vegetation | **TAG - Hydrology** | Please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4. | | | | Figure 6.2-1? Better monitoring locations. TAG understand that other locations may also be monitored, as necessary. | Yes Figure 6.2-1 is the figure that shows monitoring locations |
| 79 | Surface Water Hydrology<br>6-15 to 6-18 | Surface water levels and chemistry of the EHZ 2, 4 and 5 that receive water from the NOP, and those receiving water from the Fort Hills should be monitored and compared through time.<br><br>What happens if the measurements are outside of the 4 mm difference? Are the data discarded and you end up with a progressively smaller dataset? Or, otherwise? That is, how are corrections to be made?<br>Why delete data for an entire period if the datalogger is found dry. Why not interpret the data to determine which data are still useful/good? | **TAG - Hydrology** | Please see updates in text: If the difference in water level elevation surveyed from two or three benchmarks is more than 0.004 m, the survey will be repeated until the difference is within acceptable range (i.e., 0.004 m or less). | | X | | TAG is curious how these surveys will be completed and how a precision of 0.004 m will be achieved. It seems ambitious for differential GPS. How good are the benchmarks (e.g., for variation on soft ground)? | FHEC will initially try to collect the data within the stated 0.004 m accuracy of the handheld unit. If that cannot be achieved, the data would still be recorded and the uncertainty can be noted so that the data can be used in monitoring but can also be done with the knowledge of the uncertainty regarding its veracity (using weighted statistics or some other technique). This uncertainty can be accommodated to preserve the monitoring record. |
| 80 | Water Quality 6-19 to 6-22 | Some representative organo- and metal- contaminant should be included, see comments on Objectives 1 and 2 | **TAG - Hydrology** | While it is unclear exactly what TAG is referring to under the term contaminants, many of the parameters that would typically be considered as contamination, such as hydrocarbons, are included in the water quality portion of the environmental effects monitoring program under complimentary data. | | X | | See comments on earlier objectives. | Noted. |
| 82 | Vegetation 6-24 to 6-28 | See comments on Objectives 1 and 2. Growth rates of trees indicate hydrologic change, and should be measured | **TAG - Hydrology** | Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators. After the July 19, 2021 meeting a number of items on the Objective 2 Indicator Selection flow chart were modified based on TAG and SC feedback and shared and modified during the Aug 25, 2021 and Sept 7, 2021 meetings. There was confusion around the box asking the question "if there sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if it's an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future. A future workshop with the TAG to discuss vegetation is planned for 2022 and this can be discussed at that forum. | X | | | Tree ring data contain the prerequisite pre-mining data/responses. Therefore there are baseline data. TAG does not understand the reticence to consider this analysis technique. Further discussion is deferred to TAG Vegetation. | As noted in the previous response, Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if it's an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future. A future workshop with the TAG to discuss vegetation is planned for 2022 and this can be discussed at that forum. |

**Table 3 - Round 2 TAG-Hydrology Comments**

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 6 | | | | | | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** | **Adequately Addressed** | **Partially Addressed** | **Not Addressed** | **TAG Response** | **Fort Hills Follow Up Response** |
| 3 | | Unresolved comments on Objectives 1, 2 and 5 remain, and Objectives 3 and 4 have yet to be reviewed. Consequently, some aspects of Objective 6 may change after previous Objectives are revised. TAG finds it difficult to provide fulsome feedback on a piecemeal basis.<br>Reference ecosystems (and associated monitoring sites) are not adequately considered for groundwater and surface-water levels (e.g., Table 7.2-2 and elsewhere). See TAG comments on previous objectives.<br>Modelling. For MLWC (and surrounding area), plus Reference Ecosystems.<br>Where are comparisons to the numerical model incorporated into the analysis? That is, actual data need to be compared to prior model predictions. Do they agree or are they diverging? What is the action if they are diverging? That is, what happens if the outcomes demonstrate that the understanding of the system is incorrect? One possible outcome is that triggers and responses must be re-evaluated. This eventuality does not seem to be considered. | **TAG - Hydrology** | Reference Ecosystems: See the reponse to Objective 1, item #8.<br>Modelling: the text of Objective 6 has been clarified to incorporate more of the adaptive nature of the response framework including re-evaluating triggers and responses through time. | | | X | Mixed concerns.<br>Reference systems still require work (discussed elsewhere).<br>TAG cannot see where the modelling questions are addressed.<br>Note that the question did not concen the BACI "model" (analysis); it concerned the numerical (HGS) model. | FHEC agrees that more work is required on the reference sites and is committed to this work starting in 2022. This has been added to the Commitments Table in the Introduction (Table 1.7-1).<br>Yes numerical modelling will be supporting the response framework. If the monitoring data diverged from the predicted data FHEC would check the validatation and calibration of the numerical model. If that looks acceptable then FHEC would revist the conceptual model for potential knowledge gaps. If the conceptual model needed to be updated then monitoring locations could change based on this exercise. Triggers are based on the measured data so they wouldn't change. |
| 12 | **7-1** | "A trigger is defined as a level that indicates changes are occurring, but triggers are set early enough that significant adverse effects have not yet occurred."<br>This is an assumption based on prior interpretations of the system with a limited amount of data. It is misleading to cast this as a definitive statement.<br>***Recommendation***<br>Clarify the inherent assumption in the design basis (i.e., the definition of a trigger). | **TAG - Hydrology** | Triggers are directly linked to quantitative pre-mining baseline and reference site data. Triggers will be refined until ditching and draining activities begin in the MLWC watershed. Please see text in Section 7.2.1.3. | | X | | Also need to be based on expected responses (e.g., understanding and modelling) | Modelling data is now mentioned in Section 7.2.1.3.<br><br>For surface Water Hydrology, we have already included the use of modeling data: "Triggers will be normally defined based on recorded data. However, there will be some uncertainty associated with using limited recorded data. To reduce the uncertainty, long-term model simulated data (e.g., water levels simulated using climate data and calibrated/validated integrated hydrological model) can be used to supplement the limited recorded data to define the limits until sufficient monitoring data are collected for the program" |
| 13 | **7-2** | "For example, a monitoring value that falls within the normal range calculated from pre-mining baseline data, or is well below an applicable benchmark value, would not result in a trigger exceedance."<br>This statement leaves the impression that trends in data are unimportant; however, they may be the more important component.<br>***Recommendation***<br>Clarify that trends in data are also considered and may be relevant.<br>NOTE: These adjustments/clarifications are required throughout the Objective document. It is not always clear how (or even whether) trends are accounted for.<br>Incorporate trends in trigger criteria. | **TAG - Hydrology** | We agree that trends in the data are relevant and important. Text has been added throughout the document to emphasize where trends are considered. Trends are tied to triggers where appropriate. | X | | | | N/A |
| 21 | **7-4** | A standard, reactionary approach is proposed.<br>***Recommendation***<br>Implement a proactive approach with more frequent analysis of water level (and, perhaps, water quality) data to optimize the management system in real time. | **TAG - Hydrology** | Please see new Trigger Assessment Frequency section in which commitments for frequency of data analysis and assessment of triggers is provided. | X | | | | N/A |
| 25 | 7-7 | As above, consider more frequent analyses to develop a proactive management system. Increase the frequency after implementing management responses.<br><br>Table 7.2-2. ALWC, and GGWC are only mentioned for surface-water quality and vegetation. It appears that groundwater and surface-water levels are to never be monitored in any Reference Ecosystem.<br><br>Recommendation<br>Develop a robust monitoring program for the Reference Ecosystems.<br>Adaptive management requires adaptive monitoring (and evaluation). | **TAG - Hydrology** | FHEC has added additional text around the data analysis frequency.<br>Basic EHZ's have been generated for both reference sites. It is also acknowledged that both sites placed much greater emphasis on having similar vegetation to that of MLWC than consideration of site hydrology. The shallow flow system at MLWC derives all of its incoming flows from precipitation with no apparent regional water inputs. The patterned fens at the MLWC also sit in groundwater discharge zones supplied from the surrounding landscape. These conditions also exists at the reference sites (although the potential for regional inputs at both sites needs to be analyzed further once more data is available). In my FHEC's opinion, an argument could be made that, based on available information, the reference sites are hydrological comparable to the MLWC. FHEC is committed to further examining the reference sites post-submission. | | | X | Requires further evaluation of reference ecosystems (including GW monitoring) with development of a conceptual model.<br>Perhaps evaluation with a numerical model. | It is agreed that more work is needed to characterize the reference sites hydrologically and this will be a focus of efforts in 2022. Developing numerical models beyond simple screening level applications would take significant efforts and this isn't being contemplated at this time. |
| 30 | 7-11 | "The natural range of variability of groundwater relates to surface water variability."<br>This statement is not true; it is reversed from reality. The natural range of variability of groundwater is directly related to precipitation, including snowmelt, inputs into the groundwater system. Surface water variability is related to the same inputs, plus groundwater discharge to surface water (often in some delayed fashion).<br>"Level 1 trigger: two standard deviations above/below the mean for gradients across the sand/peat interface AND surface water levels at nearby monitoring locations that exceed the surface water hydrology Level 1 trigger."<br>TAG does not understand the rationale for the AND criterion. Surface water is dependent on groundwater, not the other way around.<br>**Revise.**<br>Presumably a change in gradient direction would be elevated in importance relative to magnitude; the trigger is silent on direction.<br>**Recommendation**<br>Correct the statement and adjust the triggers accordingly.<br>Include changes in gradient direction (in addition to magnitude) in the triggers. | **TAG - Hydrology** | The statement on groundwater and surface water relationship was not meant to imply dependence. However, it has been revised in the document.<br><br>The vertical gradient trigger should NOT include direction explicitly. Most of the GW gradients in the fen area are right around neutral, and can fluctuate around neutral (positive and negative), as detailed in Objective 1. If a change in direction is a trigger, these wells have the potential to exceed the trigger often, and for results that are within the normal range for the well pair. What is important is when the size of the gradient exceeds historic values. If the gradient in a well pair is always upward, using the historic range will cause a trigger if it flips to downward automatically; for wells that fluctuate, fluctuation that is within the normal range is allowable. | | X | | Okay. Suitable for locations where the gradients fluctuate in direction. Not suitable for places where they have a consistent direction. Differentiate between the two cases discharge/.recharge vs. flow through. Different conceptual models. | If the wells have a consistent direction, any change outside that range (whether it is also a direction change or not) will trigger assessment. The trigger assessment already includes this and does not need to explicitly include gradient direction change. Any change outside the normal range will already trigger a response/assessment. |
| 33 | 7-15 | Triggers include comparisons to simulated results. Is the calibration and predictive capability of the model sufficient? (Requires Objective 3.) Why is a similar approach not taken with groundwater triggers?<br>***Recommendation***<br>Clarify the use of models in defining triggers and reactions. Demonstrate that the triggers are appropriate for the current and future understanding of the system. | **TAG - Hydrology** | See updates to the text in Sections 7.3.1.2 (hydrogeology) and 7.3.2.1 (surface water hydrology). | X | | | | N/A |
| 38 | 7-20 | The Level 2 trigger has **three** AND conditions, meaning that **four** conditions must occur before triggering a response (recall, there is no real response for a Level 1 exceedance). This appears to require an excessive number of conditions to be met prior to implementing changes.<br>***Recommendation***<br>Justify the multiple AND conditions in the Level 2 trigger. | **TAG - Hydrology** | The responses to a Level 1 trigger are meaningful and consist of elevation of monitoring effort to the confirmation and investigation of cause tier, and development of a monitoring response plan. Briefly, the objectives of the monitoring response plan are to (1) address key uncertainties (2) explore relationships among metrics, (3) explore modelling results where applicable, (4) identify potential mitigation, and (5) review and refine triggers. Therefore, a Level 1 trigger would initiate a set of actions that are non-trivial, and useful to prepare for mitigating potential continued increasing trends. Two additional conditions are included in the Level 2 trigger: exceedance of the regional normal range, and indicator value above 75% of the benchmark. The first of these is an appropriate condition for a Level 2 trigger, because it indicates an additional change of a meaningful magnitude, which is unusual for the region. The last condition in the Level 2 trigger is tied to benchmarks, based on the rationale that water quality changes might be acceptable if they do not affect functionality or biodiversity of the wetland. An increased concentration resulting from a development that is at 75% of the benchmark is not expected to result in adverse toxicological effects, but indicates a level of concern that requires mitigation to reverse the trend before the benchmark is reached. | | X | | This seems too arbitrary and complicated. Perhaps there should not be a generic rule at the top of the evaluation. Perhaps each site should be evaluated within the context of its hydro(geo)logic position, sources and pathways. What is the expected (range of) behaviour? Then good triggers (with the generic ones as a backup) could be defined. | Similar trigger criteria have been applied successfully in other aquatic effects monitoring programs, and the proposed triggers reflect learnings from those programs. Although the trigger statements may appear complicated, their intent is straight-forward: detect a change and verify that its magnitude is large enough to be outside of normal conditions. Higher level triggers escalate the magnitude of effect and associated actions to prevent reaching an undesirable state. Multiple criteria are necessary to achieve this at each trigger level. Evaluating each site on its own would result in a substantially more complicated assessment of monitoring results, would have detailed baseline data requirements beyond what is available, and would likely introduce inconsistency among evaluated sites. |

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**DRAFT Compiled Recommendations of Sustainability Committee and Technical Advisory Group on Revised MLWC Operational Plan: OBJECTIVE 3: WATER QUALITY AND APPENDIX - HATFIELD REPORT**

***This version of the Table does include <u>all Pre-ambles and Recommendations or Questions</u> from ACFN, TAG and Co-chairs based on their review of the Operational Plan. Hence the Documents from each organization have not been included. <u>All comments from ACFN have been placed at the bottom of the table in Section 8.0 to keep the numbering system from the Dec 5 table intact.</u>***

***MFCN, FMFN and FMCA/FMMN are not providing comments.***

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| **Preliminary Review Comments on TAG WQ Model Nov 15, 2021 TAG/SC Meeting for TAG** | | | | |
| 1 | General Notes Suncor Nov 15 2021 Presentation | 1) Great progress has been made on the conceptual model. The conceptual model for water quality presented 15 Nov provides information on the source, flow path and the geology that the flow paths traverse. It also considers the hydrologic processes influencing surface water – groundwater interactions at the base of FH and wetland interface at FH and NOP. The clear distinctions between sources to EHZ1 and EHZ2 PF are noteworthy. | **TAG Hydrology/ Water Quality** | Noted and thank you. The conceptual water quality model will be further refined as a part of the work planned in 2022 in collaboration with the SC and the TAG. |
| 2 | General Notes Suncor Nov 15 2021 Presentation | 2) Integrating geochemistry, hydrometric and isotope data provides an excellent understanding of the hydrology, not just the water quality modelling. This model should now be incorporated into baseline hydrology and water quality in Objective 1, and direct indicators and location for hydrologic and water chemistry sampling in later objectives. | **TAG Hydrology/ Water Quality** | All of the baseline information is available in Objective 1, work to further the conceptual model with occur in 2022. In terms of sampling location in Objective 5, these locations are fixed for the submission however if our understanding of the system changes and as work progresses, these locations may change in future. |
| 3 | General Notes Suncor Nov 15 2021 Presentation | 3) A similar conceptual model should be generated for McClelland Lake proper. The information and synthesis recently provided / synthesized should make this a relatively easy task. In addition, the functional role of McClelland Lake as sink, source, transformer, or conveyer of nutrients and TDS should be considered. | **TAG Hydrology/ Water Quality** | Thank you, this will be considered in future work. |
| 4 | General Notes Suncor Nov 15 2021 Presentation | 4) Although this is a great start, there are some hydrologic processes and flow paths that should be included or adjusted, as well some consideration of interpretation of field data.<br>a. Consideration of or more emphasis can be placed on the role of return flow and surface expressions of groundwater (i.e., exfiltration sites) in the development of major runoff generating areas and the mixing of rain/snow (atmospheric) sources.<br>b. The role of ice at the base of hillslopes in enhancing snow melt or storm runoff generation was mentioned, this should be incorporated in the model description. Also, the near saturation of expansive EHZ5 and EHZ6 should be considered as potential runoff generation and water chemistry sources, in addition to the noted hydraulic windows.<br>c. The cross-section conceptual model of hydrologic flow paths presented was a great start. However, it is not clear why an impermeable bedrock boundary was chosen for the generalized model. Perhaps this was from comparisons to eastern shield systems. A permeable bedrock boundary and alternating layers of permeable and less permeable material, standard for the "plains" region of continental Canada, should be presented and used as a useful framework. | **TAG Hydrology/ Water Quality** | These items are all noted and will be considered when the conceptual water quality model is further refined as a part of the work planned in 2022 in collaboration with the SC and the TAG. |
| 5 | General Notes Suncor Nov 15 2021 Presentation | 5) Modeling of alkalinity and base cations is important in defining many peatland systems (See Verry 1977 as well). However, the nutrient status is also extremely important in defining and sustaining swamp and marsh systems that surround the wetland complex. These are integral to the hydrology and water quality functions of the wetland complex. Some nutrient measures such as concentrations of PO4 and TIN are standard for determining water quality. In peatland and other organic dominated systems measures of TDP and TDN along with DOC concentration would be a bare minimum to assess short- and long-term water quality and nutrient cycling. Furthermore, nutrient status of the groundwater will influence potential feedbacks with water level draw down and nutrient cycling (i.e., decomposition of peat). The water quality of the lake will be driven by internal nutrient cycling as well as landscape sources (Devito et al. 2000) and should be considered in the conceptual and numerical modelling. | **TAG Hydrology/ Water Quality** | The monitoring program under Objective 5 includes the analyses of nutrients ($NH_3$, $NO_2$, $NO_3$, P) and DOC in the fen and McClelland Lake as complimentary data. In 2022, nutrient cycling will be considered in the conceptual and numerical modeling. |
| 6 | General Notes Suncor Nov 15 2021 Presentation | 6) Redox is presented in the chemistry flow charts, but not considered in the transformation or mobility of nutrients within the peatland or lake conceptual or numerical model. WT-redox relationships are essential for biogeochemistry and vegetation dynamics. These should be considered. | **TAG Hydrology/ Water Quality** | There have been ORP measurements taken in the fen porewater and surface water, McClelland Lake, and some groundwater. FHEC is considering looking at different redox zones within the system and the influence on nutrients. |
| 7 | General Notes Suncor Nov 15 2021 Presentation | 7) The lake chemistry will be greatly influenced by landscape setting and surface inflows as well as local to intermediate scale groundwater flow (Devito et al. 2000). However, most studies show that at least half of changes to water chemistry are driven by internal processes. Such internal processes, and the influence on nutrient dynamics that control SAV and algal dynamics, are important and should be considered. | **TAG Hydrology/ Water Quality** | Noted FHEC is committed to discussing this item, and specifically appropriate approaches to modeling these dynamics, in workshops in 2022. |
| 8 | General Notes Suncor Nov 15 2021 Presentation | 8) Numerical model selection: The coupling of the EFDC and HGS did not appear to be great. Some work is still required to integrate HGS with EFDC and broadly examining overall water quality. The original EFDC model was developed in temperate karst landscapes, which is applicable here. However, it is not clear how, or if, lake freezing processes and winter anoxia and nutrient release are considered. These are important to lake functionality and water quality in our northern climates. In addition, the EFDC model is used here to only simulate TDS and cations. These parameters are obviously important for defining peatland communities. However, nutrient dynamics are also likely to be of importance to water quality (Chl-a, cyano bacteria) of the lake. The EFDC provides code for determining lake eutrophication, and should be considered. | **TAG Hydrology/ Water Quality** | Agreed. External coupling of HGS and EFDC is still producing excessive mass balance errors. The coupling issue is related to differences in computed contributed areas between a Voronio mesh in EFDC and the CVFE discretization scheme used in HGS. As well, the two models also conceptualize the vertical flux term (Qgs) differently which exacerbates the issue.<br>The parameters chosen to be simulated in the current EFDC were ones previously identified as cations the fen vegetation would be the most sensitive to (as well as TDS). No attempts were made to simulate nutrients. What gets simulated as the work progresses will be expanded.<br>FHEC has added a table of commitments to the Introduction section of future work with the SC |

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| | | | | (Table 1.7-1) and this includes water modelling workshops – further refinement of conceptual, water quality and water quantity models. FHEC looks forward to discussing this further at the workshops . |
| 9 | Suncor Nov 15 2021 Presentation Slide 6 | • Very informative. To represent this study area, include a cross-section with permeable bedrock, and perched and/or layers of permeable and less permeable materials typical of moraines on the Boreal Plain.<br>• Label the interface of upland and wetland where the water table intersects the base of slope. These are critical zone in runoff generation and elemental dynamics.<br>• The pond is shown simply as a receiving system, but most systems will show flow reversals with seasonal and inter-annual variability in weather. Also, unlike the pond, the wetland is likely a runoff generator, and most peatlands are sources of DOC and thus P and N to downstream systems. This role should be presented. | **TAG Hydrology/ Water Quality** | Noted for inclusion in refinements to the ongoing numerical and conceptual modelling efforts. |
| 10 | Suncor Nov 15 2021 Presentation Slides 8-11: | • Some great synthesis in graphical form. Some wordsmithing around these diagrams is the obvious next step. | **TAG Hydrology/ Water Quality** | Noted and these recommendations were considered into the revised Appendix E. |
| 11 | Suncor Nov 15 2021 Presentation Slide 14 | • Some caution in interpretation of the lake data is required. Emphasis was placed on runoff dilution explaining the large reduction in TDS from March to May 2017. But if you look at the inter-annual data, it is the large increase in TDS observed under ice that needs more explanation. Sure, some dilution during spring melt may occur, but our studies at URSA, and others on the Prairies, often observe increases in TDS with increased connectivity in upland runoff. If surface flow is restricted to originating from peatland surface and /or ice, reduction in TDS of receiving water can be observed.<br>• An alternative explanation could be fractionation of TDS with ice formation (very common in Boreal plain and Prairie lakes), or a simple switch to dominance of groundwater over the winter. | **TAG Hydrology/ Water Quality** | Agreed. FHEC has added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1) and this includes water modelling workshops – further refinement of conceptual, water quality and water quantity models. FHEC looks forward to discussing this further at the workshops. |
| 12 | Suncor Nov 15 2021 Presentation Slide 15: | • Great progress in the conceptual understanding of the two systems entering the fen. The interface between the upland and the wetlands is an important region for runoff generation and mixing of deeper and shallow groundwater (and precipitation) and should be labelled / considered. It is lacking in the NOP.<br>• Evaporative concentration is used to explain the trends in EC over the summer. Distinguishing between evaporative concentration, ion accumulation from groundwater, or internal (sediment) sources (plus any others?) is important in determining the susceptibility of the lake to disturbance. Interpretation of these trends requires a budget approach combined with geochemical / isotopic analyses (Webster et al. 1996, Leader 2021) | **TAG Hydrology/ Water Quality** | Agreed. Better alignment of the hydrology conceptual model and water quality conceptual model will be one of the focuses of future work, to ensure we are able to better determine the different source waters and their mixing in the interface between wetland and upland. FHEC will consider investigating the isotopic/ ion balance approach combined with geochemical analyses to generate better understanding of the distinguishing between evaporative concentration, ion accumulation from GW, or internal sources. |
| 13 | Suncor Nov 15 2021 Presentation Suncor Nov 15 2021 Presentation Slide 16: | • More emphasis on mixing of groundwater (exfiltration or return flow) and atmospheric (rain or snow) at the base of the slope or wetland interface is needed. These are areas of potential ice formation and rapid overland flow. Have any field data been collected to characterize the potential influence of this? | **TAG Hydrology/ Water Quality** | Agreed and see detailed response to item # 12. In addition, discussions of the mixing of upwelled groundwater with precipitation sourced shallow subsurface water at the upland-wetland interfaces have been added to the EFDC report (Appendix E). |
| 14 | Suncor Nov 15 2021 Presentation Slide 18: | • This provides some evidence of runoff processes diluting the EC signal. Clear alternative hypothesis could be presented, see Buttle 1994 on challenges with equifinality.<br>• I look forward to next year and EC traces through the snow melt. | **TAG Hydrology/ Water Quality** | FHEC has added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1) and this includes water monitoring and modelling workshops. FHEC looks forward to discussing this further at the workshops. |
| 15 | Suncor Nov 15 2021 Presentation Slide 19: | • Some increased concentrations are evident; however, the range is rather small. Clear alternative hypotheses should be presented to explain the trends in EC. The current analyses is simplistic. Some creativity can be used test potential catchment processes and to attempt to exclude alternative hypotheses. Statements claiming evapoconcentration as a process vs. alternatives of accumulation within the water column can be addressed by looking at mass balances (vol vs conc), ratios of cations and alkalinity vs SO4 etc. (see comments slide 15) | **TAG Hydrology/ Water Quality** | Thank you, these suggestions will be considered in work in 2022. See detailed responses in Item #14. |
| 16 | Suncor Nov 15 2021 Presentation Slides 20-22: | See general comments regarding the Numerical model. This is in the early stages<br>• Suncor team should work with Jonathan Price, he is still working [with Suncor] on the fen creation.<br>• I think it would be really worthwhile that Mike has a direct discussion with him to seek his opinion at this early stage to see if agrees with the approach. | **TAG Hydrology/ Water Quality and TAG Vegetation** | Noted, thank you. |
| **4.0 OBJECTIVE 3 – Assess Potential Impact of Mine Development** | | | | |
| **General Comments** | | | | |
| 17 | General Water Quality and Email | To be clear, you should note that TAG does not support use of results from the current version of the WQ model. Claims based on the model results are unsubstantiated.<br>In the last 2 months there has been numerous changes, drafts and requests for partial review of the OP. There has been very little time provided to make comments on this version. Thus, this is a preliminary review, and further, and perhaps more in-depth, advice may be warranted in the future. This includes after the OP has been submitted.<br>Presented here are comments referring to and evaluating how adequate, relevant and complete the water quality design, sampling, parameter selection, comparative analyses and modelling is in general. More detail on specifics will have to wait for future reviews. This would apply to integrating the review of objective 3 to all other objectives, as this analysis and consideration has only recently been completed, and would likely need to be integrated with the rest of the OP. | **TAG Hydrology/ Water Quality and Vegetation** | Noted and agreed. That is why the EFDC modelling results were not used. Due to the noted issues with the modelling results, a qualitative assessment approach was taken within Objective 3. |

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| 18 | General Objective 3 | The hydrology and water quality sections appear to have been hastily thrown together. Overall integration is still required.<br><br>These most recent data analyses and interpretation are showing that the peatlands are potential sources of DOC and P and N to the surface water and down stream systems. This is well documented throughout the Boreal and Boreal Pain. Decomposition and nutrient cycling are in a dynamic equilibrium. The cycling will change intra-annually and seasonally with weather patterns. Thus, the receiving lake will experience differences in nutrient sources. A key process that has been largely ignored is the influence of fluctuations in water table (could occur during repeated trials to find the right water resupply rates to the different fen systems, etc.) that can change peat decomposition rates. Also, small increases in nutrients of input sources (e.g., treated supply water) can also change decomposition rates. The lake is a receiver of potential increase in pore and surface water nutrients from potential increases in peat decomposition. These process should be monitored, and can be indicated by increases or pulses in surface water nutrients within the fen which may likely enter the lake (See Devito and Dillon 1994a,b; Devito et al 1997, 1998, 2000 etc., Plach et al 2016, and others).<br><br>SUNCOR should commit to monitoring and analyses of nutrients and PAH's in the fen and lake, along with TDS and base cations<br>** References are provided at the end of this document.<br>**Recommendation:**<br>WATER QUALITY COMMENTS<br>1. Additions are needed to complete conceptual water model and then its integration with water quality conceptualization.<br>2. Define "water quality" for the sake of this objective in the section, and the OP in general. Many readers may not think that TDS and base cations make up water quality inclusively.<br>3. More sophisticated analyses, comparison with potential water sources that will be used (Operations wash off, river, etc.) and consideration of ecosystem and socially relevant parameters are required<br>4. Characterize supplemental water sources more thoroughly to incorporate spatial differences in sources, etc.<br>5. More data to develop HRA-specific water quality inputs suitable for the conceptual understanding of the MLWC is needed.<br>6. More consideration of chemical composition of TDS.<br>7. PAH's should be a parameter for both fen and lake monitoring<br>8. Include ecosystem relevant nutrients –inorganic and organic P & N of surface and ground water. DEFC modelling for eutrophication could be included<br>9. Atmospheric sources, if not monitored by RAMP etc. should be considered to follow background "fertilization" of nutrient poor peatlands<br>10. Consider shallow water wetland and deeper lake characteristics when monitoring and interpreting McClelland Lake.<br>11. Throughout the objective section, effectively cite your data and provide greater (or some) justification of your interpretation or include a reference to the literature when making claims and statements. If it is based on literature from other sites, then state more in speculative terms than as fact or direct interpretation from data.<br>12. Numerical modelling appears to have severe limitations in simulating baseline conditions. Present what is proposed for the next step. A re-assessment of the modelling approach and considerable attention to step 1 and 2 (with iterations) in fig 6.1 is suggested. Some graphical techniques using empirical data should also be tried. | **TAG Hydrology/ Water Quality and Vegetation** | Nutrients and PAH's along with TDS and base cations are included as complimentary data in the Objective 5 monitoring program.<br>1) Agreed. FHEC has added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1) and this includes water modelling workshops – further refinement of conceptual, water quality and water quantity models.<br>2) See response to Item #47<br>3) Agreed. FHEC is committed to further refining the water quality modelling with the TAG in 2022.<br>4) Agreed. FHEC is committed to further refining water source chemistry in future work.<br>5) See response to item #28<br>6) Noted, thank you.<br>7) See opening to this response.<br>8) See response to item #49.<br>9) Noted, thank you.<br>10) Objective 5 does have both the shallow AND deep portions of the lake monitored.<br>11) Noted, thank you.<br>12) Agreed. FHEC has added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1) and this includes water modelling workshops – further refinement of conceptual, water quality and water quantity models. |
| 19 | General<br>4-32 to 4-59 | When considering the gaps and uncertainties in the water quality data set, and the conceptual nature of the design features, water management systems, and source make-up water (Section 5.3), it seems the confidence in the following statements is unfounded. For example:<br><br>Page 4-32 "when design features are implemented during operation and closure periods, predictions of later levels in McClelland Lake are below the Level 1 trigger, and as such are considered low risk to the functionality of the diversity of the lake.<br>Page 4-43 "...If the "wall operations" flows can be managed to resemble the water coming from the upstream fen, no substantial change in water quality is expected...."<br>Page 4-43 and 4-49 "However the large proportion of resupply water allows for flexible and active management of the water quality on the fen such that the resupply water chemical make-up will be selected or treated to achieve a chemical balance similar to baseline..... No substantial changes to water quality in McClelland Lake are expected"<br>Page 4-54; 4.3.2.3 Aquatic Resources – Lake. " With the installation and operation of the water design features, substantial changes to water quality are unlikely; no substantial changes in productivity, as measured by chlorophyll a concentrations, in McClelland Lake are expected from changes to water quality.<br>Page 4-55; 4.3.2.4 Vegetation "mining with water management design features is expected to result in wetland water chemistry similar to baseline throughout the operation al and active closure periods.<br>Page 4-59; 4.3.2.4.2 "However, with the installation and operation of water management design features developed for the Project, predicted changes to surface water levels compacted to pre-mining baseline conditions are not expected to result in changes to plant communities"... "However re-supply water going to the fen will be selected or treated to achieve a chemical balance similar to baseline, and predicted changes to water sources are not expected to result in changes to plant community composition. | **Co-chairs** | The text has been revised slightly, though it should be noted that these statements are based on the qualitative assessment carried out for Objective 3. FHEC acknowledges that ongoing refinement of the models may alter results, and therefore predictions that are contained in this section may also change. However, FHEC is committed to maintaining the functionality of the non-mined portion of the MLWC so it is not anticipated that the risks to the non-mined portion of the MLWC would change significantly. |
| **4.1 Introduction** | | | | |
| **20** | | No comments | | |

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| **4.2 Sustainability Committee Input** | | | | |
| 21 | | No comments | | |
| **4.3 Assessment Methodology** | | | | |
| 22 | 4-2 | Not clear how changes to surface water quality could be assessed and modelled if changes in groundwater quality has not been modelled yet, as the two water intermingle in their flows from the surrounding landforms to the fen to the lake. | **Co- chairs** | Agreed, FHEC is committed to ongoing refinement of the model in 2022. |
| 23 | 4-4 | I do not believe the MLWC Measured Range of Variation arrow should not extend outside the Low Residual Risk in the diagram. | **Co-chairs** | The MLWC Measured Range of Variation arrow extends outside the Low Residual Risk block, which we have shown as coinciding with the Level 1 trigger, because the Level 1 trigger is based on statistical data distributions, not data maxima/minima. For components using the MLWC normal range to characterize the Level 1 trigger, 5% of future data points are expected to occur outside of the normal range, even if disturbance is not occurring in the watershed. The Level 1 trigger is intended to provide an early warning that effects may be occurring, but does not coincide with the absolute limits of the MRV. |
| **4.3.1 Description of Models Used** | | | | |
| 24 | 4-8 | It is stated "Surface water flows within the MLWC watershed are entirely derived from precipitation (rainfall and snowmelt) and groundwater exfiltration (discharge). "<br>This statement taken literally is not true. Please provide information on saturation excess OLF that would occur when Precipitation falls or melts on saturated surface. This is a mix of groundwater and precipitation. Further, shallow SSSF is likely a dominant flow path on FHUC | **TAG Hydrology/ Water Quality and Vegetation** | Clarification has been added into the FHUC flow conceptualization section of the EFDC report (Appendix E) to highlight the dominant paths by saturation excess overland flow from Fort Hills hill slope. |
| 25 | 4-9 | ".. the EFDC model is a surface water model that only simulates the surface water portion of the fen."<br>- Does this include modelling surface water quality in the lake? Should "fen" be changed to "unmined portion of MLWC"? | **Co-chairs** | Thank you, the intent of this statement is that for the fen only the surface water quality is modelled in EFDC, so the text will remain the same. |
| **4.3.2 Assessment Results** | | | | |
| | | No comments | | |
| **4.3.2.1 Hydrogeology and Surface Water Hydrology** | | | | |
| | | No comments | | |
| **4.3.2.1.1 Linkage Assessment** | | | | |
| | | No comments | | |
| **4.3.2.1.2 Assessment Cases and Simulated Scenarios - Hydrogeology** | | | | |
| | | No comments | | |
| **4.3.2.1.3 Assessment Cases and Simulation Scenarios – Surface Water Hydrology** | | | | |
| | | No comments | | |
| **4.3.2.1.4 Risk Assessment for Hydrogeology and Surface Water Hydrology** | | | | |
| | | No comments | | |
| **4.3.2.2 Water Quality** | | | | |
| 26 | 4-36 | In the summation of NOP groundwater quality, concentrations of DOC, N and P are discussed. Provide actual concentrations across the HRA's and compare the surface and groundwater for each ecologically relevant community within the MLWC.<br>For all the figures 4.3-9 to 15, one large average for the fen is all the is provided. This has limited value in interpreting the different processes that may influence biogeochemical cycling in the different fen systems. How do concentrations within EHZ1 and EHZ2 differ and relate to the NOP and FHUC aquifers? A re-analysis to address the separate PF's and potential transport to the Lake should be conducted. | **TAG Hydrology/ Water Quality and Vegetation** | FHEC has committed to future work on the models in 2022 as shown in Table 1.7-1 of the Introduction and to engaging with the SC and the TAG on that work. This information will be considered and discussed during that work. |
| 27 | 4-36 | The surface water DOC, P and N concentrations should be plotted, compared with inputs directly to infer, or qualify potential internal mobilization and source of organic and inorganic nutrients to the lake. | **TAG Hydrology/ Water Quality and Vegetation** | See response to item #26. |
| 28 | Figures 4.3-9 to 15 | Please make it clear what the spatial distribution of the samples are for each of the averages plotted in the graphs (Peat Fen, NOP and FHUC aquifer). In the hydrogeological-HRA analyses and distribution of TDS and cations, it is obvious that there are different "sources" of water. Provide a comparison of these different waters. Currently the variation is inflated with the grouping of different water sources. | **TAG Hydrology/ Water Quality and Vegetation** | See response to item #26. |
| 29 | Figure 4.3-14. | Dissolve P is plotted. Define dissolved P. Is this total DP (inorganic/reactive and organic P)? Include SRP to determine some potential internal peat processing of organic and inorganic P.<br>PLEASE log the axis when necessary. It is extremely difficult to interpret the range and differences in P between site when the Y axis is scaled to include a few "outliers". | **TAG Hydrology/ Water Quality and Vegetation** | The definition of dissolved P has been added to the text. |
| 30 | No page number | ***Recommendation:***<br>Provide N, P and DOC concentration for individual pattern fen (PF) and non-pattern fen components (i.e. EHZ1 and EHZ2 should be plotted separately), because treatment of water supplied to each PF will need to be different. | **TAG Hydrology/ Water Quality and Vegetation** | See the response to item #26. |

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| **4.3.2.2.1 Water Quality - Fen** | | | | |
| 31 | 4-43 | How will filling the pit lakes at the FHO influence the water quality during active closure? | **Co-chairs** | The proportions of flows from the FHUC vs NOP sides of the reclaimed MLWC system will be slightly different during the active closure period while the Centre Pit Lake (CPL) fills. This may alter the net hydrogeochemistry reporting to the non-mined portion of MLWC during this period. Overall, the net impact to the flow proportions and 'net' hydrogeochemistry during this filling period is expected to be minimal. However, this assumption will be examined and verified with the geochemical modelling of the system planned for 2022. |
| 32 | 4-43 | Not sure how the water quality in the fen could be assessed in the operations phase until the source of water has been selected for the water across the wall and the injection sites? | **Co-chairs** | For this assessment, the assumption was made that independent of the source of the water, it would be treated to a quality similar to the water that currently feeds the fen. |
| **4.3.2.2.2 Water Quality – McClelland Lake** | | | | |
| 33 | 4-49 | Not sure how the water quality in the lake could be assessed in the operations phase until the source of water has been selected for the water across the wall and the injection sites? | **Co-chairs** | Repeat of item #32. |
| **4.3.2.3 Aquatic Resources - Lake** | | | | |
| 34 | 4-54 | Please explain and defend the last sentence in this section. This a bold and unsubstantiated statement that there will be no impact on lake productivity. If the cut-off wall does result in WL fluctuations within the peatland, increased decomposition can result in increased nutrient export into the lake. This is likely to impact the lake productivity and water quality.<br><br>**Recommendation**<br>Clearly show the relationship between external nutrient sources and internal cycling on lake nutrient concentrations and thus algal populations. | **TAG Hydrology/ Water Quality and Vegetation** | The following text has been added:<br>With the installation and operation of the water management design features, substantial changes to water quality are unlikely (Section 4.3.2.2.2). Increased frequency of water table fluctuations associated with mining in the MLWC watershed and implementation of the surface water resupply system could result in increased peat decomposition rates, which could influence nutrient concentrations. However, as noted above, predicted changes in water level fluctuation in the lake are small (on the order of a few cm) and within the background water level fluctuation regime of the lake. Therefore, based on the current predictions for hydrology and water quality, no substantial changes in productivity, as measured by chlorophyll a concentration, are expected of McClelland Lake. |
| **4.3.2.4 Vegetation** | | | | |
| 35 | 4-32 and 4-59 | *Page 4-32 This is similar to other studies that also found wetter portions of rich fens were dominated by Scorpidium scorpioides (e.g., Slack et al. 1980), indicating that these preferences have not changed over time.* I still find this sentence irrelevant - why would the preference of one species in natural settings change over 40 (that is by comparing Slack 1980 with Vitt report 2020)? Change the following sentence as extracted from text: An ecological series along a moisture gradient in a fen with higher Sphagnum prominence than the patterned portion of the MLWC includes Sphagnum angustifolium -> S. magellanicum -> S. fuscum -> Aulacomnium palustre -> Tomentypnum falcifolium as conditions go from relatively wet to relatively dry (Vitt et al. 1975); these species all occur within the non-patterned portion of the MLWC with >10% cover - To this in italics: *Within the non-patterned portion of the MLWC with higher Sphagnum prominence (>10% cover), one can find similar ecological series along a moisture gradient as previously reported by Vitt et al. 1975: Sphagnum angustifolium -> S. magellanicum -> S. fuscum -> Aulacomnium palustre -> Tomentypnum falcifolium as conditions go from relatively wet to relatively dry.* It reads much better that way in term of giving context.<br><br>Page 4-59. To ensure that resupply water has the same chemistry as the background, the surface water chemistry (including nutrients) should be reported, and clearly defined for the different regions in the fen (i.e. EHZ1 and EHZ2).<br>***Recommendation***<br>**Delete:** *This is similar to other studies that also found wetter portions of rich fens were dominated by Scorpidium scorpioides (e.g., Slack et al. 1980), indicating that these preferences have not changed over time*<br><br>**Change :** An ecological series along a moisture gradient in a fen with higher Sphagnum prominence than the patterned portion of the MLWC includes Sphagnum angustifolium -> S. magellanicum -> S. fuscum -> Aulacomnium palustre -> Tomentypnum falcifolium as conditions go from relatively wet to relatively dry (Vitt et al. 1975); these species all occur within the non-patterned portion of the MLWC with >10% cover ***- To this in italics:*** *Within the non-patterned portion of the MLWC with higher Sphagnum prominence (>10% cover), one can find similar ecological series along a moisture gradient as previously reported by Vitt et al. 1975: Sphagnum angustifolium -> S. magellanicum -> S. fuscum -> Aulacomnium palustre -> Tomentypnum falcifolium as conditions go from relatively wet to relatively dry.* | **TAG Hydrology/ Water Quality and Vegetation** | The text has been updated as per recommendations.<br><br>Detailed water chemistry results for EHZ1 and EHZ2 are provided in the water quality section of Objective 1. Water chemistry characteristics of EHZ1 and EHZ2 from Vitt and House (2020) have been added to Section 4.3.2.5 in Objective 3. |
| **4.3.2.4.1 Summary of Risk Assessment for Vegetation – Wetland Primary Effects Indicator** | | | | |
| 36 | 4-59 | The section is incorrectly labelled as 4.3.2.4.2 in the current text. | **C0-chairs** | Thank you, this has been corrected as it is section 4.3.2.4.4 |
| **OBJECTIVE 3 APPENDIX ?**<br>**Hatfield Evaluation of Water Quality for McClelland Lake Wetland Complex Mitigation Scenarios** | | | | |
| | | No comments | | |

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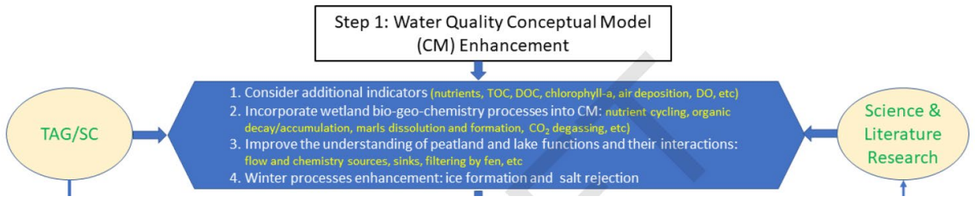
| **General Comments** | | | | |
| 37 | General | I also provided preliminary notes dated Nov 15th. Given the short turn around that has been placed on the reviewers recently, it is likely that SUNCOR may be considering but may not have integrated or responded to the comments. In SUNCOR's response please also include the Nov 15th report as well as the comments presented here.<br>(Kevin Devito comments from his Nov 15th email are summarized in comments 1 to 17 above)<br><br>** See also: Conceptual Model-Water Quality-Comments-KJD_15Nov2021+CAM.docx **(From Co-chairs: Kevin Devito comments from his Nov 15th email are summarized in comments 1 to 16 above)**<br><br>The Hatfield report is honest in describing well its shortcomings. From the peatland ecosystem point of view I retain mostly this from this modelling exercise:<br>Results of water quality in the fen appeared not as successful when compared to the near-surface water quality samples, however, the pattern of concentration between the Patterned Fen North and South represented the water source conceptualization, suggesting that the underlying hydrologic processes are able to be represented and future work can improve these results.<br><br>Looking into figure 6.1<br>  <br>I do judge that some of the best fen biogeochemistry modellers in the world are based in the Netherlands. I can provide some names of colleagues. Some have worked in the past I believe with Shell in the Fort McMurray regions. | **TAG Hydrology/ Water Quality and Vegetation** | FHEC carefully reviewed all the comments dated Nov 15th, thank you. Although we were not able to incorporate most of the recommendations into this iteration of modelling work, a roadmap of future of work with the SC and the TAG on the water quality modelling is now included in Objective 3. |
| **1.0 INTRODUCTION** | | | | |
| 38 | 1 to 2 | EFDC seems to be limited to the "unmined portion of the fen". Is or will the lake be included (I think that comes later – points to the preliminary writing of this report)? Fig 1 indicates that MCLWC is everything within the topographic watershed. Is the true? Be consistent on what is included when stating MLWC<br><br>**Recommendation**<br>Please define water "water quality", and included N and P, DOC and PAH's which currently are not included in assessment of both he fen and the lake. | **TAG Hydrology/ Water Quality and Vegetation** | Text has been reframed in the EFDC+ report (Appendix E) to state in the MLWC watershed, which includes everything in the watershed, including McClelland Lake. Water quality has been termed as water chemistry in the report as water quality is open to interpretation, particularly based on different areas of expertise and the recipient of said water quality. For the purposes of this report, water chemistry parameters include base cations and TDS. Nutrients (N & P), DOC, and PAHs are included in water sampling. Modelling efforts for both the fen and lake may consider additional parameters. |
| **2.0 CONCEPTUAL MODEL AND DATA** | | | | |
| 39 | 4 | Section 2.0: "water quality" here is TDS and cations. How do you model cations without anions (full suite of chemistry to complete the charge balance)? The analyses would then also need to include DOC (organic acid charge balance is critical in Boreal systems). So, present the anion and DOC data, or consider monitoring if you have not already analyzed water for these parameters.<br>Here the Lake is included but it is not in other definition of the area. Try to be consistent from this point on in defining what is MLWC and what you will monitor and model. | **TAG Hydrology/ Water Quality and Vegetation** | Agreed, a full suite of chemistry, including major ions, will be necessary for any reactive transport modeling in order to achieve a charge balance. The monitoring program under Objective 5 includes major ions and DOC as complimentary data. |
| **2.1 Study Area** | | | | |
| 40 | 4 | Why is there no mention of surface expressions of bedrock interaction with sink holes, both on the moraine and the northern edge of the lake? I think this should be mentioned, and justification for not including or including bedrock interaction made in the text.<br><br>It should be pointed out that over half the lake has depths 2m or less, thus technically are shallow water wetlands. This water body will have characteristics of both SWW and lakes | **TAG Hydrology/ Water Quality and Vegetation** | FHEC has added a statement in Appendix E that a large portion of lake is less than 2 m deep making it a balance between a shallow wetland and lake.<br>Any sinkhole at site with an elevation exceeding 255 masl will have a downward gradient with respect to any Devonian water inputs (that is, 255 masl is all the higher that old water can reach under the watershed). So it is unlikely to be an issue at surface in the watershed (lowland elevations around 294-300 masl). Cretaceous water can make it up to about 300 masl so the potential for these interactions can be mentioned as they are much more likely to occur (but also presumed unlikely). Good catch. |
| 41 | 4 | In the Study Area section, please check the directional references … they appear to be erroneous.<br>In the last paragraph on page 4, please add a statement that reflects 2/3 of the lake is shallow in depth. | **Co-chairs** | Noted and this issue has been addressed in the EFDC report (Appendix E). |

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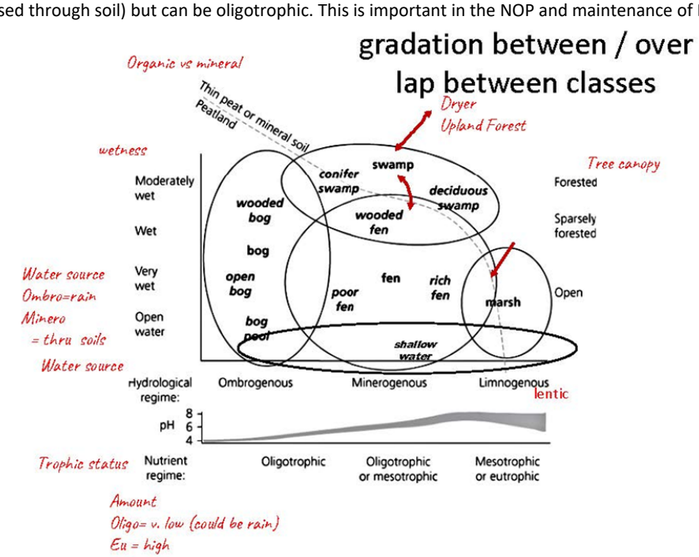
| **2.2 Hydrologic Response Areas** | | | | |
| 42 | 5 | Emphasize the differences in biogeochemistry of the HRAs. Key characteristic of the HRA's is common transmissivity, storage, geology and vegetation that result in differences in flow path, also water chemistry and eco-hydrology.<br><br>HRA 19 and 20 are confusing. What is used to designate the boundary of the HRA's? Is 20 different from 16 or is the whole plain (NOP) one HRA, and this designates Groundwater-topographic catchment boundaries (HRA 16) and the HGS modelling boundaries? If so make 15,16 and 20 the same and, also, group 17,18,19 into an HRA. The topographic high defines the FLHU (Winter 2001), and your assumption of flow is based on topography within that particular HRA. I think the clay layers are well enough characterized to determine the flow towards the fen vs outside the MLWC<br><br>**Recommendation:**<br>Emphasize the differences in biogeochemistry of the HRAs. | **TAG Hydrology/ Water Quality and Vegetation** | With respect to biogeochemistry: noted for the conceptual model refinement.<br>HRA 19 and 20 are leftover HRAs from earlier work to determine the proportion of the landscape outside of the surface watershed contributing to flows in the MLWC watershed. The majority of these HRAs (20 and 19) are superfluous (except for small part of HRA 19 that contributes to the MLWC and the portion of HRA 20 that the gw divide extends over when it is wet).<br>Yes HRA 20 is a continuation of HRA 16 outside of the watershed to the remainder of the Firebag Moraine extent. It is solely a receiving environment.<br>FHEC will examine combining these HRAs in the manner suggested by the TAG though HRAs 17, 18 and 19 may still remain separate. 17 has just the alkaline chemistry while 18 has the alkaline chemistry and the oligotrophic chemistry due to presence of the very thick surficial sands over on HRA 18. And there are no/few aspen in HRA 18. |
| 43 | 5 | In the first sentence "add the words "potential response to " just in front of the word climate. | **Co-chairs** | FHEC respectfully disagrees with this suggestion, the MLWC will respond to climate drivers. |
| **2.3 Water Quality Data** | | | | |
| 44 | 6 | Table 1: This provides limited information. The season and years are needed to determine concurrent sampling of different HRA's and if characterization of seasonality was possible.<br><br>Please keep "trophic" and "genic" clear. "Trophic" refers to nutrients (perhaps TDS can be used to infer trophic, but nutrients are very important). "Genic" refers to source. Ombrogenic means directly from precipitation, ombrotrophic is nutrient from precipitation (which is most often very low in TDS and nutrients). See the diagram below from my wetland class. Oligo trophic refers to low nutrient water. Bogs receive ombrogenic water, and in pristine areas this is ombrotrophic. It will also be oligotrophic. Groundwater from low weathering Si rich sands is minerogenic (precipitation has passed through soil) but can be oligotrophic. This is important in the NOP and maintenance of EHZ1.<br>  <br><br>***Recommendation***<br>Keep "trophic" and "genic" clear. Nutrients will be needed to define oligo, meso and eutrophic | **TAG Hydrology/ Water Quality and Vegetation** | Agreed. A list of related scientific terms with definitions and explanations has been added to the front of the EFDC+ report, to for clarification and consistent use of these terms in the report.<br><br>The text in the main body of the report has also been corrected to ensure these terms were used appropriately. |
| 45 | 6 | The first paragraph references only 18 HRAs, yet there are 21 HRAs. | **Co-chairs** | Noted and text has been changed in the EFDC+ report to express that 'The number of available water chemistry observations were spatially summarized by 18 of the 21 HRAs that are defined for the MLWC watershed' |

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| **2.4 Water Movement & Surface Water Quality at McClelland Lake Wetland Complex** | | | | |
| - | 7 to 8 | The conceptual framework in general looks good<br><br>Section 2.4.1 p.7; You use the terms "derived from precipitation and groundwater exfiltration". But it appears that you use the term for precipitation and water derived for shallow flow. Next paragraph you describe surface and groundwater flow paths. Please clarify this. Winter (2000), indicates that precipitation controlled flow regimes as water from shallow groundwater (local flow), surface stream water from shallow groundwater and OLF along with direct precipitation. These have much more dynamic hydrologic regimes driven, short residence times and controlled and respond to short term precipitation events. Larger groundwater is what Winter (2000) classes as groundwater, resilient to changes in weather patterns or climate change. Exfiltration includes very localized precipitation sourced water emerging at the base as well that travelling in longer flow paths. Please clarify this.<br>P.7; It is mentioned that the groundwater component is small. For water quality, and chemical budgets of wetlands and lakes, you cannot assume that groundwater contributions that have a small contribution to the water budget also have small contribution to the chemistry budget, nor a small influence on ecosystem biogeochemistry or ecology (Winter 2000, 2001, Plach et al. 2016 – others).<br>P.7 NOP; I think the report is referring to oligotrophic groundwater (minero-genic source). The designation or grouping of sandy areas with considerable groundwater flow should include two: 1) regions with slow weathering Si rich sand and 2) regions or deposits with feldspars that can have significantly great TDS. This grouping has been shown to be instrumental in understanding the peatland type that forms and will be key in maintaining ecosystem function during operations (See Verry 1997) (See also Alberta wetland classification – oligotrophic groundwater fen bogs).<br>P.7; "Oligogenic" is mentioned, but this is oligotrophic groundwater at the NOP. Effective management of the fen (EHZ1) requires good characterization of the nutrient status, and this must be matched in supply water to maintain soil decomposition, vegetation growth etc. to ensure long term maintenance of the fen ecosystem. Please clearly indicate what the nutrient status is of these waters, and what happens with return flow and runoff adjacent the PF.<br>The flow paths shown for the FHUC (1 to 3) indicate different waters and can now be used as sample locations to characterize the water chemistry. Have these sites been integrated into the monitoring, and included in objective 5-6?<br>P.7 FHUC oligotrophic grwater- the water in the sand aquifers May not be oligotrophic. I think the sands have more feldspars, so these waters have higher TDS (and potentially nutrients) - wait and see<br><br>***Recommendation***<br>Read / search the literature of peatland (in situ formed) bicarbonate ($HCO_3^-$) and evaluate if it has to be more specifically included in the C cycling processes of Figure 2-7 and not only $CaCO_3$. | **TAG Hydrology/ Water Quality and Vegetation** | Noted and thanks for the further clarification of precipitation controlled shallow and local GW flow path vs deeper/larger scale of groundwater flow path. Exfiltration is a mixture of both local sourced water and remote sourced GW. These clarifications have been added into the revised version of Appendix E where appropriate.<br><br>Points of GW influence and corresponding corrections were made in the revisions. For the NOP, the Appendix has been modified to consider the different sources of Si rich sands and feldspars. Further conceptualization and monitoring may be conducted to validate these sources differences and associated impacts on fen/lake chemistry regime.<br><br>Bicarbonate may be considered in future work as may be the need to characterize nutrient status of these source waters. FHEC looks forward to discussing these items in workshops planned for 2022. |
| 46 | 9 to 11; Section 2.4.2 | P. 9 Section 2.4.2 re: concrete frost; Please show evidence of this, as this is a very important mechanism in isolating snowmelt & rain from mineral soils etc. Where does this freezing occur? What is the distribution on FHUC and NOP? I would think the adjacent swamps would freeze and generate runoff this way. Has this been checked and/or documented?<br>P.10 Lake flow through and chemistry; this is all very interesting, but it is stated like it is fact. Please provide the data and interpretation, or state that this is hypothesized<br>P.10 During wet conditions. Flushing of nutrients from adjacent forest soils is mentioned. This input could be very important in overall eco-hydrology of the fen, some characterization of this water is warranted, and may need to be replicated in supply waters | **TAG Hydrology/ Water Quality and Vegetation** | Water of the fen will freeze solid where water tables are near ground surface (the fen lowlands), or freeze in ground with tight substrate materials (such as HRA 08 swamp which is armored with clay tills). These points were checked/documented within the Appendix.<br>Lake flow through and chemistry have been adjusted to be presented as conceptualizations of the system.<br>FHEC hopes to discuss the hypothesized flushing of nutrients future workshops with the TAG. |
| 47 | 12 to13; Section 2.4.3 | P. 12 McClelland Lake scenarios. Please define water quality, as it may differ from that used for the fen. I think this report only addresses TDS and cations. Then Chl a in isolation of nutrients. As noted above, P, N and DOC is required and should be included in the descriptions.<br>P.12. Figure 2.4 is cited to reference the description of lake hydrology, and geochemistry. This information is not included in Fig 2.4, Is a figure missing? A conceptual model diagram for the lake would be useful, is required!<br>P. 12: The function of McClelland is presented, but it is not clear why it is stated that the lake is well mixed. Is this an assumption? Please provide the data or justification for this. The deeper hole may not mix as frequently as the rest of the lake which will greatly influence water quality and production. It appears that the sampling is biased towards the deeper hole. Make it clear how the water chemistry is generalized and interpreted for the lake ecosystem.<br>P.12 Lake water and chemistry budget, see notes above on potential bedrock interactions. The assumptions for the modelling with regard to key external sources, mixing of input water relative to internal processes are not well presented. | **TAG Hydrology/ Water Quality and Vegetation** | Addressed, also see the response to item #46 regarding the revision of water quality in lake conceptualization: a small inset representing the lake (in Figure 2.4 of Appendix E) is used to represent the lake hydrology and geochemistry. The function of McClelland Lake is conceptualized with justification added it is believed to be a well-mixed flow through system.<br><br>A more detailed conceptual model of McClelland Lake will be progressed in 2022. |
| 48 | 14 to15; Section 2.4.4 | P.14: Show the approach used to test for, and the data that indicate the importance of precipitation events in diluting the lake surface waters, as well the relative role of evapoconcentration as a mechanism. Could not increases in the dominance of groundwater during drier periods with different chemistry result in lake water chemistry changes? This requires a concentration relative to mass balance approach (See Webster et al. 1996, Leader 2021). There seems to be a lot of speculation in this section. | **TAG Hydrology/ Water Quality and Vegetation** | FHEC amended the text to specify that conceptual water quality models using data from 2000 to 2020 were used to test the importance of precipitation events on lake water chemistry. Alternative hypotheses/isotopic/ion balancing approach may be examined in future work. |
| 49 | 16 to 17; Section 2.4.5 | P16&17; Carbon cycling is provided, but exclusion of DOC seems rather puzzling. $CO_2$-Ca dynamics are likely very important. But the DOC mass balance and transformation would also be very important in the ecosystem productivity and "water quality" (e.g., Pugh et al. 2021 - others).<br>The control of $CaCO_3$ precipitation and DOC degradation on P nutrients is important in the lake ecosystem dynamics and potential eutrophication. This should be further explored for McClelland Lake. | **TAG Hydrology/ Water Quality and Vegetation** | FHEC has added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1) and this includes water modelling workshops – further refinement of conceptual, water quality and water quantity models FHEC would like to further discuss this at the workshops. |
| 50 | 9, Figure 2.2 | In Figure 2.2, "FFUC" should be changed to "FHUC". | **Co-chairs** | Noted and addressed in report. |

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| 51 | 17, Figure 2.7 | Please label the right and left sides of the figure as the FEN and as the LAKE so there is not confusion about what the figure represents. | **Co-chairs** | Noted and addressed in report. |
| **2.5 Conceptual Model Summary** | | | | |
| 52 | 17 to 18 | P17-18 Summary; This looks good. However much of what is described concerning nutrient concentrations and dynamics (although important) has not been presented or analyzed in the report. | **TAG Hydrology/ Water Quality and Vegetation** | Nutrient dynamics and cycling of the fen will be considered in the next phase of water quality modelling. FHEC has added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1) and this includes water modelling workshops – further refinement of conceptual, water quality and water quantity models. |
| **3.0 NUMERICAL MODEL DEVELOPMENT** | | | | |
| 53 | 22 to 29 | P.22: It is not clear how the complexities of return flow from FHUC and potentially from NOP within the adjacent forests that enters the fen is represented in the model. Is it assumed to be not important? Please justify. Please clarify what assumption were used, and assessment of how well the model simulated the overall hydrologic regime.<br>P.24 The precipitation chemistry is assumed to be zero. This seems rather drastic, as much of the surface water have similar concentrations. Some sensitivity analyses should be conducted to assess this. The model is having trouble underestimating fen and lake surface water TDS.<br>P.25: There is a need for sufficient data to develop HRA-specific water quality inputs suitable for the conceptual understanding of the MLWC presented in section 3.5.3.2. The understanding now gained in this section should direct adjustments to sampling locations and frequency from 2022 onwards<br>P.29 Fig 4.2: Perhaps this will come later, with discussion on cryo-concentration, but there are several lake samples with very high concentrations – any speculation on what is happening? | **TAG Hydrology/ Water Quality and Vegetation** | A description of return flow in the conceptual model has been included in Appendix E.<br><br>FHEC has also added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1) and this includes water modelling workshops – further refinement of conceptual, water quality and water quantity models FHEC would like to further discuss this work there.<br><br>Lake outlier samples with very high concentrations are believed to be under-ice samples due to cryo-concentration. |
| **3.1 Modelling Platform and Relevant Features** | | | | |
| 54 | 19 | Finally – we learn what means EFDC at page 19 = The Environmental Fluid Dynamics Code (EFDC+) model<br><br>***Recommendation***<br>Describe the meaning of EFDC from start in the introduction: The Environmental Fluid Dynamics Code (EFDC+) model. | **TAG Hydrology/ Water Quality and Vegetation** | Addressed by inserting the full name for the EFDC+ model in the first sentence of the model introduction in Appendix E. |
| **3.2 Scope and Objectives** | | | | |
| | | No comments | | |
| **3.3 Model Domain and Grid** | | | | |
| | | No comments | | |
| **3.4 Data Sources and Associated Model Inputs** | | | | |
| | | No comments | | |
| **3.5 Boundary Conditions** | | | | |
| | | No comments | | |
| **3.6 Initial Conditions** | | | | |
| | | No comments | | |
| **4.0 MODEL SCENARIOS AND RESULTS** | | | | |
| | | No comments | | |
| **4.1 Baseline Scenario (1944-2019)** | | | | |
| 55 | 32 and 55 | P32, fig 4.4. The EDFC models does a very poor job in simulating base cations in surface water in the north and south fen. The question that should be presented now is "what is the next step to improve the simulations?" Question the numerical modelling approach? The rest of the scenario modelling is suspect. Perhaps go back to the conceptual mode (step 1 and 2 in section 6)<br>Fig 4.7; more information on locations of sampling would be helpful in attempting to interpret the results<br>Fig4.7 and others. Composition of Lake water is quite different from the fen and other aquifers. Could another external source, or internal geochemical process be influencing the lake water? Present these hypotheses to help in the next iterations of modelling.<br><br>***Recommendation:***<br>Adjust the conceptual model and the numerical model implementation (calibration) to obtain a representation of the system that can be believed and defended. | **TAG Hydrology/ Water Quality and Vegetation** | FHEC acknowledges that there is more work to be done and has added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1). This includes water modelling workshops – further refinement of conceptual, water quality and water quantity models. |
| **4.2 Operational Scenario (2015 to 2065)** | | | | |
| 56 | 36 to 43 | Problems with matching natural conditions indicate this analyses should wait on further development of the conceptual and numerical model | **TAG Hydrology/ Water Quality and Vegetation** | Agreed. |
| 57 | 36 | Are the last two bullets referring to Surface water quality, or surface water and groundwater quality? These bullets could be more specific. | **Co-chairs** | Addressed by specifying in Appendix E that near-surface water quality is used. |

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| **4.3 Active Closure Scenario (2075 to 2100)** | | | | |
| 58 | 44 to 47 | Problems with matching natural conditions indicate this analyses should wait on further development of the conceptual and numerical model | **TAG Hydrology/ Water Quality and Vegetation** | Agreed. |
| 59 | 44 | In Active Closure Section 4.3.1, the **McClelland Lake Water Quality Results** state "Overall there is a downward trend for both Ca and TDS for the first 15 years of the simulation and a generally stable annual trend in concentration for the remainder of the simulation.<br><br>IMPORTANT: **This potential effect does not appear to have been discussed in Objective 3, 4.3.2.2 on Active Closure McClelland Lake Water Quality or in Sections 4.3. 2.3 Aquatic Resources or 4.3.2.4 Vegetation.** | **Co-chairs** | These aren't referred to in the text of Objective 3 because the EFDC modelling results were not used. Due to the noted issues with the modelling results, a qualitative assessment approach was taken within Objective 3. |
| 60 | 44 | Are the last two bullets referring to Surface water quality, or surface water and groundwater quality? These bullets could be more specific. | **Co-chairs** | Addressed by specifying in Appendix E that near-surface water quality is used. |
| **4.4 Far Future Closure Scenario (2100 to 2175)** | | | | |
| 61 | 48 | In Far Future Closure Section 4.4.1, the **McClelland Lake Water Quality Results** state "However it should be noted that the simulated lake concentrations for Baseline and Far Future Closure scenarios follow more similar patterns during the during the relatively wet climate forcings and deviate from each other during other climate forcings.<br><br>IMPORTANT: **These potential deviations do not appear to have been discussed in Objective 3, 4.3.2.2.2 McClelland Lake Water Quality or in Sections 4.3. 2.3 Aquatic Resources or 4.3.2.4 Vegetation.**<br><br>In Far Future Closure Section 4.4.1, the pattern Fen North and south Water Quality Results state "the Ca concentrations are high for both Pattern Fen North and South"<br><br>IMPORTANT **These potential changes do not appear to have been discussed in Objective 3, 4.3.2.2.1 Fen Water Quality or 4.3.2.4 Vegetation.** | **Co-chairs** | See the response to Item #59. |
| **5.0 SUMMARY & KEY FINDINGS** | | | | |
| 62 | 54 | These can be cited as an important first step. However. with possibly the exception of comment on climate as a key driver, all other claims of success in capturing the conceptualization of hydrologic processes and evaluating the water supply are greatly overestimated, and appear unfounded.<br><br>***Recommendation***<br>Rewrite. Most claims of success in capturing the conceptualization of hydrologic processes and evaluating the water supply are greatly overestimated and appear unfounded. | | The "Key Findings" section has been reframed to provide insight on what value the EFDC+ modelling works adds in terms of understanding the key drivers of water quality regimes in the system. FHEC does acknowledge that there is more work to be done. |
| **6.0 POTENTIAL IMPROVEMENTS** | | | | |
| 63 | 55 to 58 | The suggested improvements are needed, and much more monitoring and testing of the conceptual models are required<br>A thorough reassessment of the numerical approach, and considerable attention to step 1 and 2 (with iterations) in fig 6.1 is suggested. In the meantime, empirical and graphical approaches need to be developed comparing time series of historical (as far back as possible) concentration of source waters, surface waters of fen and lake, and the reference sites to detect changes, and define triggers for water quality<br><br>***Recommendation***<br>Reassess the numerical approach. A work in progress. | **TAG Hydrology/ Water Quality and Vegetation** | Agreed. FHEC has added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1) and this includes water modelling workshops – further refinement of conceptual, water quality and water quantity models. |
| 64 | 57 | Recommend workshop(s) to review the water quality conceptual model, monitoring results and predictions (simulated fen and lake concentrations and flow volumes for baseline, operations and active closure) with AAG & TAG. | **Co-chairs** | Agreed. FHEC has added a table of commitments to the Introduction section of future work with the SC, and tis advisory groups (Table 1.7-1). |
| **7.0 REFERENCES** | | | | |
| 65 | 58 | (Includes those suggested in Nov 15th correspondence … ADDED BELOW<br>Burt TP, Haycock NE, 1996. Linking Hillslopes to Floodplains. In: Anderson MG, Walling DE, Bates PD (eds.), Floodplain Processes. John Wiley & Sons Ltd., pp. 461-492<br>Buttle,J. 1994. Isotope hydrograph separation and rapid delivery of pre-event water from drainage basins. Progress in Physical Geography 10: 10-41<br>Devito, K. J., Creed, I. F., Rothwell, R. L., and Prepas, E. E. 2000. Landscape controls on phosphorus loading to boreal lakes: implications for the potential impacts of forest harvesting. Can.J.Fish.Aquat.Sci. 57, 1977-1984<br>LaBaugh, J.W., Rosenberry, D.O., Winter, T.C., 1995. Groundwater contribution to the water and chemical budgets of Williams Lake, Minnesota, 1980–1991. Can. J. Fish. Aquat. Sci. 52, 754–767.<br>Mullan-Boudreau, G, K Devito, T Noernberg T Noernberg, W Shotyk. 2017. Sphagnum moss as an indicator of contemporary rates of atmospheric dust deposition in the Athabasca Bituminous Sands region. *Environmental Science & Technology*, *51* (13), pp 7422–7431 DOI 10.1021/acs.est.6b06195<br>Plach JM, J- Ferone, Z Gibbons, B Smerdon, A Mertens, C Mendoza, R Petrone; KJ Devito. 2016. Influence of glacial landform hydrology on phosphorus budgets of shallow lakes on the Boreal Plains. *Journal of Hydrology,* 535:191-203. | **TAG Hydrology/ Water Quality and Vegetation** | Noted. |

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| | | Verry 1997. Hydrological processes of natural, northern forested wetlands. In NORTHERN FORESTED WETLANDS: ECOLOGY AND MANAGEMENT, e 1997 by CRC Press, Inc.<br>Webster et al 1996. The influence of landscape position on lake chemical responses to drought in northern Wisconson L&O 41(5):977-984<br>Winter, Rosenberry, D, Merk, D 2001. Water Source to Four U.S. Wetlands: Implications for Wetland Management. Wetlands Doi:10.1672/0277-5212(2001)021[0462:WSTFUS]2.0.CO;2<br>Winter, T.C., 1981. Uncertainties in estimating the water balance of lakes. Water Res. Bull. 17, 82–115.<br>Winter, T.C., Rosenberry, D.O., LaBaugh, J.W., 2003. Where does the ground water in small watersheds come from? Ground Water 41, 989–1000.<br>Winter, T.C., 2001. The concept of hydrologic landscapes. J. Am. Water Resour. Assoc. 37, 335–349.<br>Winter, T.C., 1999. Relation of streams, lakes, and wetlands to groundwater flow systems. Hydrogeol. J. 7, 28–45.<br><br>FROM NOV 15 EMAIL FROM KEVIN DEVITO<br>Burt TP, Haycock NE, 1996. Linking Hillslopes to Floodplains. In: Anderson MG, Walling DE, Bates PD (eds.), Floodplain Processes. John Wiley & Sons Ltd., pp. 461-492<br>Buttle,J. 1994. Isotope hydrograph separation and rapid delivery of pre-event water from drainage basins. Progress in Physical Geography 10: 10-41<br>Devito, K. J., Creed, I. F., Rothwell, R. L., and Prepas, E. E. 2000. Landscape controls on phosphorus loading to boreal lakes: implications for the potential impacts of forest harvesting. Can. J. Fish. Aquat. Sci. 57, 1977-1984<br>Verry 1997. Hydrological processes of natural, northern forested wetlands. In NORTHERN FORESTED WETLANDS: ECOLOGY AND MANAGEMENT, e 1997 by CRC Press, Inc.<br>Webster et al 1996. The influence of landscape position on lake chemical responses to drought in northern Wisconsin L&O 41(5):977-984 | | |
| **8.0 Comments and Recommendations from ACFN (Dated Dec 8, 2021)** | | | | |
| 66 | NA | **Comments re: Process**<br>• Between Nov.29 and Dec.03, DLRM was unable to complete our review of the Water Quality section. As stated at the Dec.03 meeting, ACFN relies on the Technical Advisory Group's (TAG's) reviews and comments, as well as on the outcome of discussions between TAG and Suncor.<br>• ACFN would have preferred a process that allowed sufficient time and opportunity to (a) understand Suncor's information, (b) review TAG's comments on same, and (c) review with ACFN Elders – prior to providing comments at the Dec.03 meeting. In the absence of this process, DLRM re-iterated earlier comments and responded to TAG's comments shared at the Dec.03 meeting.<br>• As shared in earlier meetings, ACFN was not in support of filing an Operational Plan that contained extensive information gaps and commitments to provide further information. DLRM went into the Dec.3, 2021 meeting regarding the Water Quality content with the intent of understanding the extent to which information gaps had been filled, at least those relevant to Water Quality. | **ACFN** | Thank you for this feedback and perspective and we acknowledge these comments. FHEC and the SC have made significant progress on developing the Operational Plan and we recognize that there is still work left to do to finalize details. The OP outlines and frames our approach to protect the non-mined portion of the MLWC and we are committed to continuing work to finalize details and aspects of the plan (as outlined in the Introduction). |
| 67 | NA | **Comments re: Content**<br>• ACFN is not supportive of Fort Hills' proposal to resupply the fen with treated water from the Athabasca River, planned for 2060-2075. As stated in ACFN's Nov.26 submission and comments:<br>○ What water quality will Suncor be striving to meet with treatment? ACFN is concerned that water quality in the fen and lake will continue to deteriorate, and is uncertain if, or how, water will be treated to meet pre-disturbance conditions.<br>○ By 2060, the Athabasca River may contain process-affected water, or water from tailings ponds that has been treated for release to the environment. ACFN is concerned not only about the release of treated tailings water to the Athabasca River, but the use of this water for other reclamation activities, including resupply to the fen.<br>○ From a water quantity perspective, any "water management measures" that involve withdrawals from the Athabasca River are not considered mitigative to ACFN. The First Nation has already experienced impacts as a result of lower levels of water in the river. | **ACFN** | Thank you for this feedback and perspective and we acknowledge these comments. Further work is required to design and finalize the water treatment processes that will ensure the water supply is appropriate and protective of the non-mined portion of the MLWC. The OP includes an overview of the next steps on water resupply and commitments to collaborate with the SC. |
| 68 | NA | **Comments re: Content**<br>• ACFN supports TAG's request that Fort Hills defend the following statement in the Operational Plan: "With the installation and operation of the water management design features, substantial changes to water quality are unlikely; no substantial changes in productivity, as measured by chlorophyll a concentration, in McClelland Lake are expected from changes to water quality," (OP 4.3.2.3). | **ACFN** | See response to item #19. |
| 69 | NA | **Comments re: Content**<br>• ACFN has raised questions and concerns as to how changes in water quality as a result of mining would impact the watershed, and where, given the connectivity that ACFN Elders and members have long described. This is echoed in TAG's statement that the model does not appear to adequately represent transport within the hydrologic system. | **ACFN** | FHEC has added a table of commitments to the Introduction section of future work with the SC (Table 1.7-1) and this includes water modelling workshops, as well as seeking further ITK to support this modelling work. |
| 70 | NA | **Comments re: Content**<br>• ACFN's view and understanding is that the above information gaps and anticipated water quality impacts to the fen are still too great to support submission of the Operational Plan at this time. | **ACFN** | See response to item #66 and #67. |

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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills' Response** |
| 71 | NA | **Recommendation/Request**<br>ACFN is actively working to finish the Indigenous Water Quality Criteria (IWQC) study, undertaken together with Fort McKay First Nation and MCFN[1].<br>When it is available for distribution, we would like to provide it to the Sustainability Committee and TAG, and request that it be used as follows:<br>• To identify other chemicals or constituents that should be added to the water quality model and baseline information/monitoring, such as naphthenic acids.<br>• The IWQC sets out limits or thresholds (guidelines) for each chemical (for the protection of traditional uses and consumption/human health). Noting that these guidelines may not be suitable for the fen, the IWQC could still be used as the basis for this discussion, with the guideline or threshold adjusted as appropriate to the fen.<br>ACFN looks forward to further discussion as to how the IWQC can be used to strengthen Fort Hills' water quality information and model. | **ACFN** | Other than hearing that there is work underway, we are not familiar with the Indigenous Water Quality Criteria (for example the methodology, criteria or intended application) and are interested in understanding more about the work. At this time, no details have been shared and we are not clear on how it may inform our work or if it is appropriate for application at MLWC. |

[1] As discussed at the Dec.03 meeting, other communities not involved in the IWQC (survey portion) may wish to conduct supplementary work of their own.

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 1 | General comments | The OP is not ready. Work to date is inadequate to move to the Operational Plan. Great progress has been made and Suncor is on a good trajectory. Suncor should be ready to proceed in a few years. TAG does not support proceeding at this time. Suncor must postpone. | **TAG** | FHEC has received an extension to the OP submission deadline from Sep 30, 2021 to Dec 15, 2021 to allow more time for SC/TAG review, response to SC/TAG findings and incorporation of recommendations where applicable. FHEC respectfully disagrees with the assessment that the OP requires a few years of work to be ready for submission. Responses have been prepared for all SC/TAG findings, which will be reviewed alongside a compiled draft OP in October through November 2021. FHEC requests that this finding be revisited once all responses and the compiled OP draft have been reviewed in full. |
| 2 | General comments | TAG is still waiting for meaningful responses to previous TAG concerns, including for the hydrology.<br><br>Many of the key points listed below have been commented on in previous drafts; TAG awaits responses from SUNCOR. The report has much more, and very relevant information, but it appears rushed, and the synthesis of the information is limited, particularly at this late stage of the assessment. | **TAG** | Fort Hills acknowledges delays in responding to prior TAG findings, which resulted in duplication of some findings through review of the OP. Responses to TAG findings were provided July 12th and July 22nd, 2021. Fort Hills also acknowledges the short review cycle for this portion of the OP and will address any duplicate findings as required. Given these challenges, Fort Hills has agreed to provide responses to SC/TAG for all findings alongside another round of review of the full document prior to submission. |
| 3 | General comments | Attendance at meetings does not indicate agreement. Don't intimate that TAG (or others) agreed when we raised concerns that have yet to be addressed. A table of how disagreements were considered would help | **TAG** | Noted. Objective 1 has been reviewed to identify and if applicable, improve how meetings are discussed or agreement was implied. |
| 4 | General comments | Most comments relate to two main issues this reviewer has identified and described below in Section 2.1: Omission of IK/TLU Information and Lack of Integration of IK/TLU Information | **ACFN** | Noted. |
| 5 | General Comments | The presentation of the communities' IK and TLU in the several tables throughout Objective 1 implies a kind of tacit agreement, both with Suncor's approach to presenting and using the IK, as well as to Suncor's planned mining of a portion of the MLWC.<br>ACFN recommended Suncor request an extension from the AER for submission of the OP. The additional time could be used to address the issues below (and others, as noted by TAG and other communities) and, ideally, allow the communities the time and opportunity to more thoroughly review the revised OP. This would better position the communities to say whether the OP presents and uses their information well. | **ACFN** | Part 1: Through review of the draft content, we are seeking validation and approval to use the IK. It will be noted in the OP that community members participating on the SC have expressed concerns over mining in the fen. Part 2: please see the response to #1. |
| 6 | General Comments | Some final interpretation and integration of the surface flows and focused groundwater in the fen is required (more comments below). Integration into a cohesive and coherent conceptual model of the surrounding connections and maintenance of the fen and lake is still required. Providing a conceptual model is imperative for effective assessment and mitigation of the potential impacts of operations, helping direct sampling locations for initial and rapid change detection, and for selecting and interpreting reference systems | **TAG** | The Conceptual model appendix of Objective 3 addresses this, apologies that this was not provided in time for the review of Objective 1. |
| 7 | General Comments | BACI - This is a very important part of the short and long-term assessment of operations activity, and has receive one small paragraph. I find it incredibly naive to state that the reference system does not have to have the same hydrogeological characteristics (SUNCOR simply state "characteristics"). This assumes linearity and time invariance in the response to disturbance vs other drivers. Thus it implies that finding areas with similar vegetation will have the same connectivity – the vegetation integrates both the hydrogeology and hydrology as well as the geochemistry of the substrate and processes occurring along the flow paths. Assumptions of linearity and time invariance have been shown to not hold in sub-humid Boreal Plains or the Foothills (Holecek 1988, Devito et al. 2005, Goodbrand 2021-in review).<br>There is considerable work in regions with complex difference in storage and the threshold responses to climate and disturbance due to subtle differences in hydrogeology can greatly complicate BACI relationships, as the result of different timing or lag and thresholds of the reference vs MLWC. Simple transformation will not be able to deal with this. Long term pre and post data is required, but it must include enough climate variability to assess non-linearity. A systematic analysis of the reference and MLWC sites and conceptualization of similar connections and controls is required and sites within the reference selected accordingly. | **TAG** | It is agreed that an ideal reference site would have similar hydrogeological characteristics as those found at MLWC. FHELP has generated EHZ's for both reference sites and have also produced some preliminary conceptual analysis (hydrological) of these sites, please see the attached memo. Both sites have some basic surface water data collected but no groundwater data. FHELP believes that these sites are good reference sites in terms of looking at chemistry/vegetation responses to regional climate conditions, Audet and Gypsy Gordon are located in the similar climate regime, as such their responses to the climate variation would be similar. |
| 8 | General Comments | Reference system: Good to see these sites have been incorporated into the report. But this is incomplete and needs further description to assess the applicability of the locations to infer possible changes to WL and EHZs. Analyses parallel to MLWC is required, and if only certain selected parameters or locations are used, then a justification is also required. The current selection of references (Audet and Gipsy-Gordon) seems based largely on vegetation. Some estimate of the EHZ and what groundwater conditions is necessary. Different sites can have the same vegetation and patterns but respond to combinations of different water balances and geologic settings. The hydrogeology setting will largely determine the response to climate and other external controls vs operations. Selecting a patterned fen fed by an upstream lake is not likely to respond to climate variation in the same way as a fen that is fed by the surrounding landscape, and then flows into a lake. The important hydro-geologic connections should be replicated between the reference and MLWC as much as possible. Some estimate of the EHZ and what type of HRA or groundwater connectivity occurs at the surface and groundwater sites will help in the interpretation of the chemistry. Water level data should be collected, and gradients calculated, at these locations to compare with MLWC. | **TAG** | Basic EHZ's have been generated for both reference sites, please see the attached memo. It is also acknowledged that both sites placed much greater emphasis on having similar vegetation to that of MLWC than consideration of site hydrology. The shallow flow system at MLWC derives all of its incoming flows from precipitation with no apparent regional water inputs. The patterned fens at the MLWC also sit in groundwater discharge zones supplied from the surrounding landscape. These conditions also exists at the reference sites (although the potential for regional inputs at both sites needs to be analyzed further once more data is available). In my FHEC's opinion, an argument could be made that, based on available information, the reference sites are hydrological comparable to the MLWC. FHEC is committed to further examining the reference sites post-submission. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 9 | General Comments | Figures and tables. Still many do not provide enough information (legends, caption description etc.) to allow the reader to interpret the information provided. | **TAG** | FHEC has reviewed the figures and made edits to the legends where appropriate. Much of the information required to interpret figures and tables is provided in the text. |
| 10 | General Comments | There is no new information in the Operational Plan Objective 1 that would help evaluate how the wildlife program will inform the assessment of ecosystem functionality in the future. In their responses to TAG's Concerns and Recommendations, Suncor assures that they will work with TAG on further refinement of the wildlife monitoring. We look forward to discussions and reviews of the wildlife monitoring program in the near future, but we cannot provide further detailed comments here.<br>In their responses to TAG's Concerns and Recommendations, Suncor also notes that they will "develop a suite of indicators to assess functionality (Objective 2) as well as a develop an environmental effects monitoring program (Objective 5). " We note that wildlife has been excluded from both Objective 2 & Objective 5. | **TAG** | FHEC recognizes the importance of wildlife to the ecosystem and to the SC. The Fort Hills Wildlife Monitoring and Mitigation program is separate from the Operational Plan and will remain separate. The TAG has had much involvement in the wildlife monitoring at MLWC and has had much input to the program as it is designed today. The SC will receive updates the wildlife program and data at the same cadence as the Wildlife Monitoring Report reporting and the TAG/SC will have an opportunity to participate when the program changes. As well, Fort Hills has committed to a wildlife workshop with the TAG and SC in early 2022. |
| 11 | General Comments | Defining functionality of the ecosystem in the MLWC is the overarching task that Suncor was to perform and Suncor appears to strive towards fulfilling this task. However, it is unclear to us how an ecosystem's functionality can be determined when wildlife is not considered. Site-wide monitoring programs have been developed to monitor for mitigation success using qualitative and incidental observations. Systematic and statistically rigorous monitoring was developed for the fen only. While Suncor intends to continue the monitoring done to date in the fen as part of the site-wide monitoring program, it is unclear how that program will inform the functionality assessment when it is performed outside the Operational Plan. In particular, under the Operational Plan Objective 2, Suncor does not consider wildlife to be suitable indicators. How can Suncor assess the functionality of the ecosystem when top-down, cascading, and bottom-up effects are not considered? TAG does not believe it is possible. | **TAG** | See the response to Item #10. |
| 12 | General Comments | On the point of community concerns, TAG does not in any way intend to comment on the need for, or the validity of, what communities desire to be included in a monitoring program. We simply add our views from a western scientific perspective that may assist to address community concerns.<br>In Objective 1 ***Table 2-46: Indigenous Traditional Knowledge Related to Wildlife*** Suncor summarizes the observations of community members. Here, TAG does not comment on how adequate this summary may be; rather, we leave such comments to the AAG. However, we note that the community concerns relate to top-down and bottom-up effects, which is ecologically very meaningful and parallel to the scientific perspective.<br>While Suncor stated that they feel that muskrats are not a suitable indicator, we do not offer an opinion on what is or is not suitable in addressing community concerns. Rather, we are happy to contribute to the discussion on how community concerns could be addressed from a western scientific approach that could complement an IK approach. | **TAG** | Noted. We look forward to the wildlife workshop in 2022 with TAG and AAG participation. |
| **1.0 Introduction** | | | | |
| 13 | 1-1 | Please provide an outline of what will be provided in the Introduction, including<br>•important dates and history<br>o original approval in 2002 to FHEP (include subsequent holders – UTS, PC, Suncor); and dates & conditions in the approval with respect to the mining of the fen<br>o approval amendments<br>o establishment of the SC in 2005 and mandate<br>o 2018 proposal application<br>o 2018, 2019 & 2020 progress reports<br>•plan status at time of application<br>o conceptual nature of plan elements<br>o detailed design completion schedule<br>•brief paragraph for each of the 6 objectives, again detailing status at time of submission<br>•Conclude with future progress (re: reporting, engagement, etc.) | **FMMN/FCM** | These items are all discussed in the Introduction Section, Section 1.0. |
| 14 | 1-1 | Include a concordance table with this plan and the 2018 Proposal Tasks. Based on this Objective #1 review, there are a number of items where either work needs to be done or if partially or fully completed, included. This concordance table then needs to identify when specific tasks will be completed or developed once the project moves from a conceptual plan to the detailed design plan | **FMMN/FCM** | A concordance table with the proposal and the FH Water Act Approval will be part of the introduction section (Section 1.0). |
| 2.0 **Objective 1 – Baseline Conditions** | | | | |
| 15 | General comments on Objective 1 | Update Objective 1 to include the pre-development and pre-mining baseline conditions for each of the Values supported by the MLWC, to provide context for the Natural Range of Variation for the indicators that will be monitored. See comments from the Co-Chairs on the Table of Contents of the Operational Plan – April 27, 2021 | **Co-Chairs** | Objective 1 has been updated with additional ITK and pre-development baseline information based on the ITK studies provided. We welcome feedback from the communities on how it has been incorporated. |
| 16 | General comments on Objective 1 | Suncor should clarify the purpose of the information included in each sub-section. For example, if the information is not building the baseline for the FHOP effects monitoring program, what is it for (to inform conceptual water balance, part of a regulatory requirement associated with a site-wide monitoring program, other)? | **Co-Chairs** | FHEC's intent was to provide the regulator with a summary of all data that has been collected to date to inform the OP, even if those programs were not carried forward. It adds important context to the regulator for the work that has occurred over time. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 17 | General comments on Objective 1 | Objective 1 need to be revised to reflect <u>all</u> the information that has been prepared by the SC to assist in the Development of the OP (see attachment 1-3 of SC review). The attachments provided by the co-chairs include:<br>1.Summary of Meetings 2019, 2020 and 2021 (July 17, 2021) - For OP<br>2.Updated Information for Operational Plan - July 17, 2021<br>3.COMPARISON SC and Suncor Indicators and Methods July 17, 2021<br>Review all the reports and minutes from the SC and AAG meetings to gather all ITK information on vegetation, wildlife and other SCT proposed indicators so it can be integrated into the Objectives throughout the report. Reference all the sources used to gather ITK. | **Co-Chairs** | The information that has been prepared by the SC includes information that has been integrated throughout the OP, not only for Objective 1. Much of this information is used throughout the plan, and will be described in the Introduction. |
| 18 | General comments on Objective 1 | In their current format, the Tables being used convey some of the knowledge that has been shared by members of the SC, AAG or community members that participated in community-studies are not very useful and should be removed. This is not how IK is integrated. Tables should be replaced with text and maps linking IK for each MLWC Value for both Pre-development and Pre-mining Baseline conditions. This information can provide context for understanding thresholds and triggers within the context of natural variation and existing cumulative effects.<br>Tables should be replaced with text and maps linking IK for each MLWC Value for both Pre-development and Pre-mining Baseline conditions. This information can provide context for understanding thresholds and triggers within the context of natural variation and existing cumulative effects. | **Co-Chairs** | Accepted. The tables can be removed and IK will be included as text - linked to the values and reference conditions where possible. |
| 19 | General comments on Objective 1 | discuss the definition of the Measured Range of Variability, how it will be informed (e.g. through modeling in addition to paleo-environmental data, and monitoring data? And why is IK not used to help characterize the 'current' or 'pre-mining' case? Also, this discussion must include the application of MRV to inform the triggers and limits under Objective 6 | **FMMN/FCM** | Text added at end of second paragraph under Section 2 header and sections have been updated to hopefully better include ITK throughout. |
| **2.1 Indigenous Traditional Knowledge** | | | | |
| 20 | 2-1 to 2-4 | With respect to the IK shared, the table should include all IK shared and not be limited to that in the Baseline Report (i.e. baseline and NRV were also discussed in AAG meetings, the On The Land Workshop and in all of the workshops that have included AAG members) | **FMMN/FCM** | The tables of ITK have been removed as recommended in the review. ITK has been included from all available sources, including the baseline report, prior TLU studies in the region, AAG and SC meeting minutes and on the land experiences. We welcome any suggestions of specific content that should be included. |
| 21 | 2-1 to 2-4 | The table should become part of Section 2.3 Pre-development Baseline Conditions and Section 2.5 Pre-mining Conditions as appropriate. Also, an attempt should be made to be clear on the state based on the reference to change in addition to the context (e.g. pre-development ice formations were variable; pre-mining ice thickness/strength has been weakened corresponding to the presence of contaminants | **FMMN/FCM** | The tables of ITK have been removed as recommended in the review, and sections have been updated to hopefully better include ITK throughout. |
| 22 | 2-1 to 2-4 | This section on IK, if retained, should focus on how it informed and was integrated into defining the baseline conditions including for both the pre-development and pre-mining references cases as well as the natural range of variation (including to set limits and thresholds even if a MRV is used). For example, in the discussion of the reference sites that are then carried into the other baseline conditions | **FMMN/FCM** | The section has been updated to hopefully better include ITK throughout. |
| 23 | Page 2-1 (text), and Pages 2-2 to 2-4 (Table 2-1) | ACFN recommends that the detailed SC and AAG meeting minutes (including from any tours to the MLWC) be reviewed for where ACFN and other community members have provided information that can be included in this Objective.<br>ACFN may undertake to compile and submit an amended SoW to Suncor (given that ACFN's IK/TLU Study will not be completed in time for inclusion to the Operational Plan), or fund the work independently, to review the meeting minutes and other materials where ACFN has provided IK and baseline information and provide this information in ACFN's IK/TLU Study to Suncor. | **ACFN** | ITK has been included from all available sources, including the baseline report, prior TLU studies in the region, AAG and SC meeting minutes and on the land experiences. We welcome any suggestions of specific content that should be included. |
| 24 | Page 2-1 (text), and Pages 2-2 to 2-4 (Table 2-1) | A much more robust exercise to extract IK and integrate it into the baseline information and Objective 1 needs to be undertaken. This revised understanding of the MLWC Baseline then needs to form the basis for subsequent Objectives. | **ACFN** | ITK has been included from all available sources, including the baseline report, prior TLU studies in the region, AAG and SC meeting minutes and on the land experiences. We welcome any suggestions of specific content that should be included. |
| 25 | 2-1 to 2-4 | The introduction to the IK section should outline the requirements to integrate IK into the OP and the commitments made to integrate IK into the OP (FHOP 2018) | **Co-Chairs** | Noted |
| 26 | 2-1 to 2-4 | This section requires an introduction that highlights the cultural and ecological significance of the MLWC, the history of use/continued use, and importance to regional indigenous communities. | **Co-Chairs** | Objective 1 has been updated to hopefully better include ITK throughout. |
| 27 | 2-1 to 2-4 | The section should describe the role of the AAG and the wealth of knowledge held by individuals involved with the AAG and SC and their history in the area to provide context for the information that was shared and why the opinion of these people is so important. | **Co-Chairs** | Objective 1 has been updated to hopefully better include ITK throughout. |
| 28 | 2-1 to 2-4 | At the end of paragraph one add the following statement: Pre-development baseline conditions are informed by indigenous knowledge. | **Co-Chairs** | The section has been updated significantly. This statement has been included. |
| 29 | 2-1 to 2-4 | At the end of paragraph 3 add the following sentence: Where possible, pre-development baseline is used to understand the changes in the social, cultural and traditional economic indicators that will form the baseline for the Community Observation Logs and Interviews, and CBM Monitoring. | **Co-Chairs** | Partially accepted. The initial part of the sentence has been included. The ESCT monitoring program is included later in the document. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 30 | 2-1 to 2-4 | Section 2.1 must be updated to focus on the approach the OP has taken to integrate IK into the various objectives set out for the Operational Plan.<br>IK related to Natural Variability should be incorporated into Sections 2.3 pre-development and Section 2.5 pre-mining baselines for all the MLWC values before the OP can be considered complete.<br>Where there are gaps in information, Suncor shall make a commitment to start collecting (or in some cases simply compiling) this information. | **Co-Chairs** | The section has been updated significantly. |
| 31 | 2-1 to 2-4 | Table 2-1 includes some IK for indicators that are not being monitored as part of the effects monitoring program (for example Eggs/nest for birds nesting around McClelland Lake,). | **Co-Chairs** | See response to item 16 above, as well, more information has been added to the section. |
| **2.2 Work Completed Prior to Operational Plan Development** | | | | |
| 32 | 2-5 | There is one reference on page 2-5 that states: As noted in the introduction to this section, FHEC has reviewed the ITK provided through the SC and has identified where the ITK supports or departs from the results of the monitoring data analysis.<br>Upon review of the Introduction (which is not developed), the introduction of Section 2.2 and the introduction to Section 2.4 as it is referenced in the sentence prior to this one on page 2-5; this does not exist. This information needs to be included and validated with the AAG.<br>As noted in the introduction to this section, FHEC has reviewed the ITK provided through the SC and has identified where the ITK supports or departs from the results of the monitoring data analysis.<br>Upon review of the Introduction (which is not developed), the introduction of Section 2.2 and the introduction to Section 2.4 as it is referenced in the sentence prior to this one on page 2-5; this does not exist. This information needs to be included and validated with the AAG. | **FMMN/FCM** | The section has been updated. |
| 33 | 2-5 | This section should speak to all of the work that informed the development of the plan including the reports, meetings, input, and workshops conducted (or to be conducted) prior to submission of the Plan. Their absence conveys that all of that work has not contributed to, informed or been integrated into the Plan. All of this information should also be included as a separate Table. | **FMMN/ FCM** | Accepted. The section will be updated to better reflect work completed to collect ITK and the source of information. The work of the SC informs all sections of the OP, not just Objective 1, or baseline information. |
| 34 | 2-6 | Please update reference to section 2.6 | **FMMN/FCM** | This has been updated, thank you. |
| 35 | 2-8 | The Predevelopment Baseline Conditions should include the knowledge and information provided through the Baseline Report as well as through the various meetings and workshops where pre-development knowledge and information was shared | **FMMN/FCM** | Accepted. The section will be updated to better reflect work completed to collect ITK and the source of information. |
| 36 | 2-8 | This Section should start with the pre-development condition(s) information shared including knowledge and information on the NRV | **FMMN/FCM** | Accepted. Additional ITK and NRV content will be added. |
| 37 | 2-8 | Information on the pre-development baseline and NRV should be discussed both from a western science and Indigenous knowledge state of knowledge including identifying any gaps that may need to be filled through further information/data collection and modelling if needed to back-cast the pre-development condition and NRV of key indicators that are being used in the monitoring program. | **FMMN/FCM** | Accepted. Additional ITK and NRV content will be added. Reference to Objective 3 where modelling baseline info completed. |
| 38 | 2-8 | A discussion of how IK and western science was integrated and how it has informed and influenced the development of the plan is required. | **FMMN/FCM** | Accepted. Additional ITK and NRV content will be added. The integration should be carried throughout the plan, not just this section. |
| 39 | 2-8 | Baseline conditions, both for predevelopment and pre-mining conditions must also include the Social, Cultural and Traditional Economic Baseline information. This information is needed to inform all other sections of the Operation Plan such as indicators, thresholds, mitigations and the response framework. | **FMMN/FCM** | Accepted. Available information (from the Baseline Report) on Social, Cultural and Traditional Economic Baseline information has been added. |
| 40 | 2-5, Table 2-2 | The earliest report referenced is from 2017 (Page 2-5, Table 2-2), and questions whether there is an opportunity to identify how the Sustainability Committee and Indigenous Communities provided input into earlier reports and work of the SC. | **ACFN** | Accepted. This table is a summary of the most recent technical synthesis work. Additional context will be added on the contributions of the SC, including IK studies. |
| 41 | 2-5 | Describe the work completed by the SC, TAG and AAG Prior to Operational Plan Development. Refer to the List of Products that have been produced by the SC. | **Co-Chairs** | Accepted. Additional context will be added on the contributions of the SC, including IK studies. |
| 42 | 2-5 | Table 2-2 should be amended to show where there are GAPS in the monitoring data set for indicators that have been selected for the wetland values supported by the functions of MLWC. | **Co-Chairs** | The table has been updated to include all sources of information used in the OP. The purpose of the table is not to identify gaps for indicators or values that are part of later objectives. |
| 43 | 2-6 | Please insert a table comparing monitoring programs at MLWC and the 2 reference sites. The table should list the indicators being monitored at each site, the number of sampling locations for each indicator/metric, and the sampling frequency for each indicator/metric. This table should also highlight gaps – where no monitoring data is being collected for the indicators/metrics that have been recommended by the SC. | **Co-Chairs** | This information is provided in Objective 5 where the effects monitoring program details are provided. Tables 6-2 and 6-3. |
| 44 | | The data collected on Reference "sites" are insufficient for moving forward. Baseline historical data are required to develop the necessary conceptual models and to assess changes. | **TAG** | FHEC acknowledges that more information is required for the reference sites. See responses to items #7, #8 and #15. |
| **2.3 Pre-Development Baseline Conditions** | | | | |
| 45 | 2-8 | It is noted that there is no discrete "Indigenous Knowledge" in subsections: [Section 2.3: Pre-development Baseline Conditions] (as per other sections), and the reviewer questions whether there was Indigenous Knowledge provided through IK/TLU studies or through the communities' participation in the SC and AAG. | **ACFN** | Accepted. Additional ITK and NRV content will be added. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 46 | 2-8 | The OP must include Pre-development baseline information for all of the wetlands values supported by MLWC functions.<br>Predevelopment baseline information is required for the indicators that have been recommend for the following wetland values :<br>• Vegetation Harvesting<br>• Water Quality<br>• Lake water levels/flows<br>• Wetland water levels/flows<br>• Ice/snow conditions<br>• Water Use<br>• Wildlife (moose, waterfowl, beaver, muskrat, birds, frogs)<br>• Hunting<br>• Trapping<br>• Indigenous Culture and Habitation (cabins, camp sites, staging areas, access and travel)<br>• Education and Learning<br>• Health and Wellness | **Co-Chairs** | The objective has been updated to include additional information and we hope that reviewed with other objectives as a complete document this information will be provided. |
| 47 | 2-11 | fig 2-4. Really interesting data. Units are required | **TAG** | The figure has been modified. |
| 48 | 2-12 | Change title figure to: Figure 2-12 Location of Six Ecohydrology Zones at in the McClelland Fen (not Wetland Complex ) | **Co-Chairs** | This figure includes areas outside the fen (e.g., EHZ 6 = swamp), so the title must remain Ecohydrology Zones at the MLWC. |
| 49 | 2-13 | 2.3.2.4. stated … likely do to climatic and increased loading from anthropogenic activities . What would the anthro-activities be, dust? Is this significant. | **TAG** | This information was pulled directly from the Innotech (2020) report. They were likely referencing well known increases in air emissions but no further details were provided in the report. |
| **2.3.1 Peatland Paleo-Ecology** | | | | |
| 50 | 2-8 to 2-13 | Provide the key findings of this section, maybe in text boxes, to provide the reader a snapshot of the pre-development case findings | **FMMN/FCM** | FHEC respectfully disagrees with this approach, if we were to add text boxes with key findings in all sections (for consistency) the document would become unmanageably long. |
| 51 | 2-8 to 2-13 | With respect to the findings, including changes from the 'pre-development' to the 'pre-mining' conditions there is an opportunity to integrate IK and the findings from that shared knowledge. | **FMMN/FCM** | Accepted. Additional ITK and NRV content will be added. |
| 2.3.2 McClelland Lake Paleolimnology | | | | |
| 52 | 2-14 | in general the shallow section of the lake, that covers 2/3 the area, has not been considered | **TAG** | Sediment coring for paleolimnology purposefully targets the deepest portion of the lakes as sediments tend to migrate to and accumulate in the deepest areas over time. The littoral areas are shallow and often well oxygenated; therefore, sediment column in the littoral area can easily be disturbed by wind driven waves and benthic animals, making it unsuitable for a paleo study. |
| 53 | 2-14 | Figure 2-7 highlights how different 2/3 of the lake is. Some data should be collected for the more littoral areas | **TAG** | See response to item #52. |
| **2.4 Ecohydrology Zone Conceptual Model** | | | | |
| 54 | 2-16 | In the description of the EZC (EHZ) model and the HGS Integrated Numerical Flow model and corresponding ecohydrological zones and hydrological response areas there is no mention of how or if IK was used to inform them, or at a minimum develop the model assumptions. Whether IK was used to inform them and if so how should be discussed | **FMMN/FCM** | This information is provided in the conceptual model appendix of Objective 3. |
| 55 | 2-16 | It is noted that there is no discrete "Indigenous Knowledge" in subsections: [Section 2.4: Ecohydrology Zone Conceptual Model] (as per other sections), and the reviewer questions whether there was Indigenous Knowledge provided through IK/TLU studies or through the communities' participation in the SC and AAG. | **ACFN** | Accepted. Detailed information is provided in the conceptual model appendix of Objective 3. This will be referenced. |
| 56 | 2-16 | On other – EHZ's. This is a top down approach. Seems that the EHZ's are more vegetation-soil zones. These largely respond (with eventually some feedbacks and controls) to flow path connectivity, water tables, and chemistry (nutrients) controlled by the hydro-geologic setting and geology and substrate type. I suggest integrating with hydrogeology or HRA's, use as two layers. And eventually apply to reference systems | **TAG** | Section 1.3 (Figure 30 and Table 4) in the Obj 3 Conceptual model appendix discusses this and provided a discussion and concordance between the EHZs and the HRAs. |
| **2.4.1. String and Flark Patterning** | | | | |
| 57 | 2-18 | The finding of the remote sensing work should be described as applying to the pre-mining condition only as the remote sensing began in 2005 and may not be reflective of the pre-development condition | **FMMN/FCM** | Accepted, see section for revisions. |
| 58 | 2-20 | Figure 2-11. Surface flow seems to be biased just to the more western side. There is evidence of focused flow (likely groundwater discharge) on south-eastern portion in at least two locations. These seem to be missing | **TAG** | This figure has been removed, please refer to Figure 30 in the Objective 3 Conceptual Model appendix. |
| **2.4.2 Permafrost** | | | | |
| 59 | 2-20 | Please a map showing the sites of permafrost in the MLWC | **Co-Chairs** | Accepted, see section for revisions. |
| **2.4.3 Ecohydrogeology Zones** | | | | |
| 60 | 2-21 – 2-22 | There is an opportunity in this section to add additional information based on IK, particularly with regard to zones 1 and 2 that flow into McClelland Lake. | **FMMN/FCM** | The EHZ information discussed in this section is summarized from a specific piece of technical work by Vitt and House. Information on IK has been incorporated into the Conceptual Model section of Appendix 3. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 61 | | EHZ's and HRA, the discussion states how these two delineated areas are different. Does this mean SUNCOR will have two different systems to assess the impact and effectiveness of mitigations? This will be very cumbersome. Clearly these two can be integrated to define regions of unique vegetation and soils with different surrounding connectivity. These can be used in the conceptual model. The EHZ are essentially what Devito et al. (2005, 2012) define as HU's, and they layer on top of the HRAs. The EHZ's vegetation and soils develop in response to the regional-local hydrogeology and hydrology which interact with geology and substrate type (with some feedbacks) to influence WT, flow path and chemistry (nutrients). The HRA helps define these with EHZ's. Using the HRA's helps to define the EHZ 1 and 2, but importantly helps with defining the location of the source of water. Integration of EHZ's and HRA should be conducted to come up with units to define for mitigation and monitoring | **TAG** | Section 1.3 (Figure 30 and Table 4) in the Obj 3 Conceptual model appendix discusses this and provides a discussion and concordance between the EHZs and the HRAs. |
| **2.5 Pre-mining Baseline Conditions** | | | | |
| 62 | 2-22 | The OP must include Pre-mining baseline information for all of the wetlands values supported by MLWC functions.<br>Pre-mining baseline information is required for the indicators that have been recommend for the following wetland values :<br>• Vegetation Harvesting<br>• Water Use<br>• Wildlife (moose, waterfowl, beaver, muskrat)<br>• Hunting<br>• Trapping<br>• Indigenous Culture and Habitation (cabins, camp sites, staging areas, access and travel)<br>• Education and Learning<br>• Health and Wellness | **Co-Chairs** | The objective has been updated to include additional information and we hope that reviewed with other objectives as a complete document this information will be provided. |
| 63 | 2-22 | The Pre-Mining Baseline Conditions should include the knowledge and information provided through the Baseline Report as well as through the various meetings and workshops where pre-development knowledge and information was shared and integrated throughout each subtopic (**2.5.1 thru 2.5.11**). | **FMMN/FCM** | Accepted. Additional ITK content will be added. |
| 64 | 2-22 | This Section should also start with western science and Indigenous knowledge and information on the NRV and any changes (see also comments on the Paleoecology sections with respect to the results pertinent to framing the pre-mining condition – i.e. influences of climate change and anthropogenic activity) and not merely default to the proposed MRV. | **FMMN/FCM** | Accepted. Additional ITK content will be added and incorporated throughout. |
| **2.5.1 Analytical Approach for Pre-Mining Baseline Data Characterization** | | | | |
| 65 | 2-22 | 2.5.1 Analytical Approach should be followed by a section that describes how IK informed the approach and was collaboratively integrated into each discipline under review, and validated by the AAG and SC. | **FMMN/FCM** | ITK has been incorporated through Section 2.5 based on information provided through the SC. We are seeking support of including this information through the review of the draft OP |
| 66 | | 2.5.1.1 should be titled 'Measured Range' and all references to normal should be omitted. As evidenced in the paleoecology section short term monitoring may not be indicative of normal.<br>This section should discuss that it is based on monitoring data for the specific periods of time. | **FMMN/FCM** | Text in Section 2.5.1.1 has been revised for clarity |
| 67 | general | A discussion with the SC on back-casting options should be completed prior to finalizing the draft plan for incorporation into the pre-development baseline. | **FMMN/FCM** | FHEC suggests that this new activity could be undertaken through the SC as a future work scope. |
| 68 | | Techniques for analyzing changes in hydrology are not apparent. Later, water levels are specified as the metric. However, changes in flow are also necessary. Consequently, gradients, spring flowrates and streamflow will be required. How will changes be assessed? | **TAG** | The purpose of Objective 1 is to define baseline conditions these recommended considerations are discussed further in Objective 2. |
| 67 | 2-24 | BACI. If you are trying to determine the effect of land-use or operation (impacts) vs climate and other natural variability, similar hydrogeologic settings are required as responses may have non-linear and hysteresis controls associated with different hydrological flow paths, and soils and bedrock storage thresholds. This needs to be considered | **TAG** | See the response to item #7. |
| **2.5.2 Geology and Hydrostratigraphy** | | | | |
| 68 | 2-24 to 2-25 | It is unclear if the document entitled *Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance & Conceptual Model* has been validated and finalized by the AAG and/or SC. This should be finalized as complete prior to use in the operational plan. | **FMMN/FCM** | This document has been finalized and shared with FHEC. |
| 69 | 2-24 to 2-25 | This section should not just provide a table of observations (Table 2-3) but should discuss how it informed the section and was integrated. **This applies to each section (2.5.2 thru 2.5.11).** | **FMMN/FCM** | The tables have been removed throughout and additional context provided. |
| 70 | Page 2-25 (Table 2-3) | Section 2.5.2.1 is titled "*Indigenous Knowledge Related to Geology and Soils*". It lists a half page of "Community Observations", five in total, three of which include references to dates, all of which are from March 03, 2021.<br>Please see this reviewer's comments on Section 2.1 above. The issues regarding (1) Omission of IK/TLU Information and (2) Presentation vs Integration of IK/TLU Information (Lack of Integration) apply here, as well as the recommendations | **ACFN** | See response to item #69 |
| 71 | Page 2-25 (Table 2-3) | See General Comment about using tables to convey Indigenous Knowledge and the need to describe where and how is the information is being applied. | **Co-Chairs** | See response to item #69 |

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|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 72 | | Figure 2-14 to 2-16. Great transects and information. One transect between A and B would help in interpreting the potential for focused groundwater discharge sites where patterning starts, close to the south-east or base of Ft Hills.] AQ3 (and AQ4) likely pinch out and are sources of constant discharge. Has this entered the discussion of connectivity? Perhaps it should. | **TAG** | FHEC agrees with the TAG interpretation regarding AQ3 and AQ4. Within the watershed, the springs act as drains for these aquifers. All the rest of the excess groundwater heads towards the Firebag within the aquifers. |
| **2.5.3 Topography** | | | | |
| 73 | 2-34-2-35 | The 2018 proposal defines the MLWC as including McClelland Lake, the fen, and the adjacent upland drainage basin. The watershed that contributes to the McClelland Lake Wetland Complex is referred to at the McClelland Lake Wetland Complex watershed. (page 9). This section however only focuses on the topography of the fen, particularly the strings and flarks. This section needs to be expanded, as do all of the sections 2.5.2 thru 2.5.11 to include not only the fen but also McClelland Lake and the surrounding drainage basin and where appropriate, the watershed. | **FMMN/FCM** | See figure 1-1 in Section 1: Introduction for the delineation of the spatial boundaries for the Operational Plan. Condition 3.11 of Fort Hill's Water Act Approval 151636-01-00 (as amended) requires that an operational Plan be developed for the sustainability of the non-mined portion of the MLWC. As such monitoring programs have been focussed on this area. |
| 74 | 2-34-2-35 | This section did not include any IK shared about topography. A review of IK shared should be conducted and integrated into this section. Examples of shared IK include changes from introduction of roads on the landscape and the beaver's role in the landscape of the MLWC. | **FMMN/FCM** | Accepted. Additional ITK and NRV content will be added. |
| 75 | 2-34-2-35 | It is noted that there is no discrete "Indigenous Knowledge" subsection (as per other sections), and the reviewer questions whether there was Indigenous Knowledge provided through IK/TLU studies or through the communities' participation in the SC and AAG.<br>The reviewer recalls ACFN members and other community members making comments about how the MLWC (the fen) will function once the topography changes due to alteration and removal of the Fort Hills, resulting in changes in drainage patterns into the fen. These comments and the corresponding IK are an omission in this section | **ACFN** | Accepted. Additional ITK and NRV content will be added. |
| 76 | 2-34-2-35 | Integrate IK about topography to Section 2.5.3. | **Co-Chairs** | Accepted. Additional ITK and NRV content will be added. |
| **2.5.4 Hydrogeology** | | | | |
| 77 | 2-35 to 2-64 | Section 2.5.4.1 is titled "*Indigenous Knowledge Related to Hydrogeology*". It lists three pages of "Community Observations".<br>Please see this reviewer's comments on Section 2.1 above. The issues regarding (1) Omission of IK/TLU Information and (2) Presentation vs Integration of IK/TLU Information (Lack of Integration) apply here, as well as the recommendations. | **ACFN** | Noted. The tables will be removed and ITK will be included as text. |
| 78 | 2-35 to 2-64 | It is not clear how the observations (IK) contained in Table 2-4 was integrated into this section and how it informed the pre-mining baseline conditions. For example, how it influenced monitoring locations or modelling assumptions. This needs to be clearly articulated in the Plan. | **FMMN/FCM** | Accepted. How the information was used and a reference to the Conceptual Model provided. |
| 79 | 2-35 to 2-64 | See General Comment about using tables to convey Indigenous Knowledge and the need to describe where and how is the information is being applied. | **Co-Chairs** | Noted. The tables will be removed and ITK will be included as text. |
| 80 | | Table 2.4. Excellent TK. Anyone tried to locate these springs on a map? This would really help in the conceptual model. | **TAG** | Noted. Please see section 1.4.2 of the Conceptual Model appendix (Objective 3) for mapped (major) spring locations at MLWC (Figure 186) |
| 81 | | It curious why a map of the watershed and nearby, relevant surrounding area, with important landscape and sampling information, is not provided. Perhaps this is in an earlier introductory section. It would be nice to evaluate this information for content and would be a benefit in this first section, objective one. | **TAG** | See Figure 1-1 in the Introduction Section (Section 1.0) |
| 82 | | The interpretation of fig 13-19 is very informative. These new data and hydrogeological interpretation allow for the advancement of the conceptual model. For the fen, it appears that the Fort Hill's recharge AQ3 and AQ4 which pinch out at the base. These two aquifers likely provide the focused recharge at the two main locations on the southeast side. Extrapolation is required between transects A and B, but the Clay Till 1 thins here. A transect that incorporates the potential focused groundwater discharge location is advised. These two discharge locations are the likely source of the two pattern fen flow systems. Note that these where not included in the surface water analyses and need to be incorporated. | **TAG** | See figure 30 in Objective 3 Conceptual Model Appendix to see the 2 locations being discussed. FHEC has provided a x-section through the patterned fen and the big hydraulic window and another at the other big spring located to the west of that location. FHEC respectfully disagrees that these locations are likely the sources both patterned fens, it is likely that they are just the source for the bigger, southern patterned fen (EHZ 2 or HRA 01). |
| 83 | | The Lake, some interpretation of hydrogeological data and catchment data is still required, but it looks like SUNCOR's understanding is greatly improved over the past 2 years. However, some clear finalized conceptual model of landscape-lake connections is still required. The transects mentioned above show quite well that coarse veneer substrate in the southern "cabin" creek catchment generates considerable recharge and flow (also noted in traditional knowledge). | **TAG** | Please see Figure 31 in the Objective 3 Conceptual Model Appendix. |
| 84 | | Surface flow in the fen seems biased to the northern side which interacts with northern sand recharge area. Incorporation of the potential diffuse flow and focused discharge from Ft Hills is required. | **TAG** | The diffuse FHUC flows are being generated from the HRA 08 (conifer swamp). The concentrated flows are being generated from the springs (including the big hydraulic window). |
| 85 | 2-39 | Simply stating that you can not use the water levels because one baro is down is not acceptable. The water level trends over time are important. Some alternative is required. Barometric pressure is standard on all met sites, use these, there a several in the area. And in the future, will you ensure you have several baro-recorders in the MLWC? | **TAG** | FHEC now has a complete barometric data set with no gaps over the observational period where we have water level data. This barometric data has been used to correct obviously uncorrected water levels.<br>FHEC will also look into having multiple barometric recording devices on site. |
| 86 | | Figure 2-20: It is not clear of the relevance of this information presented this way to the overall objective 1. This is detail that clutters rather than directs the discussion. Some interpretation of the potential direction of groundwater flow in the lake should be provided | **TAG** | FHEC interprets the lake to receive groundwater from the north, south and west. Groundwater leaves the lake on the east side see figure 31 in the Conceptual Model Appendix. |

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| 87 | | Table 2-5: Very interesting data, but it is not clear how this is interpreted. This is an average from a range of wells, presumably with different depths below the surface. Is not depth BG a way to standardize this? Also, time periods for measurements are needed to compare across and within sites. Were these collected at the same time? | | FHEC will not change this in the Objective 1 write up – in this objective, the elevation context makes sense as we are comparing wells within and wells outside of the fen on the same tables. However, for Objective 5, with the selected monitoring wells for integrated wetland monitoring, we have edited the table today to show mbgs for these wells. |
| 88 | | Ft Hill upland complex – noting a variation of 1.13 m in WT in sand is quite large. Where is this well? | | See response to item #82 |
| 89 | 2-64 | Page 2-64: Reference Sites: It is more than unfortunate that no groundwater data have been collected at the reference sites. Assessment of potential groundwater connectivity must be conducted with regional and local landscape position, and attempts to duplicate sites at MLWC. Baseline groundwater data and conceptual models are required to understand the reference systems and to interpret changes between reference systems and MLWC | | See response to item #7. |
| **2.5.5 Surface Water Hydrology** | | | | |
| 90 | 2-68 – 2-72 | See General Comment about using tables to convey Indigenous Knowledge and the need to describe where and how is the information is being applied. In table 2-16, row: Fen Water level. Change “one family” to “local trappers” | **Co-Chairs** | Accepted and revised |
| 91 | | The issues regarding (1) Omission of IK/TLU Information and (2) Presentation vs Integration of IK/TLU Information (Lack of Integration) apply here, as well as the recommendations. | **ACFN** | Noted. Additional ITK and NRV content will be added. Reference to how applied into other sections of the OP (i.e. Objective 3) will be provided. |
| 92 | 2-73-2-74 | Figures 2-30. Perhaps a comparison using the same dates would also be appropriate to fully test the spatial variability between sites | **TAG** | The data are compared for the same time period in Figure 2-30a. |
| 93 | 2-64 to 2-91 | An effort throughout each section should be to identify gaps or disparities between the IK and western science provided and identify whether this requires additional verification. In its absence the Plan defaults to the western science findings or predictions, seemingly noting the IK but otherwise ignoring it. | **FMMN/FCM** | In keeping with the Two Roads Approach, in the Plan we are intending to include knowledge from both disciplines and are not attempting to merge them into a single truth. Additional effort will be put towards identifying disparities in the information and providing context around how it influences the plan (i.e. Objective 5 comments on NRV), but in many cases we can only recognize deviations of information we have. |
| 94 | 2-76 | A single ITK comment has been highlighted yellow. It is not clear how this comment is linked to the rest of the data presented in the section. As it is, this statement provided little value and should be removed. | **Co-Chairs** | The section is about precipitation variability and the ITK comment applies to observations about snowfall timing. The statement has been moved to a more appropriate location in the text and additional context added. |
| 95 | 2-77 | Understanding now, how FHOP is considering climate data, and the importance of tracking climate data in order to understand changes in lake levels, the review of the OP provides an opportunity to fill the current gap in IK for Section 2.5.5.3. The gap could be filled by: 1) compiling the many existing IK records about climate, and 2) asking AAG representatives to comment on climate, (long term trends in temperature, precipitation, snow accumulation), in relation to the data being considered by FHOP to inform understandings about baseline conditions, and triggers for implementing management actions | **Co-Chairs** | Climate is a very important aspect of hydrology. Long term climate records exist and it's not currently viewed as a gap in knowledge/information. We agree that ITK holders may contribute additional information and context, and can suggest inclusion in the future AAG workplans. |
| 96 | 2-77 | Fig 2-34. Less snow in open. This likely depends on the size of the opening, and the sampling strategy. Were lakes used? Did transects incorporate the edges of openings to include saltation? If not than this is an underestimate | **TAG** | For clarity, the “Open” area only includes the McClelland Lake and Baby Lake and the Fen and other wetland areas that may be conceptualized as “Open” are generally treated as “Flat Low Lying” which generally has some of the higher SWE proportions. To date the approach for lakes in the MLWC has been to conduct a transect on the lake that represents the wind blown (majority) area of the lake. This transect as with all others is comprised of 40 depth measurements along with 4 density measurements. This would represent the “Open” portion and majority of the lake area reasonably well. The comment from TAG asks if the sampling incorporated the Lake, yes, and edges, in this case no. However, this was considered in the design. The lake edge, if we assume a 120 metre buffer on the perimeter would account for less than 10% of the total area of the lakes in the MLWC so any edge effect would be an order of magnitude lower in representation than the predominant portion of the Lake. Also, a sampling strategy to adequately measure this edge effect along the perimeter of McClelland Lake with wind direction and fetch taken into consideration would be possible but would require more sampling time and helicopter days to accomplish, and therefore was not included for the marginal gain to the overall program. |
| 97 | 2-80 | “ITK holders identified that water levels in McClelland Lake are already much lower compared to pre-development baseline conditions, while one ITK Holder identified that they had never soon McClelland Lake lower than what it was when they were out there (in March 2020).” March 2020 is the wrong date. This statement was from , who was referring to a trip in with the MLWC SC in 2019. Due to high levels of precipitation, the lake levels were considered high in 2020.<br>March 2020 is the wrong date. This statement was from , who was referring to a trip in with the MLWC SC in 2019. Due to high levels of precipitation, the lake levels were considered high in 2020.<br>Change “2020” to “2019” | **Co-Chairs** | Accepted and revised |

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| 98 | 2-82 | **Question:** Water level in the fen- Recorded Data. **Local trappers have noticed that the fen is drying out in certain places.**<br>**Suncor forgot to include the 2 quotes shared by local trappers about water levels in the fen decreasing (Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance & Conceptual Model..pg 10)**<br>**The OP suggests the fen is not drying out by saying that the "data" indicated that water levels in the fen are consistent and reflect surface topography. But in their review of the Progress report, one of TAG's comments was " mining, dewatering and depressurization activities ..... may have already impacted "baseline" conditions. Indeed, despite claims to the contrary, the analysis presented in FHELP in Appendix C of the Progress Report suggested that baseline hydrologic conditions within the MLWC may have not been maintained." Pg 8 of Suncor Response)**<br>**Is Suncor monitoring water levels in the locations/type of topography that Community members are concerned about? Can water levels in some locations of the fen change more than other places?**<br>Local trappers have noticed that the fen is drying out in certain places.<br>Suncor forgot to include the 2 quotes shared by local trappers about water levels in the fen decreasing (*Indigenous Knowledge and Observations to Inform the Development of the MLWC Water Balance & Conceptual Model* ..pg 10)<br>The OP suggests the fen is not drying out by saying that the "data" indicated that water levels in the fen are consistent and reflect surface topography. But in their review of the Progress report, one of TAG's comments was " mining, dewatering and depressurization activities ..... may have already impacted "baseline" conditions. Indeed, despite claims to the contrary, the analysis presented in FHELP in Appendix C of the Progress Report suggested that baseline hydrologic conditions within the MLWC may have not been maintained." Pg 8 of Suncor Response)<br>Is Suncor monitoring water levels in the locations/type of topography that Community members are concerned about? Can water levels in some locations of the fen change more than other places? | **Co-Chairs** | Water levels are measured in multiple locations around the fen and the variability is noted in Objective 1. The quotes were added (although 1 is repeated in Objective 3). The text below describing the variability was adjusted to better reflect the IK provided. JP SEPT 30 2021: In general, water levels will be more stable in the lowlands of the MLWC system. For example, McClelland Lake's levels have only varied within a 70 cm range over the last 20 years or so. The MLWC fen feeding the lakes will likely exhibits slightly more variability, the surrounding slopes even more, and finally the uplands would show the greatest degree of water level variability. FHELP needs more water level monitoring points in the uplands and slopes of the MLWC system to better reflect the full range of variability of the MLWC system in their monitoring data. |
| 99 | 2-82 | The SC has recommended in the Env and SCT indicators and methods table and in subsequent meetings that at least 1 monitoring sites should be placed in to the shallow portion of McClelland lake for water quality and levels to document changes in areas of littoral zones where traditional users gather plants. | **Co-Chairs** | See Objective 5, FHEC has one water quality station near the boat launch area and one near the outlet (both in shallower portion of the lake) and lake level is being measured and is included as a primary effects indicator. |
| 100 | 2-82 | P 2-82, and elsewhere. Simulating Lake water levels. There are years, that represent a large portion of the simulation period, where simulated and observed do not match very well or at all. This challenge / problem needs to be resolved. Is it just errors in precipitation estimates? | **TAG** | As discussed with the TAG on Oct 7, the issue is Fort Mac Airport data not picking up convective storms occurring at MLWC. This can be fixed by using local climate forcing data in the HGS model instead. This fix has already been tested. Please refer to Figures 6-7 and 6-8 in Section 6.2.5 in the HGS modelling appendix for Objective 3 |
| 102 | 2-84 | There should be a linkage to the modeled simulated data and the IK that also notes a decreasing water level as well as some context to qualify the statement that the decreasing trend is not significant (e.g. is it within the NRV or MRV). | **FMMN/FCM** | Accepted and revised. There is general agreement between the IK observations and the back-cast model simulations of lake level. |
| 103 | 2-86 | (figures 2-41) What time period is this for?It can't be the average if there is a change in storage | **TAG** | Figure caption updated |
| 104 | 2-89 | The discussion on McClelland Lake outflows would be a great opportunity to collect IK with respect to outflow, particularly with respect to the location to the north of the principle outflow point. With respect to the difference between the data and the modeling results for both outflow and inflow, there should be a discussion about how this aligns with the NRV, assuming the MRV is 'unreliable'. | **FMMN/FCM** | Accepted and revised. Included IK about outflow. |
| 105 | | NRV - Information is provided and the tradition knowledge is extremely helpful. But this information does not seem to be summarized, and actual parameters or measures are not provided to allow the reader to assess the assumptions (i.e., the "reasonableness") of the variability. For example, it is clear the shallow portion (2/3rds) of the lake dries out, but this was over 150 years ago and presumably in a very different climate. Is this range included? If so how? | **TAG** | Information from the paleo work, airphotos from the 1950's, and from the ITK that has been shared that lake levels were at times much lower than at present, that is part of the NRV. FHEC is using the MRV for the effects monitoring program, which in this case is more conservative. |
| **2.5.6 Surface Water and Groundwater Quality** | | | | |
| 106 | 2-91 to 2-112 | It is not clear how the observations (IK) contained in Table 2-21 was integrated into this section and how it informed the pre-mining baseline conditions. This needs to be clearly articulated in the Plan. | **FMMN/FCM** | Accepted. Additional ITK and NRV content will be added. |
| 107 | 2-91 to 2-112 | The issues regarding (1) Omission of IK/TLU Information and (2) Presentation vs Integration of IK/TLU Information (Lack of Integration) apply here, as well as the recommendations. | **ACFN** | Accepted. Additional ITK and NRV content will be added. |
| 108 | 2-92 to 2-93 | See General Comment about using tables to convey Indigenous Knowledge and the need to describe where and how is the information is being applied. | **Co-Chairs** | Noted. The tables will be removed and ITK will be included as text. |
| 109 | 2-94 | The statements about natural conditions and no aquatic life in the fen require additional discussion. What is the characterization that the pH in the fen reflects natural conditions based on? For example, is it based on a calculated NRV? The statement that says aquatic life is not present in wetlands does not follow the CCME and GOA definitions of aquatic life that include both animal and plant species and not just fish. As the fen is also an important cultural use area, this need to either be explained or the provincial and federal guidelines for the protection of aquatic life should apply or an assessment for all species in the fen be undertaken | **FMMN/FCM** | This was an error and mischaracterization in the text, it has been changed. |
| 110 | 2-94 | Surface water sampling locations. EHZ 1 and 4 are poorly represented, and likely reflect main sources of groundwater from NOP. The transition (4) should be sampled | **TAG** | FHEC has recently installed two shallow wells that are in or near the EHZ 1 and 4 areas which should hopefully, together with measured water levels in the lake, help to provide insight of groundwater heads and exfiltration water magnitude and intensity from those zones |

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| 111 | 2-103 | In the second bullet at the top of the page a sentence has been included: "*ITK holders have stated that water in McClelland Lake smells like sulphur* " – This statement is taken out of context. Generally, the water from McClelland Lake that is taken for domestic use does not smell like sulphur. Local trappers have described the water in McClelland Lake as being good – prior to oil sands development in the area (up until the late 1990s), people drank the water straight out of the lake. However, there are some places, when the ice is broken in the spring, along the shore near beaver houses there is sometimes gas/bubbles that come up that smell. People don't drink this water.<br><br>People don't drink the water today because they are worried about contaminants from air deposition and more recently, seepage from tailings storage at FHOP. People still use water from McClelland lake for cleaning. This has been documented in minutes from the AAG meetings in July during discussions on potential monitoring programs.<br><br>Delete sentence that says: "ITK holders have stated that water in McClelland Lake smells like sulphur", or add appropriate context to the statement. Add new IK statements from July AAG meeting on future monitoring programs | **Co-Chairs** | Accepted. This additional context will be included. |
| 112 | 2-105 | Table 2-25 and figure 2-50 Reference sites. Some estimate of the EHZ and HRA should be attempted in comparing the Reference site water quality with the reference sites. | **TAG** | See response to item #7. |
| 113 | 2-112 | Reference conditions (pre-development) should also include IK for which there is much information about the pre-development reference condition. This needs to be included. This would also allow future data collection as referred to as needing to be further refined. | **FMMN/FCM** | Additional context about NRV will be added, also discussed further in Objective 5. |
| **2.5.7 Aquatic Resources** | | | | |
| 114 | General comment | Add a separate section to the report on what monitoring programs have been discontinued and reasons why. | **Co-Chairs** | FHEC respectfully disagrees with this recommendation. The purpose of Objective 1 is to provide baseline conditions, it isn't merely a discussion of monitoring. FHEC has provided a summary of all data collected and then provides, for some, rationale on why with data collection is not continuing (for the most part due to the data being so variable that they are not useful for detecting change). |
| 115 | 2-112 | The issues regarding (1) Omission of IK/TLU Information and (2) Presentation vs Integration of IK/TLU Information (Lack of Integration) apply here, as well as the recommendations. | **ACFN** | Accepted. Additional ITK and NRV content will be added. |
| 116 | 2-112 | Include the IK shared about fish and changing water levels and integrate into this section. | **FMMN/FCM** | Accepted. This additional IK content and context will be included. |
| 117 | | It is unclear why invertebrates will not be used as an indicator.<br>Upon a scan of draft Objective 5, there will be in fact no monitoring of aquatic resources. Chlorophyll a instead will serve as a proxy. Chlorophyll a was not mentioned under this section as it is a water quality parameter. It should be made clear in this section, with appropriate rationale, why invertebrates will not be sampled as was identified on page 2-118 where it stated that the way to understand if diversity changes over time is to do post-impact monitoring. | **FMMN/FCM** | Data collected to date has shown that a program to monitor aquatic invertebrates would take many years (or decades) of baseline data collection and is unlikely to result in adequate statistical rigour to detect meaningful changes. As well, the SC agreed via their shared recommendations on indicators (Final Approved Short Early Warning Indicators and Methods, May 29, 2021). |
| 118 | 2-119 | Data collection on aquatic resources to date has been less than comprehensive, using various data sets, yet with respect to fish, the draft Plan states:<br><br>*The analytical results for the one fish tissue sample collected from McClelland Lake (Maxxam 2011) showed detectable concentrations of 13 of the 30 metals tested, and 2 of the 18 PAHs tested (Table 2-29)*<br><br>Further discussion is required about whether or not a fish and fish health monitoring program is required | **FMMN/FCM** | Fort Hills respectfully disagrees with this recommendation. McClelland Lake lacks any large-bodied fish populations (i.e., sport fish or suckers) that would be used for traditional or recreational fish harvest, and only supports three small-bodied forage fish species. As well, McClelland Lake forage fish populations would not be suitable indicators because populations are small, they are short-lived, they have high natural variability, and are not sensitive to environmental change. Our understanding is that this was discussed and agreed to at the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021). |
| 119 | 2-112 to 2-122 | Remove the information on the sampling methods and data being included for Aquatic Invertebrates and Fish Populations and Fish health (and tissue sampling) if the programs are being discontinued.<br><br>Explain why these programs have been discontinued. | **Co-Chairs** | FHEC respectfully disagrees with this recommendation. The purpose of Objective 1 is to provide baseline conditions, it isn't merely a discussion of monitoring. FHEC has provided a summary of all data collected and then provides, for some, rationale on why with data collection is not continuing within Objective 1 (for the most part due to the data being so variable that they are not useful for detecting change). |
| 120 | | See General Comment about using tables to convey Indigenous Knowledge and the need to describe where and how is the information is being applied. | **Co-Chairs** | Noted. The tables will be removed and ITK will be included as text. |
| **2.5.8 Soils** | | | | |
| 121 | 2-122 to 2-123 | There is no IK integrated into this section. This needs to be included in the Plan. | **FMMN/FCM** | Accepted. Additional IK content will be included. |
| 122 | 2-122 to 2-123 | As dewatering and construction in the fen could lower the surface water table and affect soil moisture it is important to understand the baseline for soils in and around the MLWC. As soils in and around the fen support traditional use species this is of particular importance to understand. This section should quantify soil moisture for future monitoring purposes. Of note is that no monitoring of soils is proposed under Objective 5 – this needs further discussion. | **FMMN/FCM** | FHEC is monitoring water levels, both for surface and ground water, and vegetation as primary effects indicators. Soil moisture monitoring will continue but will not be included under the effects monitoring program. |
| 123 | 2-122 | Remove the information on the soil sampling methods if the program is being discontinued.<br>Explain why these programs have been discontinued. | **Co-Chairs** | See response to items #16 and #114 |
| 124 | 2-122 to 2-123 | The issues regarding (1) Omission of IK/TLU Information and (2) Presentation vs Integration of IK/TLU Information (Lack of Integration) apply here, as well as the recommendations. | **ACFN** | Accepted. Additional IK content will be included. |

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| **2.5.9 Vegetation** | | | | |
| 125 | 2-123 to 2-157 | Again, it is not clear how the observations (IK) contained in Table 2-32 was integrated into this section and how it informed the pre-mining baseline conditions. This needs to be clearly articulated in the Plan. Note that there was only one reference to IK (page 2-132 describing changes in culturally important plant species) yet it is out of place in the discussion. | **FMMN/FCM** | Accepted. Additional context will be included. |
| 126 | 2-123 to 2-157 | This section should provide the vegetation baseline for McClelland Lake and adjacent upland drainage basin. As noted previously, the 2018 proposal defines the MLWC as including McClelland Lake, the fen, and the adjacent upland drainage basin. Therefore, this information should be included in the Plan as was intended not only in the 2018 proposal but to be inclusive of the information, including IK, shared with and by Indigenous Communities. | **FMMN/FCM** | See figure 1-1 in Section 1: Introduction for the delineation of the spatial boundaries for the Operational Plan. Condition 3.11 of Fort Hill's Water Act Approval 151636-01-00 (as amended) requires that an operational Plan be developed for the sustainability of the non-mined portion of the MLWC. As such monitoring programs have been focussed on this area. |
| 127 | 2-136 | Reference to data representing an undisturbed condition is not correct and should be replaced by pre-mining condition. | **FMMN/FCM** | This has been corrected in the text. |
| 128 | General Comment | Discuss with Community Representative whether information on Traditional Plant Use can be shared for use in the Operational Plan and if so what would the information look like. This is important IK information would be used in the vegetation plot monitoring programs, and in subsequent changes in plants observed in the community observation logs and interview. | **Co-Chairs** | Context added about traditional plant use. Monitoring programs to be developed in support of ESCT indicators will be discussed and further developed. |
| 129 | 2-123 | See General Comment about using tables to convey Indigenous Knowledge and the need to describe where and how is the information is being applied. | **Co-Chairs** | Noted. The tables have been removed and ITK will be included as text. |
| 130 | 2-128 | Please include Pre-Mining Baseline Information for the other EHZs and vegetation communities that occur in the McClelland Lake Wetland Complex. Integrate information about culturally significant species and harvesting areas. Describe how Pre-mining baseline conditions differ from Pre-development baseline conditions | **Co-Chairs** | Long term vegetation monitoring plots were established in EHZs 1, 2, 4 and 5 (majority of the peatland). Detailed baseline vegetation data is not available for EHZs 3 (two small areas at the lake shore) and 6 (the riparian swamp margin) nor the upland. The vegetation monitoring program was established long before the identification and delineation of the EHZs and was designed to support the effects monitoring in the non-mined portion of the MLWC, thus not all EHZs were included in baseline vegetation monitoring.<br>It is very difficult to make direct comparisons between pre-mining and pre-development baseline conditions considering differences in methods and the available data. However, the paleo study results indicated persistence of dominant bryophyte species in the patterned fen over thousands of years. |
| 131 | 2-131 | The yellow highlighted text may have been inserted in the wrong section. The section is about two of the EHZ, specifically diversity measures for String, Flark and Wooded Fen Vegetation Data, yet the quote is about harvesting concerns and harvesting blueberries, cranberries, choke cherries and diamond willow fungus. These species are not harvested in the fen.<br>The yellow highlighted text that is being on 2-131 is not related to the information presented about EHZ 1 & 2 and should be removed. | **Co-Chairs** | Noted, this text has been removed from this section. |
| 132 | 2-141 to 2-157 | The section comparing the Reference Site Baseline conditions to the MLWC through several diversity indices if very long, convoluted and it is challenging to understand the conclusions from the analysis . It is recommended that the detailed analysis be moved to an appendix, and a comprehensive summary of the comparisons be provided | **Co-Chairs** | This section has been revised to make it easier to read. |
| **2.5.10 Wildlife** | | | | |
| 133 | 2-157 to 2-163 | This section requires much more information to describe baseline. At a minimum data should be presented by species and some quantitative analysis should be presented. There is no reference to MRV or NRV, both which should be included. | **FMMN/FCM** | This section has been revised. |
| 134 | 2-157 | IK is presented in Table 2-46 but it is unclear how it informed the baseline or was integrated into the report – for example, IK holders identified cultural species but that is not compared to the data collected as the data, with the exception of species of management concern, was not presented. Also, the IK was popped in incidentally as opposed to informing the description – for example, IK on frogs was provided in the table but not included under the amphibians section. | **FMMN/FCM** | Noted. The tables have been removed and ITK will be included as text and revised. |
| 135 | 2- 157 to 2-166 | This information will not be used in the go forward environmental effects program and it is confusing why it is provided here. Similar to the recommendation for aquatic resources and fish and health, remove baseline for programs that have, or are going to be discontinued including the aerial invertebrates and the frog mass counts and snow track counts<br>Add a separate section to the report on what monitoring programs have been discontinued and reasons why? | **Co-Chairs** | See response to item #119 |
| 136 | 2-157 | See General Comment about using tables to convey Indigenous Knowledge and the need to describe where and how is the information is being applied. | **Co-Chairs** | Noted. The tables have been removed and ITK included as text. |
| 137 | 2-161, 2-162 | This section should include pre-mining baseline information for the wildlife indicators that have been recommended by the SC. It is not clear how the information presented in this section could be used as baseline in a monitoring program. | **Co-Chairs** | Wildlife is monitored through the Fort Hills WMMP. This information is available through the Fort Hills WMMP and is included in the WMR that has been provided to the SC and the TAG. |
| 138 | 2-162 | Section 2.5.10.2 includes some information about birds, frogs and “mammals”. The report says “eight species have been detected on cameras” deployed from 2009 and 2018. What species were they? How many records were there? Is there more than one camera in the MLWC? | **Co-Chairs** | The text has been revised to include more information under the Mammal header. |

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| 139 | 2-164 | In Section 2.5.8.3 that compares reference site wildlife baseline conditions to those of MLWC please provide conclusions on the comparability of the three sites and their value going forward. | **Co-Chairs** | Wildlife is monitored through the Fort Hills WMMP. This information is available through the Fort Hills WMMP and it included in the WMR that has been provided to the SC and the TAG. |
| **2.5.11 Aquatic Invertebrates** | | | | |
| 140 | 2-163 | There was no data presented or comparison with the aquatic invertebrate program. This needs to be included to justify dropping the monitoring program. | **FMMN/FCM** | This information is available in the final report for the invertebrate program (Armada, 2013) that has been previously provided to the SC and the TAG. |
| 141 | 2-163 | Remove subsection – it is unnecessary.<br>This information seems out of place. The summary of old data is not very useful. This section could be removed | **Co-Chairs** | See response to item #119 |
| **2.6 Integration** | | | | |
| 142 | 2-163 to 2-165 | The title of this section is misleading – if the intent is to summarize the findings of defining the baseline conditions, which it should, the content should include pre-development, pre-mining, all baseline conditions (e.g. soils, vegetation, wildlife should be included) and be based on both the western science monitoring data as well as the IK shared by the Indigenous communities. Further, any dependencies and references to conceptual models and their outputs should be introduced at the end of the discussion. This entire section needs to be re-written. | **FMMN/FCM** | Due to this series of comments, this entire section has been updated in the text of the document to add clarity. |
| 143 | 2-163 to 2-165 | The closing of Objective 1 should set the stage for Objective 2, as defined as Functionality refers broadly to the individual and collective physical, hydrological, chemical, and biological processes performed by the MLWC that relate directly to the characteristics of the ecosystem and its capacity to interact with the adjacent landscape. Functionality is linked to the baseline conditions described under Objective 1 (Section 2), and considers pre-development baseline conditions, pre-mining baseline conditions, and associated natural range of variability (NRV) and measured range of variability (MRV). The closing of Objective 1 should set the stage for Objective 2, as defined above. At a minimum the pre-development baseline conditions and NRV have not been adequately addressed in Objective 1 and therefore Objective 2 does not have the appropriate information for which to define functionality as defined above | **FMMN/FCM** | Due to this series of comments, this entire section has been updated in the text of the document to add clarity. As requested, a closing paragraph has been added to set the stage for Objective 2. |
| 144 | 2-163 to 2-165 | What is the purpose of this section? There is some information about reference sites included in some (not all) sections. Is this Section supposed to compile all information about each site to allow for comparison or?<br>Remove this sections and integrate the information into the surface water quality and groundwater sections | **Co-Chairs** | Due to this series of comments, this entire section has been updated in the text of the document to add clarity. |
| 145 | 2-165 | The Integration section (Section 2.6), including the new Innotech work (Figure 2-63) seems brief and incomplete, although it might be worked into the conceptual model (yet to be received). | **TAG** | Due to this series of comments, this entire section has been updated in the text of the document to add clarity. |
| 146 | 2-165 | Reference ecosystems are required, with integrated hydrology, vegetation, wildlife. TAG notes that some wildlife and vegetation work has been done, but no hydrology. | **TAG** | See response to item #7. |
| **Comments from the TAG - Vegetation** | | | | |
| 146 | General comment – Shrub encroachment | Include in the future planning (have a written record) that once mining activity starts, a vegetation geomatics analyst should do a verification on shrub bands of 10 strings to determine whether they are getting thinner or wider on the downside of the main water flow. It is to be kept in mind that dwarf birches are clonal, so they respond quickly to soil environmental changes.<br>TAG is of the opinion that shrubs could be an earlier warming flag of changes. It is very interesting to note the from the reporting of Indigenous Traditional Knowledge Related to Vegetation that shrubs (willows) have been noticed as one metric of change most readily remarkable – see the IEG (2021) and December 12, 2020, at page 2-126. If we really want to integrate ITK and western science in this Fort Hills project, shrub monitoring appears to be one common attribute. | **TAG** | After the July 19, 2021 meeting to review comments on Objectives 1 & 2, the Objective 2 Indicator Selection flow chart was modified based on TAG and SC feedback. There was confusion around the box asking the question "if there sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not include anything in the OP for which there is not enough baseline to determine if its an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future. |
| 147 | Dendrochronological Study | The TAG has concerns with the rational rejecting this program and requests scientific evidence backing up statements provided to the TAG's technical review (see detailed comments provided by TAG). Fort Hills should have a good discussion with experts as our understanding is that this could be a very good early warning metric, not expensive to conduct (one day of doing the tree coring in the field – 3 days for the 3 sites maybe and it can start only once mining activities have started). Measurements of tree ring and comparison with regional climatic database are done in the laboratory. | **TAG** | See response to item #146. |
| 148 | Vegetation Strata structure | TAG has never recommended that individual height of species be measured. The structure of the vegetation will most likely change in response to an effect such as potential draining before vegetation composition (diversity). Height should be measured by plant strata and maybe the sentinel species proposed by Vitt and House 2020. Mean plant height per plot is a quick metric to add to the sampling designs already in place.<br>TAG will be happy to discuss the mean height metric with the FHELP vegetation team. References have been provided under TAG-vegetation comments of Objective 5. Furthermore, one can refer to Elzinga, Salzer, Willoughby and Gibbs. 2001. Monitoring plant and animal populations. Blackwell Science Inc. 360p., where they discuss the positive facts of evaluating the structural characteristics of plant community. | **TAG** | See response to item #146. |
| 149 | 2-1 | It is not easy to remember the meaning of acronyms NRV, MRV etc. so I would remove as much as possible the acronyms and make sure to write them at length at least at the beginning of each section– it will not lengthen the report by much but it will be easier to read. | **TAG** | Fort Hills respectfully disagrees with this recommendation, the OP is a very long document and the use of acronyms will help significantly in reducing its length, and repetitiveness. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 1 | | | | |
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| 150 | Table 2-1 | Table 2-1: What is meant by pre-development and pre-mining should be briefly described in the figure title. | **TAG** | Fort Hills respectfully disagrees with this recommendation, these terms are defined in the accompanying text and it is best to leave them there otherwise it would make the title lengthy and cumbersome. |
| 151 | S 2.4.1 String and Flark patterning | Ask Hatfield consultant in remote sensing if, by zooming in on a selection of 9 to 12 strings (or using the same one for tree vigour), the dwarf birch width on the downside of the water flow could be mapped | **TAG** | See response to item #146. |
| 152 | S 2.4.2 Permafrost | Has the thawing of the permafrost been mapped? LiDAR remote sensing could prove useful here too to build the baseline status of the thawing.<br>Possibility: Do a yearly mapping (monitoring) of the thawing of permafrost within each of the four related landforms, with a sub-sampling within each zone – not for the whole MLWC where permafrost occurs.<br>Warning: TAG is not strongly recommending the mapping of changes in permafrost features as the overall global warming is already affecting them greatly. | **TAG** | Fort Hills respectfully disagrees with this recommendation, as stated by the TAG, these features have already been greatly impacted, and changes could not be directly tied to the Fort Hills Project. |
| 153 | 2-23 | No harm in doing all these detailed species richness/diversity profiles but they will not be early warning indicators. Not a first priority to do really detailed biodiversity analyses | **TAG** | Fort Hills agrees. The baseline data will be reported on using this approach, and Fort Hills is taking this advice from TAG and working with Dale Vitt to revise the metrics in further Objectives. |
| 154 | Table 2-22 | adding the range of depth at which water samples are taken in the Notes column would also be informative. | **TAG** | Surface water quality samples are generally collected at approximately 30 cm below the water surface, following standardized sampling protocols, with the exception of sampling locations in the Patterned Fen/Flark and Non-Patterned Fen. Perforated PVC standpipes have been installed in the shallow peat in the fen to collect surface water samples, considering that water levels in the fen are often near or below the ground surface |
| 155 | 2-102 | The description of the summary water quality should be accompanied by a table – very nice data assembled, and comparisons well done but still a table would help the reader with quicker decoding. | **TAG** | The tables provided in Appendix C summarizes this data and are put there to manage the overall length of Objective 1. |
| 156 | Table 2-23 | Curious this value without using a non-parametric method. As is, the value appears out of line. Was the pH log scale accounted for? | **TAG** | See comment for Table 2-23 (now Table 2.5-16) |
| 157 | 2-104 | Table 2-24 It is unclear how the zone Peat/EHZ 1, 2, 3 etc differ from the surface water sampling. Add a description of how Peat/EHZ 1 differ from surface water quality EHZ 1 | **TAG** | Wetland surface water quality is different than peat groundwater quality as these were sampled using different methods (i.e., bootwell in surface water vs well in groundwater). Purging method in well sampling, exposure to the atmospheric oxygen for surface water are a few reasons for the differences in water quality. |
| 158 | 2-105 | Verify the labelling in text and on the figures for 2-50a, 2-50b, 2-51a and 2-51b. Concordance is not always there. | **TAG** | Text revised |
| 159 | 2-123 | *"Identification of problematic plant species by taxonomic experts, quantitative assessment of water depth or cover within ground subplots, integration of water chemistry and hydrology data with vegetation data, and quantitative assessment of tree vigour were suggested as improvements to the vegetation monitoring program" (Golder 2018)*<br>*1. Identification of problematic plant species by taxonomic experts…* TAG - This should not be a problem in the future as Vitt and House (2020) are providing a good plant list of what can be found at MLWC.<br>*2. Water depth:* TAG - easy to remediate and is now included I believe.<br>*3. Integration of chemistry, hydrology and vegetation:* TAG - now implemented with the Vitt and House grid sampling design.<br>*4. Tree vigour: vigour was assessed using a qualitative five-point scale for ten permanently marked trees.* TAG – now this is very subjective and variable from one person to the next. The same already marked trees could be used to analyse the tree vigour by a dendrochronological approach. | **TAG** | Fort Hills agrees that improvement should be made to the vegetation field program. A future meeting with the TAG and other experts such as Dale Vitt will be held in 2022 to ensure improvements to the vegetation program are incorporated going forward. |
| 160 | 2-123 | *Concerns with changing species identification and inter-annual variation in percent cover values were identified*<br>TAG response : calibration each day prior to field surveys has to be performed. See the comprehensive protocol on calibration on vegetation estimations, sent by Line Rochefort on August 10th, 2021 to the Fort Hill's group entitled: EPA_QA QC_Restoration_Prjcts_EPA-905-K-19-001_April_2019 | **TAG** | See response to Item #159. Additionally, this calibration protocol has been referenced in the OP and will be used going forward. |
| 161 | 2-123 | Within each tree plot, use the already marked trees for coring to assess quantitatively vigour. | **TAG** | See response to Item #159. |
| 162 | 2-123 | Request that future consultants who will be conducting the vegetation surveys present an adapted calibration protocol to the vegetation sampling design already in place to Fort Hills. | | See response to Item #160. |
| 163 | 2-129 | With vegetation experts carrying out the analyses for Fort Hills, explain to TAG why recommended visualization on the structure of the plant communities of data are rejected, as absolutely no additional metric is requested to be measured in the field (it is known for different type of ecosystems that structural changes will occurr prior to species assemblages changes | | FHEC is committed to examining this further in future, beginning with discussions at the vegetation workshop planned with TAG and the SC in early 2022. |
| 164 | 2-131 | Page 2- 131; better for consistency to use Latin names first for plant species designation (and common names in parentheses if wished as the common names can change from province to province). | | The convention for Fort Hills regulatory submission is to use common names so the report is readable by a non-technical audience. |
| 165 | 2-131 | The paragraph starting with Deep peat layers is out of place it appears – I would move it in the results about paleoecology of the site. | | Agreed, the text has been adjusted. |

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| 166 | 2-132 | RE: "*possibly due to observer variability"*.<br>TAG: if a calibration protocol is requested (it is a must) than such conclusion will be invalid in the future. | | Agreed, the calibration protocol suggested has been incorporated. |
| 167 | 2-132 | RE : « *that there is more natural variation in this fen type »* . Please precise natural variation in what ? number of plant species, relative species composition. | | Agreed, the text has been adjusted. |
| 168 | 2-132 to 2-141 | Overall the text from page 2-131 to page 2-141 on the biodiversity analyses is hard to follow and decode. For example, this sentence: *one string indicator, Tomentypnum nitens, had relatively high cover in one plot and relatively low cover in the other plot(s), causing high standard errors in all years* comes back often and gives a sense of reading the same thing over and over. It convinces TAG further that biodiversity values will be of little use as early warming signs of changes. Simple visualisation of the quality of field data already obtained could be done. | | Agreed, the text has been revised. |
| 169 | 2-152 | a conclusion should be added by the people who did the analyses. Are the two reference sites judged acceptable or not to make comparisons with MLWC? OK as we learned later in further section, let the reader know here that there is an Integration section on the suitability of the reference systems coming up. | | Agreed, the text has been revised. |
| 170 | 2-152 to 2-157 | Is it a consulting firm that is proposing this whole biodiversity approach?<br>Based on Vitt and House approach and TAG judgement, the visualization of the abundance of sentinel species (sensus Vitt and House) or main functional group or species (sensus TAG) should be done through time including the monitoring of the structure of the vegetation which might prove more responsive than multiple biodiversity analyses.<br>• TAG recommendation from the review of the 2020 progress report said: *Coverage of main vegetation strata and estimation of the mean height of each vascular plant strata should start in 2020, for MLWC and reference ecosystems*<br>NB: Strata does not mean individual plant species. | | Agreed. See response to Item #153. |
| **Comments from FMFN** | | | | |
| 171 | 2-13 | The paleo-hydrology study indicates: "The current increase in hydrological variability indicates increasing evaporation and/or decreasing hydrological (i.e. Precipitation and groundwater) inputs to McClelland Lake." and "a noticeable increase in primary production, and increased cyanobacteria and golden algae, likely due to a warming climate and increased wildfires, from ca. 1970 to present." Traditional knowledge (pages 2-69 to 2-70, 2-80 to 2-82) indicates variability and the effects of climate change on the MLWC with lower water levels than in the 1950s.<br>**Recommendation**<br>How will FHEC take into account the current increasing hydrological variability in its mitigation measures for MLWC? FHEC's Effects Monitoring (Objective 5) and Response Framework (Objective 6) should include mitigation measures to address low water levels and other effects of climate change combined with or exacerbated by effects of the project. | **FMFN** | The purpose of the proposed design features and contingency mitigation measures is to maintain ecosystem diversity and function of the non-mined portions of the McClelland Lake Wetland Complex (MLWC). Use of reference sites will help to inform consideration of potential climate change over the life of the Fort Hills Project. Baseline monitoring and future effects monitoring of reference sites will allow comparison of potential changes to the McClelland Lake Wetland Complex with reference wetlands. If a change that could be attributed to climate occurs in the McClelland Lake Wetland Complex, and a similar change is observed within the reference site(s), this will be taken into consideration when the cause of the change in the McClelland Lake Wetland Complex is being evaluated. Any potential changes due to climate change will be factored in to management decisions. |
| 172 | 2-86 | In Figure 6-3 and table 6-2 there are two hydrology stations on the lake: one at the outflow at the east end of the lake and one at the areas of inflow along the southern edge of the lake. In examining the baseline report (Figure 2-41, page 2-85 to 2-88) it states that there is a very small amount of overland flow from the north, however the figure does note that there is inflow from this direction.<br>**Recommendation**<br>Provide a rationale for no hydrology station at the north end of the lake, alternatively consider monitoring of flow at the north end in case there are changes in flow patterns and amounts. | **FMFN** | Overland runoff from the north wetland (HRA 10)into the Lake were not proposed to be measured, due not only to site access issues, but also to the fact that the flows are typically insignificant and ephemeral, there are no defined channels for gauging instrumentation. |
| 173 | 2-103<br>to 2-112 | Table 2-23 shows the natural ranges of water quality parameters in the various ecozones of the fen and in the lake. Some of the ranges are quite large e.g. electrical conductivity, TDS, calcium. How will water quality be a sensitive indicator when the ranges are so large. Are there other parameters that would provide additional sensitivity? The TAC recommended a longer list of water quality parameters. The TAC had also recommended sediment sampling.<br>FHEC indicates that the ranges of water quality parameters will be refined as more data are collected. Is FHEC confident that the selected group of water quality parameters (considering the variability) are sufficient to describe the groundwater and surface water quality of the fen and lake and to be early warning indicators of change related to the project?<br>**Recommendation**<br>What parameters will FHEC use as early warning indicators to determine if there is any seepage of process-affected water into the groundwater and/or surface water of the fen or lake? A discussion should be added to explain how FHEC would detect process-affected water.<br>Are the basic water quality parameters sufficient? Should parameters such as naphthenic acids and PAHs be included within the baseline and effects monitoring rather than using these as complementary data. | **FMFN** | FHEC has included the main water quality parameters are primary effect indicators that are important to maintain vegetation species within the fen. How as noted in Objective 2, many other water quality parameters will be sampled for complimentary data, including PAHS, and naphthenic acids. PAHs, naphthenic acid, and hydrocarbons do not make good indicators because they are not conservative and can biodegrade along the flowpath. Process affected water has elevated chloride which is conservative, and is included in the MLWC monitoring as complimentary data as well. The site wide monitoring also includes all of these parameters and should there be a concern of operational water seepage moving towards MLWC, the data will be available to be examined and interpreted. |
| **Comments from FMFN** | | | | |
| 174 | General | Is there a reason why certain references to family or community members are highlighted? Or is this just to double check who the comment is linked to? | **MCFN** | We wanted to highlight ITK to assist in the review/validation of the information. The presentation of ITK in Objective 1 has been substantially revised and in the revised section we have included quotes as italicized text. |

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| 3.0 **Objective 2– Define Functionality** | | | | |
| 1 | General comments on Objective 2 | Tables in this section listing indicators, values and metrics need to be checked for consistency with various SC Products (See Attachment 3 of SC Comments on Objective 1) | **Co-Chairs** | Noted, the final list of recommended indicators that was provided by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021) was used as the basis for Objective 2. |
| 2 | General comments on Objective 2 | Further discussion is needed between the SC, AAG and TAG, and Suncor on the classification of indicators and the monitoring that would be conducted as a consequence of this classification. There was no agreement provided by SC on classification system. | **Co-Chairs** | Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators. After the July 19, 2021 meeting to review comments on Objectives 1 & 2, a number of items on the Objective 2 Indicator Selection flow chart were modified based on TAG and SC feedback and shared and modified during the Aug 25, 2021 and Sept 7, 2021 meetings. The first box in the flow chart was modified, the part of the question that included "and important to Indigenous land users" was removed as requested. There was confusion around the box asking the question "if there sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if its an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future. As well, there was concern that the ESCT indicators appeared at the end of the flow chart. The ESCT indicators were moved to be selected via a box that asks "is the indicator a measure of social, cultural and traditional economic value". And finally, due to concerns around the name "integrated indicators", the name was changed to "primary effects indicators". |
| 3 | General comments on Objective 2 | There should be a concordance table with this plan and the 2018 Proposal Tasks. Based on this Objective #2 review, there are a number of items where either works needs to be done or if partially or fully completed, included. This concordance table then needs to identify when specific tasks will be completed or developed once the project moves from a conceptual plan to the detailed design plan. | **FMCA/FMMN** | Concordance tables are provided in Section 1: Introduction. |
| 4 | | The objective is to define the functionality. This appears to be a very general high-level report. The MLWC itself would appear to be the non-mined portion of the wetland that is a combination of non-patterned and patterned fen. Clear definition of this as the only area of interest should be made, but the function of the lake should also be considered throughout. | **TAG** | See figure 1-1 in Section 1: Introduction for the delineation of the spatial boundaries for the Operational Plan. Condition 3.11 of Fort Hill's Water Act Approval 151636-01-00 (as amended) requires that an operational Plan be developed for the sustainability of the non-mined portion of the MLWC, which includes McClelland Lake. As such monitoring programs are focussed on this area. |
| 5 | | The large littoral or shallow areas of the lake seem to be ignored but provide lots of services (or functions). The pre-mining condition or function of other areas in the groundwater and topographic watershed that are relevant to maintaining the function should be included. This is needed to direct mitigation measures, predict effects of operations and maintain function of the MLWC. | **TAG** | Water quality is measured in the shallow areas of the lake, and the deeper portion of the lake has been added as per previous TAG suggestions. |
| 6 | | Only a high-level summary of drivers to direct indicator selection, and effects monitoring is provided. A clear list with detail of potential (later)and realized impacts is needed. Fig 3-1 is a crude generalization, and does not appear to include the lake nor the adjacent forests. It is not clear, or justification not adequate (i.e. not indicative of early change) | **TAG** | The figure provided was used because as has been approved and recommended by the SC. |
| 7 | | For “Indicator Selection Criteria” (Figure 3-3 and elsewhere), the criterion should be “… measure of wetland functionality OR important to Indigenous land users”. Consider both WS and TK perspectives rather than forcing them to coincide. | **TAG** | See response to Item #2 |
| 8 | | It is apparent from the justifications provided for including or excluding parameters to detect change presented in earlier workshops, and decisions on the applicability of many techniques and indicators are based on the lack of understanding or time constraints/ practical considerations of the SUNCOR team. This is not only frustrating but dangerous and may hinder developing trust with stakeholders. | **TAG** | See response to Item #2 |
| 9 | | Contaminants are a major concern throughout the AOS and is extremely limited in this report. Perhaps much of the contaminant monitoring will be conducted in the EPEA approval, but no information is provided in this report to allow us to evaluate this. It should not be dropped from the discussion in this report. All protocols, locations, and measurements in the EPEA assessment should be included, and then noted that it will be conducted in other programs. | **TAG** | The environmental effects monitoring program for MLWC is not intended to be a regional monitoring program, it meant to capture effects of the Fort Hills Project on the non-mined portion of the MLWC. While it is unclear what TAG is referring to under the term contaminants, many of the parameters that would typically be considered as contamination, such as hydrocarbons, are included in the water quality portion of the environmental effects monitoring program under complimentary data. |

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| 10 | | Also, this section (Objective 2) reports that all the committees and their members met repeatedly to discuss indicators - this is true. But it does not say what the final recommendations were by members, and if a final meeting was conducted to agree on the final decision to include or exclude parameters. This reduction of indicators was conducted by SUNCOR and is not agreed upon by all advisory committees. A more scientific reason for exclusion or parameters is needed. | **TAG** | Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators and some modifications have been made based on SC and TAG feedback. As well, the final list of recommended indicators that was provided by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021) was used as the basis for Objective 2. Ultimately, the classification of indicators and where they sit within the framework of monitoring for Fort Hills is a Suncor decision but has been made using the list of indicators and other recommendations provided by the SC. The rationale behind why some have not been included is provided in the text of Objective 2 and also in this response document. |
| 11 | | Chl-A is not necessarily an effective measure of lake health in systems that are naturally prone to eutrophication. Boreal Plains lakes are nutrient rich to start with and this will cycle greatly within years and between years Chl-A should not supersede or be used as a surrogate for potential contamination by organics and metals. Some measure of contaminants with in the biota, and in the sediments are required to assess the potential affect of operation on the ecosystems. For determining surface water and lake contamination, similar measures directed for groundwater should be included in the lake and its sediments. Some measure of contaminants within the sediments of the lake is probably the only way for early detection within the lake and general area. The reasons for dropping these measures are not adequate. | **TAG** | The sedimentation rates at McClelland Lake are relatively low due to the extensive fen complex located up-gradient of the lake, which also suggests that any watershed changes associated with Fort Hills mining operation will manifest in the fen complex before any changes can be detected in the lake (e.g. water quality, sediment quality). Sediment samples collected by conventional surficial sediment sampling methods (e.g. Ekman or Ponar) may represent decades of sediment accumulation at one location due to the penetration depths and homogenization of sediment samples within the top layer, and therefore, may not be able to distinguish any short-term changes in sediment quality. Sediment quality samples are not planned to be collected from the lake as they are not early indicators of change and data is not needed to aid in the interpretation of other indicator metrics. The SC agreed via their shared recommendations on indicators (Final Approved Short Early Warning Indicators and Methods, May 29, 2021). |
| 12 | | Tree growth was also dropped. Changes in tree growth are the most obvious effect of changes in hydrology within peatlands across the boreal plain. This should be the basic measure. There are others, see specific comments<br>list and categorization of functions seems fine, but there is little on how stakeholders have managed or aided in sustaining the systems. | **TAG** | See response to Item #2<br><br>Recognizing in some regions stakeholders have managed or aided in sustaining the hydrologic system, no information has been shared regarding this for the MLWC wetland. |
| 13 | | summary to indicators, and effects monitoring- A clear list with detail of potential (later) and realized impacts is needed but not provided. Fig 3-1 is a crude generalization, and does not include the lake nor the adjacent forests | **TAG** | See response to item #6. |
| 14 | | Basic Lake water balance should be conducted; it is a standard assessment.<br>Measurements of water levels are not sufficient. Measurements (or calculations) of changes in flow (e.g., gradients, spring discharge, streamflow) are required to evaluate water balances and any changes in where water flows | **TAG** | FHEC does collect the data for lake water budget annually and will continue to do so. However, as there are difficulties in measuring aspects of it accurately due to complex and undefined inlets and outlets and due to beaver impoundments, it will not be included as an indicator for the Operational Plan. |
| **3.1 Introduction** | | | | |
| 15 | 3-1 | Update text in Section 3.1 to reflect the ecological and socio-cultural functions of MLWC. | **Co-Chairs** | Accepted, see section for revisions. |
| 16 | 3-1 | Previous reporting by both the AAG and Suncor identify the need to include in this interpretation of functionality, how it links to, supports and is supported by traditional values and use. This would include adding social and cultural functions that is largely lacking in Objective #1.<br>*Functionality is linked to the* **environmental, social, cultural and traditional** *baseline conditions described under Objective 1 (Section 2), and considers pre-development baseline conditions, pre-mining baseline conditions, and associated natural range of variability (NRV) and measured range of variability (MRV).* | **FMCA/FMMN** | Accepted, see section for revisions. Stronger connections made between ESCT impacts, monitoring and indicators elsewhere in OP. |
| 17 | 3-1 | It would have been beneficial to have the communities participating in the SC and the AAG:<br>• define functionality with regard to the entire (present-day and former) MLWC<br>• define what functionality means once a portion of the MLWC has been mined, or rather, what the unmined portion will look and act like if they are to say that its functionality has been maintained. The point would not be to confirm some communities' perspectives that functionality cannot be maintained, but to strive to achieve a greater degree of functionality from a community perspective<br><br>This reviewer also notes that some aspects of the MLWC's functionality have not been adequately considered. | **ACFN** | The definition of functionality has been updated to reflect the work of the AAG, synthesized in the IEG report, and now includes recognition of the social and cultural functions. Additionally, the functionality definition prepared by Jones and Stokes in 2009 reflects the work on behalf of the Sustainability Committee. |
| 18 | 3-1 | Clearly define the systems that will be addressed. There is confusion of where the lake vs the patterned peatland fit in this objective. Also, in Table 2-2 (objective 1) testimonies indicate that important and values of the whole watershed, and direct use of the peatland (patterned and non-pattern) is not mentioned as much. This should be reflected in the functionality of the non-mined portion that considers more than just the peatland. | **TAG** | See response to Item #4 |
| **3.2 Key Driver-Stressor-Response Relationships** | | | | |
| 19 | 3-1 to 3-2 | Word Changes …First sentence in par 3 … Stressors are actions ….function of biological systems and affect Indigenous land use and land users (ADD). | **Co-Chairs** | Agreed, text has been revised. |

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| 20 | 3-1 to 3-2 | The title of Figure 3-1 should identify source of the figure as from the Sustainability Committee. Make small changes to the Figure 3-1 as recommended above. | **Co-Chairs** | This figure was revised by Suncor and later approved by the SC. |
| 21 | | Figure 3-1 does not fully represent Driver and Receptor table that was submitted on behalf of the SC by the co-chairs to ensure all effects that could occur in the MLWC were being addressed in the Operational Plan (due to time constraints, although this figure was presented to the SC it did not get approval due to time constraints).<br>Although the diagram correctly references Emission to the Environment, Noise, Light and Activities as physical receptors , the SC has not been given any information on how these are being documented in the MLWC …this information should be added to the text e.g. Under Suncor's EPEA two new assessments are being prepared:<br>• a noise assessment is being conducted in relation to the changing locations of facilities including the overburden dump. A noise level will be modelled at the boat launch on MLWC<br>• an updated predictive air emission model is being prepared that will include emission levels and deposition levels in the non-mined portion of the fen.<br>The SC diagram lists the detailed aquatic and fish and wildlife receptors that have not been added to this diagram…<br>Contaminants in Biota has not been listed under Fish and Wildlife.<br>Please explain why tailings was removed as a potential source of Project Emissions that could affect the MLWC. The co-chairs had put this in the original effects' diagrams.<br>There needs to be a color coded legend added to the figure | **Co-Chairs** | See response to item #20. |
| 22 | 3-1 to 3-2 | The information presented in Figure 3.1 is new and was not presented, discussed or validated with the AAG or SC. Further discussion is required to ensure that the drivers, stressors and responses correctly represent the drivers, stressors and responses that may affect the functionality of the fen. This includes the apparent color coding of what is considered a primary indicator and the appropriate use of spatial scales. | **FMCA/FMMN** | See response to item #20. |
| 23 | 3-1 | Potential spills are listed in the second paragraph, but there is no detail of the constituents of these spills. This detail should be provided and is key for deciding what indicators to use. The organo- and metal contaminants may be, or perceived to be, a significant constituent of these spill. This is not addressed in the lake, or in the forests. The potential contaminants should be listed. | **TAG** | Potential spills would be as a result of construction of the design features, would be local to the area, and standard construction mitigation measures (such as site isolation, spill prevention) and construction monitoring will be employed and detailed in future construction plans. |
| 24 | 3-2 | Fig 3-1: This appears to be a crude summary, more detail of actual drivers should be provided to allow to assess if the indicators will catch these | | See response to Item #20. |
| **3.3 Approach to Indicators Selection** | | | | |
| 25 | 3-3 | Add text on integrated approach taken to the identification and selection of indicators/aspects. (see text and reference locations for information above)<br>ADD THE TWO ROAD APPROACH DIAGRAM<br>Par 3 …**Sentence 3** TAG also presented on aquatic resources .<br>**Sentence 4** Change to "ITK holders and social scientists" supporting | **Co-Chairs** | The Two Roads Approach diagram is included/addressed in the introduction, as it covers work throughout the Operational Plan. Text has been revised as suggested. |
| 26 | 3-3 | "Validated" and "verified" are strong terms. TAG has not validated the proposed indicators. Several recommended by TAG are still missing. See comments elsewhere | **TAG** | Your feedback is noted, thank you. The term validated was used to refer to documents that had been approved at the SC and verified was used in the context of that specific workshop. |
| 27 | 3-3 | Page 3-3. Paragraph listing and describing the meeting where indicators have been discussed. This is very misleading. Having a meeting does not indicate that the advisory group endorsed your final selection. To say we met is one thing, but what was suggested should be presented, both the positive and critical statements | **TAG** | This feedback is noted. Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators and some modifications have been made based on SC and TAG feedback. As well, the final list of recommended indicators that was provided by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021) was used as the basis for Objective 2. |
| 28 | 3-3 | Suggested edits to the language in the last two paragraphs to be more representative:<br>• ITK and western science indicators (second last paragraph); and<br>• change in wetland function (second last paragraph). | **FMCA/FMMN** | Accepted and revised. |
| 29 | 3-3 | Reference that selection of indicators was dependent on sufficient baseline data is portrayed throughout Objective 2 as being agreed to. In fact, this was not agreed to and this remains an outstanding issue. | **FMCA/FMMN** | See response to item #2. |
| 30 | 3-7 | Difficult to measure or insufficient baseline data are not valid reasons to omit a metric. Make the important measurements happen, perhaps by bringing in outside expertise or by modifying the measurement techniques. Suncor has the time to look at environmental changes within the scope of the project, even if measurements are only started now | **TAG** | See response to item #2. |

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| 31 | 3-3 | The April 29/30 workshop Action to Suncor to provide more transparent/detailed rational for classifying indicators remains an outstanding issue and requires further discussion before the content on indicators can included in the Plan. (see also comments on Indicator Selection below). | **FMCA/FMMN** | See response to item #2. |
| 32 | 3-5 to 3-6<br>Table 3.1 | Table 3.1 is referred to as the preliminary list of Environmental Indicators Recommended by the Sustainability Committee. The table presented is not the table recommended by the SC to Suncor at the May 27, 2021 SC meeting entitled *Short Early Warning Indicators and Methods* that included both AAG and TAG input. Please provide the May 27th recommended table or remove the incorrect reference to indicators recommended by the SC. | **FMCA/FMMN** | The referenced table of recommendations, that has since been approved by the SC, was used as the basis for Table 3-1. The title and associated text have been changed to reflect this accordingly. |
| 33 | 3-5 to 3-6<br>Table 3.1 | Table 3-1: In discussing and describing the lake, definition or characterization two different regions, littoral shallow zone (2/3rd of lake) and deeper section should be provided, and indicators for each considered. | **TAG** | See response to Item #5. |
| 34 | 3-6 | The paragraph on page 3-6 assumes that the indicator selection criteria was agreeable to the SC, AAG and TAG. Given the apparent change in direction from the February workshop to the April workshop, the change in definition of 'integrated indicator' which was meant to mean that it was informed by both WS and IK and now is defined as meeting Suncor's defined criteria, further discussion is required to validate these foundational steps before the rest of Objective 2 can be developed. | **FMCA/FMMN** | See the response to Item #2. |
| 35 | 3-3 to 3-6)<br>Table 3-1 | Please have someone carefully compare Table 3-1 with the final List of Indicator/Aspects provided in Table: Methods for Measuring Change in Environmental land Social, Cultural and Traditional Economic (SCT) Indicators that would be sensitive to Potential Effects from the Fort Hills Project related to the conditions in the approvals and outlined in the Operational Plan (May 2021) the was approved by the Sustainability Committee and provided to Suncor<br>Table 3-1 does not reflect ALL the indicators and metrics provided by the Sustainability Committee in the Final Environmental and SCT Table:<br><br>some parameters are added that are not in the SC table,<br>some metrics do not reference those provided by SC;<br>wildlife has been generalized<br>Some indicator/metrics were missed…plants important to Indigenous Communities, contamination, loss and absence of species, major anions under water chemistry etc. | **Co-Chairs** | See the response to Item #32. |
| 36 | | See Attachment to SC Co-Chairs comments: *Methods for Measuring Change in Environmental land Social, Cultural and Traditional Economic (SCT) Indicators that would be sensitive to Potential Effects from the Fort Hills Project related to the conditions in the approvals and outlined in the Operational Plan*<br>Review and change Table 3-1 to reflect ALL the indicators and metrics provided by the Sustainability Committee in the Final Environmental and SCT Table. | **Co-Chairs** | See the response to Item #32. |
| 37 | 3-7 | Page 3-7, last line. It does not seem reasonable to fully review Objective 2 without having Objectives 5 and 6 at hand. | **TAG** | Fort Hills has agreed to provide another round of review of the complete OP document by the SC and the TAG. |
| 38 | 3-7 | Figure 3-3, first box. Should be an OR criterion rather than AND | **TAG** | This box has been revised. |
| **3.3.2 Indicator Selection Process** | | | | |
| 39 | 3-7 | It would be useful to provide a summary matrix of the information used to justify the classification of the various indicators. | **Co-Chairs** | We have included the indicator selection process that was used to classify the indicators (the process flow) and the resulting classification in Figure 3-4. A matrix assessment to classify indicators was not the process used. See response to Item #2 above. |
| 40 | 3-7 | Attendance at meetings does not indicate agreement. Don't intimate that TAG (or others) agreed when we raised concerns that have yet to be addressed. A table of how disagreements were considered would help. | **TAG** | See response to item #2 above. Fort Hills has had several meetings to review responses on drafts from the SC and the TAG and it committed to providing responses back with the full draft of the document. These responses from FHEC will encapsulate any items on which consensus was not achieved. |
| 41 | 3-7 | Difficult to measure or insufficient baseline data are not valid reasons to omit a metric. Make the important measurements happen, perhaps by bringing in outside expertise or by modifying the measurement techniques. Suncor has the time to look at environmental changes within the scope of the project, even if measurements are only started now. | **TAG** | This has been updated based on feedback. See the response to Item #2. |
| 42 | 3-7 | Clarify the text on complementary data (bottom of 3-7) to state that information on these indicators is currently being collected through the existing monitoring program and will continue to be collected in the future<br>Still need the baseline data to recognize changes in trends over time, even if there are not triggers and thresholds. | **Co-Chairs** | The text in the document has been revised to provide additional clarity. |
| 43 | 3-7 | Further discussion is needed between the SC and TAG, and Suncor on the classification of indicators and the monitoring that would be conducted as a consequence of this classification. There was no agreement provided by SC on classification system. | **Co-Chairs** | See the response to Item #2. |

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| 44 | 3-7 to 3-9 | 3.3.2 first paragraph – as presented this is misleading unless the recommendations provided are address. Currently, the indicator selection criteria were developed by Suncor and not adopted by the SC, AAG or TAG.<br>If no changes are made to the selection criteria the wording in the first paragraph must explicitly say that the indicator selection criteria were developed by Suncor and not adopted by the SC, AAG or TAG | **FMCA/FMMN** | See response to Item #2 and #10 above. |
| 45 | 3-7 to 3-9 | At no time was input sought on the parameter groupings. Given this, input is now offered to be adopted and to assist in revising the contents as applicable in the Operational Plan:<br>Revise the parameter groups and apply throughout the Plan as necessary:<br>•Primary indicators that characterize the MLWC as defined in the 2018 Proposal to monitor the functionality and biodiversity of the MLWC including biophysical, biocultural and socio-cultural indicators that will be included in the effects monitoring program and response framework. This includes integrated indicators as defined below.<br>•Integrated indicators that characterize the MLWC as defined in the 2018 Proposal and are informed by both western science and Indigenous knowledge that will be included in the effects monitoring program and response framework<br>•Complementary data and information that support the interpretation of the Integrated indicators<br>•Site-wide operational monitoring data specific to the indicators identified for monitoring in the Operational Plan<br>•Excluded from ongoing monitoring programs | **FMCA/FMMN** | See the response to Item #2 above. |
| 46 | 3-7 | Revisions to the section related to the input provided above, namely:<br>• revising reference to existence of pre-mining data; and<br>• revising mitigation to construction of the wall or alternative | **FMCA/FMMN** | No changes made |
| 47 | 3-7 | It is unclear why complimentary data will be monitored but not included in Objectives 5 and 6. It is assumed that this would allow this information to not formally be required and hence subject to termination at Suncor's discretion. This requires further discussion. | **FMCA/FMMN** | Complimentary data are collected at the same time as the primary effects indicator data, and will be used to help interpret the primary effects indicator data. However, they will not have triggers associated with them and are thus not included in the discussion in Objectives 5 and 6. The text in the document has been revised to provide additional clarity. |
| 48 | 3-9 | Wildlife indicators and triggers are required, from both ITK and WS perspectives. Mitigation can only respond to triggers, which require monitoring. | **TAG** | Wildlife indicators are monitored through the Fort Hills WMMP. While no formal triggers are associated with the WMMP, via past support and work from the TAG, the MLWC program is designed to be able to detect change. If change were being detected it would be flagged to the regulator through that program. |
| 49 | 3-9 | 3.3.2.3. Site-Wide Operational Monitoring Data . The EPEA monitoring is mentioned. This is all well and good, but there is not enough detailed information provided for the committees to evaluate what is being done. State clearly what is being done, and then note (asterisk) and say it will be covered in EPA monitoring. This should include monitoring of contaminants in both the reference and MLWC and lake | **TAG** | Parameters that would be considered contaminants (PAHs, hydrocarbons, etc.) are being monitored in water in the non-mined portion of MLWC and the reference sites as complimentary data in the OP monitoring program as stated in Objective 2. Other EPEA monitoring requirements are clearly stated within those separate programs and will remain there so as to not have overlap between the programs. |
| 50 | 3-9 | The first paragraph of Section 3.3.2.4 should be revised to focus on the social, cultural and traditional economic values identified for the MLWC: Harvesting and Subsistence Use, Indigenous Culture and Habitation, Education and Learning, Health and Wellness. | **Co-Chairs** | The section includes a description of social, cultural and traditional economic values with additional context including those recommended. Please clarify the specific changes that need to be made. |
| 51 | 3-9 | Regarding statement: "*Parameters identified as ESCT indicators will be monitored by Indigenous communities and used to inform the effects monitoring program and response framework described under Objective 5 and 6 respectively"*.<br>Question – How will information collected through this program (for example: wildlife & wildlife harvesting, ice, and traditional plant harvesting) inform the Effects Monitoring Program, if the Effects monitoring program doesn't collect data related to wildlife or vegetation that is important to communities?<br>Please insert a linkage diagram showing how information collected through each of the monitoring programs (integrated, complementary, ESCT and site wide monitoring programs) shown on Figure 3-4 will work together to influence specific mitigation, management and response frameworks. | **Co-Chairs** | More information is provided on this in Objective 5, though as not all of the detail on the ESCT program will be finalized prior to submission, there will still be work that is required with the SC in future to fully detail the program and its connections with others at Fort Hills. Commitments on timing are made within Objective 5. |
| 52 | 3-9 | Reconciliation with identified MLWC indicators and site-wide monitoring programs needs to be reconciled in a table (for example for species identified as culturally important). Information and data that is being collected must be provided to inform mitigations, management and the response framework specific to the MLWC and should the need arise for adaptive management. Again, it is unclear why this important information is not to be included in Objectives 5 and 6. This requires further discussion prior to using EPEA approval conditions, especially as they relate to regional monitoring which may not be occurring at the spatial and temporal level and therefore have the sensitivity needed to inform the functionality and biodiversity of the MLWC | **FMCA/FMMN** | See response item #48 |
| 53 | 3-9 | Provide the SCT values are already identified on page 3-3 and then provide their associated indicators as provided in the SC recommended table of Short Early Warning Indicators | **FMCA/FMMN** | The ESCT values and their associated indicators are provided in the ESCT section of Objective 2, as well as in the indicator classification flow charts. |

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| 54 | 3-9 | The introductory sentence should read 'have confidence in' and NOT 'enjoy' and 'social fabric' should read 'socio-cultural fabric' | **FMCA/FMMN** | Accepted and revised |
| 55 | | The last paragraph seems to say that if a parameter didn't make the list (e.g. many of those in the Short Early Warning Indicators, whether collected through WS or Community Land Users or integrated) but was still important to Communities that it landed in the ESCT indicators – formally known and referred to only as the SCT indicators. Moreover, this bucket of indicators will be monitored by Communities but there is no reference to, for example a Community-based Monitoring Program that would be required in addition to the interviews and surveys envisioned to make up the SCT indicator data/information collection. Please make this clear in this section along with the indicators for which the Communities will be provided capacity to collect monitoring data beyond the interviews and surveys (i.e. those that require western science methods and collection). Also, more clarity is required for how this information will be used (e.g. linked with the primary, integrated, complimentary and site-wide information). | **FMCA/FMMN** | See the response to Item #2. Additionally, not all of the detail on the ESCT program will be finalized prior to submission, there will still be work that is required with the SC in future to fully detail the program and its logistics. Commitments on timing are made within Objective 5. |
| **3.4 Selected Indicators** | | | | |
| 56 | 3-9 to 3-11 | Provide more detail on the justification for classification of indicators and review it with the TAG and the SC. For example, in Table 3-3, the Justification to include "Surface water hydrology – wetland" is: "Surface water hydrology – wetland". What does that mean? | **Co-Chairs** | See the response to item #2. Additionally, the justification for SW hydrology is a copy-paste error and has been revised. |
| 57 | 3-10, Figure 3-4 | Update this diagram reflecting the following changes in the classification of indicators: These changes should also be made through the text under the various classification sections | **Co-Chairs** | See response to Item #2. |
| 58 | 3-10, Figure 3-4 | Fig 3-4: summary of selected parameters – see main comments.<br><br>Sediments (and top predator- bio-accumulation) should be measured for a representative organo- and metal-contaminants, as in groundwater sampling | **TAG** | The sedimentation rates at McClelland Lake are relatively low due to the extensive fen complex located up-gradient of the lake, which also suggests that any watershed changes associated with Fort Hills mining operation will manifest in the fen complex before any changes can be detected in the lake (e.g. water quality, sediment quality). Sediment samples collected by conventional surficial sediment sampling methods (e.g. Ekman or Ponar) may represent decades of sediment accumulation at one location due to the penetration depths and homogenization of sediment samples within the top layer, and therefore, may not be able to distinguish any short-term changes in sediment quality. Sediment quality samples are not planned to be collected from the lake as they are not early indicators of change and data is not needed to aid in the interpretation of other indicator metrics. Our understanding is that this was discussed and agreed to at the SC based on recommendations approved by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021). |
| 59 | 3-11, Table 3-2, | Water levels and quality in McClelland Lake are important; measure them on the shelf, which represent about 2/3 the area of the lake and is important habitat for stakeholders. | **TAG** | Water quality in shallow areas of the lake and lake water levels are being measured. Details are provided in Objective 5. |
| 60 | 3-11, Table 3-2, | Need contaminant monitoring as an indicator of changes and health. | **TAG** | See response to item #49. |
| 61 | 3-11, Table 3-2, | Adequate (and easy) vegetation surveys have been proposed, including mean height, encroachment, and dendrochronology. Consult Line for additional background. | **TAG** | Fort Hills agrees that improvement could be made to the vegetation field program. A future meeting with the TAG and other experts such as Dale Vitt will be held in 2022 to ensure improvements to the vegetation program are incorporated going forward. However, Fort Hills will not include anything in the OP for which there is not enough baseline data to determine if its an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future. |
| 62 | 3-10, 3-11, Table 3-2, Figure 3-4 | Indicators recommended by TAG for monitoring are shown as not being included but they are still being discussed and the feasibility of measuring seepage is being piloted:<br>• seepage rates from springs – suggest it becomes complementary<br>• vegetation structure (height of plant form) – suggest it becomes complementary<br>Three indicators that were recommended by the SC were not mentioned in the figure or text:<br>• biodiversity<br>• contamination<br>• bird and mammal habitat .. this indicator may be placed under site wide monitoring if the site wide mapping includes the MLWC area<br><br>The indicator "Measure Quality of Snow and Ice as Drinking Water" was missed and should be included as an SCT indicator under Water Use | **Co-Chairs** | For the first two items, as discussed at the SC, Fort Hills will not be including indicators in the OP for which there is not enough baseline data to determine if its an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future. For the other items, suggested revisions have been made to the figure. |

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| 63 | Table 3-2 | Table 3-2: Chl-A is a terrible parameter to use on Boreal Plains lakes - they are nutrient rich to start with. This will cycle greatly within years and between years. For water quality look at blue-green algae (others?) and sediments or for bioaccumulation. | **TAG** | See response #11 above. |
| 64 | 3-9 to 3-16 | The introductory paragraph is misleading. Upon review of the 2019 progress report there is a large list of WS indicators and a discussion of SCT indictors (as this work was in progress) however, the assignment to the groupings, based on the selection criteria, as discussed above was created by Suncor alone and was not a product of the SC, AAG or TAG nor was it reflective of input received by SC and TAG members on the progress report.<br>Please refer to the comments and recommendations above and revise section 3.4 accordingly | **FMCA/FMMN** | See response to items #32. We have clarified that Suncor/Fort Hills selected the indicators included in the OP. |
| 65 | Page 3-14 to 3-15 | In the section on Environmental, Social, Cultural, and Traditional Economic Values and Land Use Indicators, the reviewer notes that "spiritual wellbeing" is an indicator under Health and Wellbeing.<br>The reviewer also notes that many community members made comments about a more spiritual function of the fen, the MLWC, on the landscape. This is not contemplated or assessed, and the impacts of mining a portion of the fen on this function it provides are not identified or understood.<br>This reviewer recommends further discussion of the AAG to confirm whether more work needs to be undertaken. | **ACFN** | Suggest this be discussed further with the AAG as we further develop the ESCT program in 2022 |
| 66 | | Exclusion of complementary data based on the premise that it is difficult to measure, may have insufficient pre-mining baseline datasets, may not be indicative of early change in MLWC functionality, or may not be responsive to Fort Hills Project mitigations are not valid reasons. These operations are having a massive impact on the environment and many parameters may be difficult to measure. Clear reasoning or definition of these criteria are needed. TAG disagrees on decisions to drop parameters (e.g., gradients, springs, sediment contamination, tree growth, wildlife) that they are not indicative of early change. Define the timeline. Consult experts to refine the monitoring program.<br>Table 3-3, Not clear why contaminants have been excluded, or if they examined in another context (i.e., EPEA) | **TAG** | See response to items #2 and #37. |
| 67 | 3-14 | Please verify that snow tracking that is noted in Table 3-4 is continuing. If this program is discontinued it should be noted in the table. | **Co-Chairs** | Snow tracking was discontinued in 2011 as the area was too small for effective data. It will be clarified in the table. |
| 68 | 3-14 | The table references wildlife disturbance from noise, light and reduced habitat connectivity. This information should be added to the text e.g. Under Suncor's EPEA two new assessments are being prepared:<br>- a noise assessment is being conducted in relation to the changing locations of facilities including the overburden dump. A noise level will be modelled at the boat launch on MLWC<br>- an updated predictive air emission model is being prepared that will include emission levels and deposition levels in the non-mined portion of the fen. | **Co-Chairs** | Fort Hills respectfully disagrees with this recommendation. As specified in Objective 2, these items are not included under the OP, they are included under EPEA and the Fort Hills site wide monitoring programs and are addressed there. |
| 69 | 3-14 | Habitat connectivity does not appear to be monitored in the MLWC. Please confirm? | **Co-Chairs** | As specified in Objective 2, these items are not included under the OP, they are included under the Fort Hills WMMP and can be found there. Discussion on wildlife programs at Fort Hills will be the subject of a future 2022 meeting with the TAG and SC. |
| 70 | 3-14 | The SC has recommended expanding wildlife monitoring sites along the west shore of the lake: by adding some cameras and evaluating whether data collected by ARUs for yellow rail could also be analyzed for birds and frogs (as per the current fen monitoring program). It has also been suggested that vegetation plots, and shallow water level and water quality plots (related to habitat) be included in the environmental monitoring program as part of the early warning monitoring approach.<br>ATTACH THE "UPDATED" COMPARISON OF SITE WIDE PROGRAM WITHIN THE FORT HILLS LEASE AREA TO THE MLWC RECOMMENDATIONS FOR WILDLIFE MONITORING PREPARED FOR THE SC | **Co-Chairs** | As specified in Objective 2 and discussed with the SC, these items are not included under the OP, they are included under the Fort Hills WMMP and can be found there. Discussion on wildlife programs at Fort Hills will be the subject of a future 2022 meeting with the TAG and SC. |
| 71 | 3-14 | Table 3-5. Potential contaminants in berries and other edible vegetation should be examined. Poor justification for excluding this. Same with harvested meats. | **TAG** | The SC agreed that these were not indicators of early change, see Final Approved Short Early Warning Indicators and Methods, May 29, 2021. |
| 72 | 3-14 – 3-15 | Add to Table 3-5:<br>Aquatic resources: Waterfowl – abundance, health and behaviour<br>Wildlife health: Moose, beaver and muskrat health and usability<br>Under Water Use … Measure quality of snow and ice as drinking water | **Co-Chairs** | Accepted, please see revisions. |
| 73 | | Table 3-6. Water balance for the lake is key. If you can come up with a balance for objective 1, why not maintain monitoring of this during operations? This is a standard assessment tool. | **TAG** | FHEC does collect the data for lake water budget annually and will continue to do so. However, as there are difficulties in measuring aspects of it accurately due to complex and undefined inlets and outlets and due to beaver impoundments, it will not be included as an indicator for the Operational Plan. |
| 74 | | Measurements of water levels are not sufficient. Measurements (or calculations) of changes in flow (e.g., gradients, spring discharge, streamflow) are required to evaluate water balances and any changes in where water flows | **TAG** | Gradients are currently included as complementary data; water balance in lake not included because it is difficult to accurately measure outflow. |
| 75 | | Table 3-6: Excluding examining lake sediments: It should be made much clearer on the science used to rationalize this? This seems to be at odds with standard impact assessments. Following sediment contamination is a standard way to follow potential impacts.<br>If there is contamination via dry fall, or unknown inputs this is the primary way to detect this. Also define "Early change". Increase in contamination over 10-20 years is a "early" signal to long-term problems | **TAG** | See response to item #58 above. |

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| 76 | | TAG disagrees on decisions to drop parameters (e.g., gradients, springs, sediment contamination, tree growth, wildlife) that they are not indicative of early change. | **TAG** | See response to Item #2. |
| 77 | | In the anchoring sentence of the introduction, Suncor states that the purpose of Objective 2 is to "maintain ecosystem diversity and function of the non-mined portions of the MLWC during operation and reclamation of the Project" [p.8]. How can ecosystem diversity and function be maintained if wildlife is not considered to be a part of it? Wildlife is at the receiving end of the bottom-up chain, from water quality and quantity, to forage availability, to predator-prey responses. It also affects the lower ecological levels through-top down and cascading effects from predators affecting prey, prey affecting vegetation, and vegetation affecting water quality and quantity. It is inconceivable to exclude wildlife from an assessment of ecosystem functionality. | **TAG** | The MLWC wildlife monitoring will continue at MLWC via the Fort Hills WMMP and will reported on through that process. Discussion on wildlife programs at Fort Hills will be the subject of a future 2022 meeting with the TAG and SC. |
| 78 | | TAG does not agree with Suncor's rationale to exclude wildlife as indicators. TAG disagrees because a great deal of wildlife data have already been collected and the data collection and analysis are amenable to improvement and refinement so as to improve statistical power. Wildlife can and does respond to a number of drivers such as "Project emissions, dust or potential spills; and increased human activity and presence in the watershed associated with noise, light, and the presence of more people carrying out activities " [p.8] within weeks or months, and this response can be measured.<br>If wildlife is not included as an indicator of any kind, then no triggers or thresholds can be developed to prompt mitigation and adaptive management. | **TAG** | See response to Item #48. |
| **Comments from FMFN** | | | | |
| 79 | 3-2 | Overview Figure 3-1 shows the broad relationships between key drivers, physical receptors, biological receptors and indigenous community receptors. It captures most of the overall broad connections however under hydrological changes, there could be more clarity that there is potential for water management system/cut off wall/pumping and injection wells to affect water quality – it would not simply be hydrological (water quantity) changes as is the title of the driver but changes in water management (e.g. potential issues with management of cut off wall and pumping wells leading to process-affected water seepage). Recommend putting in a separate driver box for water management to clearly show this as a key driver.<br>For biological responses the figure lumps fish and wildlife. These could be affected differently through different pathways – recommend separating out fish from wildlife. For both fish and wildlife identify (in brackets) the wildlife indicators. Even if the actual monitoring wildlife is done through the EPEA approval there should be a clear link to how it fits into the monitoring of MWLC and, in the effects system (Objective 6).<br>**Recommendation**<br>1) Key drivers - Recommend putting in a separate driver box for water management to clearly show this as a key driver distinct from hydrology<br>2) Biological receptors – separate out fish and wildlife into different boxes. Even though monitoring of fish and wildlife is done through EPEA, include indicators in brackets. | **FMFN** | The figure provided was used as-is because it has been approved and recommended by the SC. |
| 80 | 3-6 to 3-10 | The approach to indicator selection is well explained and shown in clear diagrams.<br>We understand that there are integrated indicators (Figure 3-2, Figure 3-4 and Section 3.3.2.1) that are integral to the monitoring program and are the basis of the effects monitoring program and response framework.<br>However, EPEA monitoring could 1) have useful complementation information 2) show effects on receptors that are important to Indigenous communities. Also, key pathways e.g. from air quality deposition could affect the MLWC, and with the focus of the effects monitoring program is on hydrology and water quality, its possible that air effects on the fen or combination effects would not be evaluated or appropriately responded to.<br>Some example pathways are project effects lead to drying of fen, change in wildlife habitat, reduction in wildlife population, impacts on hunting. Another example is dustfall affecting plants in the fen, combined with the project water management and hydrology changes affecting water levels and quality in the fen and these two effects combining and resulting in negative effects on berry abundance and quality.<br>Our understanding is that FHEC would be monitoring wildlife and dust through EPEA in their site-wide monitoring plan. However, if these are linked to MLWC then there should be formal linkages in the effects monitoring program (Objective 5) and response framework (Objective 6).<br><br>**Recommendation**<br>EPEA Site-wide monitoring - For receptors that are monitored through EPEA (e.g. emissions in the environment, fish and wildlife), ensure that in the effects monitoring program (Objective 5) and the response framework (Objective 6) there is a clear linkage described from how data, results, trends etc. from EPEA monitoring link into the response framework.<br>Linkage diagrams - Individual detailed linkage diagrams of effects pathways for EPEA monitored items would be instructive. We recommend a linkage diagram focused on air emission deposition and dust showing how information/data from EPEA monitoring would be examined in the effects monitoring and response framework to look at potential combination effects (e.g. dustfall and hydrological effects) and to ensure appropriate mitigation response. Also a similar diagram for wildlife showing how wildlife data collected in EPEA monitoring would be examined or analyzed for any link to changes in the MLWC. | **FMFN** | See response to item #51. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 2 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 81 | 3-9 to ## | Site-wide operational monitoring data could be useful in the response framework and is especially important to Fort McKay in terms of links to indicators important for exercise of rights (e.g. waterfowl, berries, moose). There seems to be a really gap here between the monitoring program for the wetland and the site-wide EPEA monitoring.<br>**Recommendation**<br>The response framework should include links to site-wide EPEA monitoring and how information from these programs (e.g. dust monitoring, wildlife, emissions) would link to potential changes of physical and biological receptors in the monitoring plan and the driver-stressor-response relationships. These linkages should be indicated in Objectives 5 and 6. Similarly, complementary data (how it would be used) should be referenced in Objectives 5 and 6. | **FMFN** | This recommendation is noted, interpretation of site-wide data will occur within the context of their respective programs. As explained under Objective 6, should a trigger exceedance be noted to MLWC primary effects indicators, the complimentary data and site-wide data would be examined during the "Investigation of Cause". |
| 82 | | Very good, easy to follow diagram with clear colour coding.<br>Comments on indicators:<br>Sediment was excluded from baseline data collection (even though it was recommended by the TAC), and therefore of course there are not sufficient baseline data. For sediment quality I could see a role as complementary data.<br>Vegetation – the TAC had recommended vegetation structure and shrubs (width) – these are excluded as “difficult to measure”.<br>**Recommendation**<br>FHEC should more clearly document the process used to select the indicators – was there consensus from the AAG and SC and TAG as to the indicators chosen by FHEC. The document indicates a series of workshops but does not note if any indicators chosen or not chosen were contentious.<br>Provide a rationale as to why sediment quality is not considered an appropriate baseline or indicator. Could sediment quality be used a complementary data?<br>Provide a rationale as to why vegetation structure and shrub width were considered too difficult to measure.<br>Why are surface water quality data such as metals, naphthenic acids, PAHs categorized as complementary data rather than indicators? FHEC has indicated that complementary data will not be included in Objective 5 and 6, so does this mean that complementary data are not looked at when interpreting changes in the MLWC indicators? As recommended in our comments on Objective 1F HEC should clearly explain how the indicators, monitoring plan and response framework will detect process-affected water (as well as deposition through air emissions). | **FMFN** | See responses to Items #2 and #10. |
| 83 | 3.4.1 Integrated Indicators | The integrated indicators look to be appropriate indicators of wetland and lake biophysical states for water quality and quantity. | **FMFN** | Noted, thank you for the feedback. |
| 84 | 3.4.2 Complementary Data | FHEC is excluding complementary data from Objectives 5 and 6. While these are not the integrated indicators, there should be some formal linkage in these Objectives to the use (and collection, if needed as per Figure 3-3) of complementary data.<br>**Recommendation**<br>Include complementary data (or at least appropriate linkages to the use of this data to support the interpretation of MLWC Integrated Indicators) in objectives 5 and 6. | **FMFN** | See response to Item #47 |
| 85 | 3.4.3 Site-Wide Operational Monitoring Data | FHEC indicates that wildlife is too variable to be an early indicator but is monitored through the site-wide monitoring and reported on through a Comprehensive Wildlife Report (CWR) every 3 years. FHEC has committed to sharing the report with the SC.<br>***Recommendation***<br>Discuss (in Objective 5 and 6) how any changes in Integrated Indicators will be used as complementary data in the interpretation of wildlife monitoring. Conversely, how will changes in the integrated indicators be followed through (i.e. pathways) to examine wildlife receptors (i.e. Figure 3-1). | **FMFN** | This recommendation is noted, interpretation of wildlife data will occur within the context of the CWR, and MLWC data will be shared to that program as required. |
| 86 | 3.4.4 Environmental, Social, Cultural and Traditional Economic Values and Land Use Indicators | FHEC states that “ESCT indicator parameters will be monitored by Indigenous communities and used to inform the effects monitoring program and response framework described in Objectives 5 and 6” and it “will work with the SC to develop an ESCT monitoring program that ties into the effects monitoring program and response framework described under Objectives 5 and 6, respectively. The ESCT monitoring program is expected to include community observation logs and land user interviews.”<br>***Recommendation***<br>In the work of the SC and FHEC on the ESCT indicators it will be important to understand the linkages between MLWC integrated indicators and ESCT indicators and also to define effects pathways (as in Figure 3-1) for each indicator. | **FMFN** | This recommendation is noted and will be carried forward as work on the ESCT program continues. It is also noted that Figure 3-1 does provide linkages for all of the indicators and effects from the Fort Hills Project. |
| 87 | 3.4.5 Excluded Parameters | FHEC presents a table of excluded indicators with the rationale for exclusion. Fort McKay may want to check with the TAC as to their views on the reasons for exclusions.<br>***Recommendation***<br>See comments and recommendations above in Section 3.3.2 regarding indicator selection process. | **FMFN** | See response to item #82 |

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| SC Recommendations for the MLWC Operational Plan (OP) – Objective 2 | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| **Comments from FMFN** | | | | |
| 88 | General | Related to a previous comment about how integrated indicators and ESCT indicators have been separated. Is there any way that some of these indicators can be combined so that the ESCT are separate from, and less considered than, the integrated indicators? | **MCFN** | See the response to Item #2. |
| 89 | Table 3-1 | Is it possible to consider the use of remote sensing to determine ice thickness in and around the fen? | **MCFN** | FHEC understands that using remote sensing for ice thickness on the fen isn't possible at this time. |
| 90 | Table 3-6 | I see that tissue analysis is being excluded because it's highly variable, but would it be possible to support this as more of a community-led project to give land users some comfort in what they are consuming around the complex? If there was an annual duck hunt or berry harvest, could some of it be submitted for analysis? | **MCFN** | The purpose of indicators for the environmental effects monitoring program in the OP is to detect early change due to the Fort Hills Project. Fort Hills understands that tissue analysis is not sensitive to project effects (particularly for animals with large ranges or migratory birds), and would be slow to detect change (requires changes in water/diet to result in tissue changes that could be detected in a test - and slow to detect statistical change). Following much discussion, the consensus decision at the SC was to not recommend tissue analysis as an indicator. We continue to welcome sharing of info on the FMFN berry program and are open to discussions on collaborating to add a site to the MLWC area. |
| 91 | Table 3-6 | The rationale is pretty vague in this table. Can TAG add their comments on whether they agree or not? In previous discussions, Suncor said that not having baseline data right now does not preclude them from using the indicator in monitoring. Some baseline monitoring can still be done before operations begin, depending on the indicator. | **MCFN** | See response to Item #2. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 3 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 1 | General Comment | OF IMPORTANT NOTE IS OUR REQUEST FOR A PRESENTATION ON THE 2002 ASSESSMENT AND RETRACTION AND WHAT THAT INCLUDED AND DIDN'T AND HOW IT RECONCILES WITH OBJECTIVE 3. WE WOULD LIKE THIS AT THE BEGINNING OF OUR MEETING ON THURSDAY. | **FCMA_FMMN** | Reviewed and discussed at SC meeting on Oct 7, 2021 |
| 2 | General Comment | Suncor is tasked under Condition 3-11 to assess and monitor the effects on the functionality and ecosystem diversity of the MLWC. The assessment of impacts on wildlife is an essential element of understanding impacts on the functionality and ecosystem diversity. We understand that Suncor is planning to monitor wildlife under the site-wide monitoring program, but we do not know when or how the assessment of wildlife impacts will be provided. Furthermore, we do not know when or how Suncor will integrate the work done under the site-wide program with the Operational Plan. To satisfy Condition 3-11, Suncor needs to present a plan, as part of the Operational Plan, for conducting such an integration. Suncor remains silent on this requirement, including in this assessment of potential impacts of mine development. | **TAG - Wildlife** | This was discussed at the October 7th SC workshop. As stated in the authorized OP Proposal, the approach to assessing potential impacts of Fort Hills mine development on the McClelland Lake Wetland Complex would be based on use of models and focussed on effects to groundwater and surface water. Impacts to wildlife from the Fort Hills Project were provided in the 2002 EIA and updated in subsequent approval amendments as required. Although the MLWC was not included in the 2002 EIA, impacts to wildlife in proximity to Fort Hills Operations – including within the MLWC watershed – was assessed. Impacts to wildlife from Fort Hills Operations and specifically within MLWC are monitored under the site wide monitoring program, which the TAG has had extensive involvement in designing. |
| 3 | General comments: Incomplete – further review is required | This represents a preliminary review of a first draft of the most important objective, Obj 3. There is a tremendous amount of work presented in this objective. However, there was considerable delay in receiving this document, and limited time to review given the scope of work and length. In addition, the appendices with the crucial information to assess are over 400 pages. All sections on water quality, modelling and otherwise, are missing from this draft.<br><br>Surface-water quality modelling is not ready to report. How can this assessment be completed without a robust discussion on water quality? It can't.<br><br>A more detailed review can be provided once the Objective 3 section is complete. | **TAG - Hydrology** | Noted thank you. FHEC will provide the water quality modelling results as per our schedule discussed at the October 7th meeting with the SC. |
| 4 | General comments: IK Integration | The Plain Language summary is a great way to introduce the protocols and importantly the conceptual model illustrating the holistic linkages of the system. It also provides a great opportunity to integrate IK and the sciences. Having said that, at present it merely **highlights what information was or could be used but does not directly state how**.<br><br>This is where a **summary conceptual model that synthesizes the understanding of Western Science and IK, and illustrates the foundation for the numerical modelling, assessment, and mitigation strategies.** This summary could then be informative and used by all parties. At present it presents little to inform stakeholders or scientists. It largely comes across as a "feel good" document. | **TAG - Hydrology** | Accepted. The plain language summary will be updated to to include how the info was used to build the conceptual model and the HGS model. It will be redesigned to be an actual summary (at a very high level) of how water and nutrients cycle through the system, how the HGS model was applied and a generic (because details may change as engineering advances) description of the mitigation strategy |
| 5 | General comments: Summary Conceptual model is required | There is no summary conceptual model showing the whole system, nor a basic synthesis of the interconnectedness of flow paths and the key processes at various locations throughout the MLWC. These are required for the final assessment of the relative roles of different sources, mitigation operations and success of the cutoff wall.<br><br>Importantly a synthesis of the conceptual model is required to direct the understanding of hydrologic processes and to define the locations to measure the indicators referred to in other objectives. Currently the reader must collate and synthesize this information from individual descriptions in the appendix that is extremely long. | **TAG - Hydrology** | Accepted. An enhancement of the conceptual model synthesis will be made in the conceptual model appendix of Objective 3. This information is summarized again within the main body of Objective 3 (Section 4.3.1) and in the plain language summary. Hopefully these 3 syntheses will be sufficient for everyone's needs |
| 6 | General comments: Incomplete – further review is required | In the text the direct citation of important sections in the appendix (appendices?) referred to in the main document are not provided. This is difficult to follow and provide a thorough assessment. As stated above, this is a rather preliminary draft that is difficult to fully assess in a short period of time. Recognizing the timing and the stage of the draft (but incredible amount of work), the expectation is that Suncor will submit a revised draft for consideration. | **TAG - Hydrology** | These citations have been updated to point to the appropriate Appendix. |
| 7 | General Comment | It appears that the conceptual model came after the model development. This is opposite to the standard approach, although we do recognize the iterative nature of these assessments. We anticipate that Suncor will complete the iterative step (i.e., update the numerical model to agree with the conceptual model) soon. Related to the last statement, are the references to using the current model for indicators and mitigation used in objective 2 and 4 (and likely 5 and 6). It is not clearly stated whether Suncor used the current model results for their interpretation and actions indicated in the other objectives, or whether these results are new and the interpretation and actions need to now be applied. At a minimum the other objectives require adjustments to correspond to the new information contained in the new models. | **TAG - Hydrology** | The MLWC HGS model is a multi-generational model wherin the conceptual model has been progressively updated and then the HGS model was updated. For the MLWC OP, the HGS model used the most current conceptual understanding as of EOY 2020. The 2021 MLWC conceptual model includes new info not considered at the EOY 2020. However the conceptual/numerical work will continue after the OP submission and continue to use the methodology have used all along. The next build of the MLWC HGS model (currently underway in October 2021) is using the 2021 conceptual model as its basis. The primary updates are Aspen AET rates assigned in the Fort Hills and how long and how hard the ground freezes. The climate forcing data is also being examined to mitigate the simulated vs observed lake levels deviation from 2005-2009 (Fort Mac airport data did not record the convective storms that occurred at the MLWC). JP showed the TAG that swapping in Bitumount climate data fixed the issue with simulated lake levels. The TAG also suggested looking at Mildred Lake data too which will be done. Drafts of the conceptual model were used in writing the other objectives. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

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| 8 | General Comment | We disagree that the simulated groundwater elevations are close to the observed from the tiny map/plots and table of values and differences provided. Many core ranges don't even overlap. Importantly, the simulated water levels are systematically higher than the observed, indicating a bias in the calibration. A time series of water levels and assessments of goodness-of-fit are required for further evaluations. | **TAG - Hydrology** | There is a slight overpressurization bias in the deeper Quaternary aquifers making up the FHUC (silt sand aquifers 1-4). The bias is much less pronounced for the groundwater levels under the fen (surface sand aquifers) and peatlands. This continues to be addressed in the HGS updates. |
| 9 | General comments: Simulated Water management system scenarios | We need to know how management of the system was simulated (i.e., fen resupply and OW injection wells, in particular) and how that relates to implementation. Digging into the Aquanty appendix the resupply and injection rates are stated to be specified as differences between the R1 and R0 model simulations. That approach assumes ideal knowledge of different realizations. How will they be determined in practise when there is only the one reality? | **TAG - Hydrology** | To support designing the mitigation system, historical climate data needed to be used and it is agreed that this allows perfect knowledge of the system response. In operating the system, the weather will not be known in advance and so a different methology would need to be used. This methodology would need to combine knowledge of historical system states and responses, field data (e.g., water levels) and modelling. Water resupply volumes would need to be forecasted and rolling adjustments to these forecasts would need to be made. It is possible that machine learning could be used to help support operation of the system. FHELP will not be solely relying on historical climate data and the HGS model to operate the water resupply system |
| 10 | General Comment | Groundwater quality is explicitly excluded from the evaluation. Why? It was established in Objective 1 (and the Conceptual Model appendix) that groundwater quality varies and has an influence on surface-water quality. | **TAG - Hydrology** | Groundwater quality is included as an input to the EFDC model, but EFDC is a surface water quality model. Groundwater quality modellling will be conducted as it pertains to the injection system during future design work of that system and this work will be advanced post-submission. |
| 11 | General comments: Readability | The Conceptual Model and HGS Model appendices were neither searchable nor bookmarked. This made TAG's review more difficult than it needed to be. Numerous pages in the Conceptual Model appendix required rotation. That said, the appendices were not reviewed; they were only used as a resource for several specific questions. They can be reviewed once the Objective 3 section is revised. | **TAG - Hydrology** | This has been corrected. |
| 12 | General comments: | Throughout the review of this section outputs are discussed in relation to a simulated baseline calculation and yet another new term is introduced - the 'expected' or 'predicted' range of variation.<br><br>Measured range of variation is cited only in Section 4.3.2.4 for Aquatic Resources and 'observed range' (assuming this is the same as MRV) in Section 4.3.2.1.2 for the R0 case for hydrogeology.<br><br>Since Objectives 1 and 2 introduce the range of variation to be used as the MRV and then this is carried through Objectives 4 to 6 that imply that the 'normal range' is based on the MRV (observed) it would seem logical to use the MRV in Objective 3, or at a minimum compare the results to the MRV and expected/predicted range. Alternatively, all other Objectives must introduce this new concept and discuss how it will be utilized throughout the Plan. | **FCMA_FMMN** | The use of "expected" or "predicted" range referred to the results from the model simulations that were completed for groundwater and surface water. In the text, this has been updated to say "simulated range", which is different than the MRV. |
| 13 | General comments: | Given that Indigenous communities have requested several times for an extension to finalizing the Plan prior to its submission to the AER, and understanding that the AER did envision such a delay as a possibility, please provide an update on this request including where this scenario is discussed in the Plan. Reference SIR 11 c) regarding potential delay of the plan. | **FCMA_FMMN** | FHEC has assumed a timeline for review and authorization of the MLWC OP in 2023. The OP authorization is on the critical path for FHEC's current mine plan consisting of ditching and draining in 2025 and overburden mining in 2028. FHEC understands that there is always a potential for delay in the review of regulatory submissions. With SIR 11c) it is FHEC's understanding that the AER was looking for information on how Fort Hills would continue to operate Fort Hills mine under a MLWC OP authorization delay scenario. FHEC anticipates that an alternate mining sequence could be used to accommodate a delay; however, this could have negative implications to closure and other outcomes in the overall plan such as targeted overburden backfill in MLWC. In order to complete hydrological modelling of a delay scenario mine plan, FHEC would need to develop a complete alternate mine, tailings and closure plan which will require a significant amount of time. Fort Hills may provide further discussion of this scenario in Annual Progess reports for MLWC, as appropriate. |
| 14 | | There is an inconsistent reference to the development phase, construction throughout Objective 3. In some cases the effects from construction phases are recognized but in other sections it appears that construction effects are discussed under the operations phase. ***Be consistent in the referencing of construction, operations, closure and far future phases through the Impact Assessment Objective 3.*** | **Co-Chairs** | There is no explicit construction phase used for the risk assessment in Objective 3. Due to the phased approach of the design features, construction effects will occur throughout the operational phase of the mine and have been accounted for therein. |
| **4.1 Introduction** | | | | |
| 15 | 4-1 | The recommendations in other objectives need to be reconsidered with the new data presented for Objective 3 because Objective 3 reporting came after all other objectives. Provide clear statements as to whether the conceptual model and modelling results provided in Objective 3 were used in the versions of Objectives 2, 4, 5 and 6 presented earlier this summer. Or, given that Objective 3 has only recently been provided, have these current results from Objective 3 been incorporated in the other objectives. | **TAG - Hydrology** | See response to item #7. |

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 3 | | | | |
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| 16 | 4-1 | "required to maintain the functionality and diversity of the MLWC" and "the specific assessment of the non-mined portion of the MLWC was withdrawn, with any further assessment deferred until the development of the OP." Objective 3 of the OP does not assess functionality and diversity. Important aspects of vegetation appear to be missing and wildlife is not dealt with at all. In order to understand functionality and diversity the disciplines that explain ecosystem diversity and functionality must be assessed and integrated.<br><br>Suncor must explain how impacts to wildlife will be assessed and how that assessment will inform the Operational Plan. Moreover, disciplines that are currently assessed under the OP should make available their results and mitigation actions for the wildlife assessment. | **TAG - Wildlife** | See response to item #2. |
| 17 | 4-1 | As should be provided in the Introduction for each objective, a concordance table with the 2018 Proposal should be included. It is unclear what has been done to verify model predictions as in some cases the simulated outputs differ from observed baseline (MRV?), for example Figure 4.3-1 (not labeled). Upon review of the HGS Appendix on calibration and validation, calibration targets were set and data applied depending on various factors (e.g. collection period, fit with calibration targets) with the data not used in the automated calibration used for validation. The requirement refers to proposing investigation and monitoring (which should be addressed in Objective 5) but it is unclear if the model(s) is/are still not finalized how Objective 5 can be considered adequate (e.g. if more/different locations or variables need to be considered based on final model outputs) or, alternatively if design features need to be modified. Based on the draft plan sections provided, leaving the NW section of the wall in place at closure is the part of the design features for closure – Objective 3 does not clearly indicate if with or without the NW section of the wall at closure was modeled and what the different results were. | **FCMA_FMMN** | Concordance tables will be provided in the Introduction Section (Section 1.0).<br>The active closure and far future simulations made with the 2020 MLWC HGS model assume that the NW section of the cutoff wall remains intact but the remainder of the wall has been removed or perforated. |
| 18 | 4-1 | It would be very helpful to have been provided the original assessment (2002 EIA) to understand how effects to the MLWC was assessed, including the section that was subsequently retracted to be provided in the Operational Plan and specifically Objective 3. As Objective 3 does not address the effects of the mitigation measures (design features from Objective 4), it is unclear if they were adequately addressed in 2002 since, at that time, they were not developed. How did the EIA consider the working platform, wall, pumping wells, water supply etc. during construction, operation, closure and far future (for example, the NW portion of the wall is going to be left in place in the closure landscape)? As well, was the retracted portion of the EIA dealing with the MLWC within the hydrogeology and surface water assessments or did it also include water management and reclamation that would have been in Section 1 of the EIA. How were all other related valued components assessed in the absence of the MLWC assessment (e.g. vegetation, wetlands, wildlife, biodiversity, traditional land use, etc.)? This should be discussed at the October 7th workshop and, if necessary, a concordance table should be developed and included in Objective 3 to demonstrate that this Objective fulfills the intended purposes and if assessment of other VCs had included mining in the MLWC this needs to be clearly outlined including any residual effects identified. | **FCMA_FMMN** | This was discussed at the October 7th workshop. As stated in the authorized Proposal, the approach to assessing potential impacts of Fort Hills mine development on the McClelland Lake Wetland Complex would be based on use of models and focussed on effects to groundwater and surface water. |
| 19 | 4-1 | Please explain why a R1 (development scenario with no implementation of water management design features) was not assessed for water quality. Is it assumed that all indicators would surpass thresholds in this scenario and therefore was not modelled for? Would this not be the 'worst case' scenario if the proposed design features fail – if so, then this scenario should be included. A discussion on such a rationale is needed in the introduction. | **FCMA_FMMN** | Water quantity modelling established that functionality of the fen would not be maintained for the R1 scenario. Given the importance of other water quality modelling scenarios to the OP this was not considered for further work. The R1 scenario would not provide much insight on the scenario where the design features fail (presumably this means the cut-off wall). |
| **4.2 Sustainability Committee Input** | | | | |
| 20 | General Comment | The Sustainability Committee did not receive the final conceptual designs for the mitigation plans (and hence the full understanding of potential impacts of Fort Hill Project) including the change in the length and location of the cut-off wall and the drainage from the North Dump, one of the wetlands and other reclaimed areas to the MLWC after closure, until the committee members received the Management Response (Section 5) of the Operational Plan. Also no final decisions on the sources of water to replenish water to the MLWC through the operations and closure periods have been made yet, so the full effects of the design features cannot yet be assessed. | **Co-Chairs** | We look forward to the feedback on the review of the OP as a whole document and hope it will show how the sections fit together. Many aspects of the final mitigation designs will be developed in subsequent years, including the water resupply system. The OP outlines potential for water treatment depending on the potential sources identified as well as confirms the commitment to sustain the MLWC through operations and closure. |
| 21 | General Comment | Add a section in the text on the changes that were made to the "conceptual model" and to the "integrated flow model" due to input from the Sustainability Committee. | **Co-Chairs** | Accepted and revised. |
| 22 | General Comment | This section is very short, but cites a long appendix where the reader is to somehow envision the conceptual model. The appendix is not cited properly, and there is no summary of the processes or synthesis to allow the reader to assess, quickly and easily, the "interconnectedness" of the system with the surroundings. | **TAG - Hydrology** | A summary of the conceptual model is now provided in Section 4.3.1. |
| 23 | TAG Input | TAG provided the first draft for a summary conceptual model over a year ago. We expected some progressive iterations of this and reporting of the final synthesized model. A version would have been needed to direct the numerical modelling and to allow TAG to assess the appropriateness of the numerical modelling approaches and interpretations for mitigation provided in Objectives 2 and 4.<br><br>Provide a summary of dominant flow paths and connectivity of the fen and lake to each other and the surrounding landscape. | **TAG - Hydrology** | A summary of dominant flow paths and connectivity has been added as a part of conceptual model synthesis in appendix. All of the needed information is already in the conceptual model, it just needs to be summarized in one location. |

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| 24 | 4-1 | The first sentence is repetitive, please delete. | **FCMA_FMMN** | Fort Hills respectfully disagrees with this recommendation. |
| 25 | AAG Input | Given that Objective 1 is still under revision to better integrate IK it will be important to be able to link the Objective 1 baseline information with Objective 3 with respect to baseline and other IK that has been shared and documented. See also comments and recommendations with respect to the Conceptual Model Appendix.<br>**See detailed comments (2018 Operational plan P. 34)* | **FCMA_FMMN** | Agreed. Objective 1 has been revised to better integrate ITK and links to Objective 3. |
| 26 | AAG Input<br>Appendix: pages 17 – 23 | With respect to the Conceptual Model Appendix: pages 17 – 23 is well done and should set the example for the rest of this appendix (e.g. geology, topography, etc.). The integration of IK and its use in informing the discussion on pages 17-23 should serve as a model for the entirety of the plan with respect to integration and demonstration of how IK informed the content. | **FCMA_FMMN** | Thanks |
| 27 | AAG Input | Page 4 the map labels the main rivers encircling the MLWC, but Moose Creek, which connects with Firebag, is not labelled north of Muskeg River. Elder has provided knowledge regarding Moose Creek and it should therefore be labelled on the map. | **FCMA_FMMN** | The figure will be updated in the plain language summary |
| 28 | AAG Input | With respect to the HGS Model Appendix: as stated in the Plain Language Summary, **IK still needs to be integrated into the content of the appendix. It is recommended, as noted above, that the example provided on pages 17 – 23 be used as a guide.** | **FCMA_FMMN** | Most of the direct IK integration is found in the conceptual model appendix and this conceptual understanding is the basis for the HGS Model. Future model refinement will include comparing trends and behaviors in the model results against comparable trends or behaviors observed by knowledge holders. FHEC suggests that this be part of an AAG workplan in the coming months/years. |
| 29 | TAG Input | "The MLWC TAG and the MLWC SC also helped guide the development of the integrated flow model through feedback during updates on modelling progress." And they also indicated that wildlife is not part of the OP. We all understand that water is foundational for ecosystem function and diversity; however, the causal arrow between water and ecosystem function can point in both directions. The TAG and the SC have pointed this out.<br><br>The OP must include a discussion on how and when Suncor intends to assess and monitor wildlife in the non-mined portion of the fen. Furthermore, the OP should clarify how Suncor intends to inform the SC of wildlife monitoring and impact assessment results. | **TAG - WIldlife** | See the response to item #2. As stated in recent SC meetings and within the OP, wildlife is monitored under the Fort Hills WMMP, which the TAG has contributed to, and reviewed. Additionally, Fort Hills is committed to a 2022 workshop on wildlife to allow the TAG to be further involved in the wildlife monitoring going forward. |
| **4.3 Assessment Methodology** | | | | |
| 30 | 4-2 | The results from this objective (3) are quoted to be used for Objective 6. However, given that this information came long after Objective 6 was presented, please clarify whether the current information presented in Objective 3 was used, or whether some adjustments are required to finalize objective 6!<br><br>Re-evaluate other objectives considering this updated Objective 3 (once revised). | **TAG - Hydrology** | See response to item #7 |
| 31 | 4-2 | "which is considered the lowest risk to the functionality and diversity of the MLWC."<br>The risks to functionality and diversity were not fully assessed.<br>The assessment of impacts to wildlife should also include a risk assessment. | **TAG - Wildlife** | See responses to items #2 and #29 |
| 32 | 4-2 to 4-4 | Reference to the results of the modeling should specifically say 'to hydrology and water quality' as the design features have not taken into account other components of functionality or biodiversity, nor have they been assessed.<br><br>*The risk assessment uses the results of the R0 and R1 model runs as "endpoints" to evaluate whether the design features are effective in minimizing or eliminating effects to* ***the hydrology or water quality of*** *the non-mined portion of the MLWC.* | **FCMA_FMMN** | Text has been updated - added in hydrogeology as well as hydrology and water quality |
| 33 | 4-2 | Table 4.3-1 (Risk Assessment Summary Example) seems overly simplistic. Should the S1 case not be a yes/no as opposed to assuming it will be a 'yes'? Certainly, under Objective 6 there is an understanding that an indicator may trend above a Level 1 trigger value and this may even occur prior to the finalization of the construction phase. As commented on in Objective 4 and 6 a 'no' scenario in this table would necessitate adaptive monitoring and management to occur. As well, in the logical sequence of risk assessment, the assessment should be completed BEFORE the design is completed to inform the design. In this case it seems as if the risk assessment has been completed to stand up the mitigation (i.e. design features). | **FCMA_FMMN** | Table 4.3-1 is meant to be an example of how the Risk Assessment Summary tables will look in the relevant technical subsections - it was not meant to represent a risk assessment of a particular metric. The text in the table has been modified to state "aaa", "bbb", "ccc" to eliminate the use of "X", "Y", "Z" to help avoid confusion. |
| 34 | 4-2 | The last paragraph is repetitive, please delete. | **FCMA_FMMN** | Agreed - relic from formatting that Fort Hills appreciates being pointed out. |

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| SC Recommendations for the MLWC Operational Plan (OP) – Objective 3 | | | | |
|---|---|---|---|---|
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| 35 | 4-2 | "*The assessment completed for Objective 3 focuses on determining the risk to the non-mined portion of the MLWC* ***following implementation*** *of the design features*<br><br>Design features are assumed to be engineered mitigations (i.e. wall, ditches, pumps, wells water treatment systems etc. ). Members of the SC, TAG and AAG have raised concerns related to the potential significant and adverse impacts to a range of wetland values during the construction of engineering design features presented in the OP.<br><br>Have the effects from the construction of the ditches, cut-off wall been included in the effects in the Operations phase?<br><br>If this information is not going to be included in the OP, please indicate when the Impact Assessment for during construction phase for the other wetland values was completed, and cite these assessment so that relevant information can be referenced in Objectives 2, 4, 5, 6. | **Co Chairs** | See the response to item #14. |
| 36 | 4-2 | Table 4.3-1 suggest using "yes or no" in the last column linked to result Z. | **Co-Chairs** | See the response to #33 |
| 37 | 4-2 | Describe the methods employed for the "qualitative risk assessment" for aquatic resources and vegetation.<br><br>How are risks assessed for wildlife? Risks to people (Access, harvesting, culture etc.?) | **Co-Charis** | Additional text has been added to Section 4.3 - "Qualitative assessments described potential effects to the indicator based on assessment results of relevant key stressors (e.g., no substantial change in water levels or water quality)".<br>In addition, see responses to items #2 and #29. |
| 38 | 4-3<br>Figure 4.3-1 | Figure 4.3-1 does not correspond to Objective 6 and should be amended to reflect the Trigger Levels discussed in that Objective. Namely:<br>1. The MRV arrow should correspond to Low (not go into high)<br>2. An arrow to Level 2 should be illustrated and identified as 'regional range'<br>3. Level 3/R1 should also be identified as System Limit | **FCMA_FMMN** | Figure 4.3-1 has been updated |
| 39 | 4-3<br>Figure 4.3-1 | This figure is confusing due to the addition of the 3 levels of triggers.<br><br>The intent of the triggers and levels of mitigation/management responses is to keep effects within the Measured Range of Variation (MRV) for each indicator, so on the top half of the figure there should be no residual risk extending past the highest MRV.<br><br>On the bottom half of the figure, all the types of mitigation/management responses should be listed. | **Co-Chairs** | The Level 1 trigger is meant to be an early warning (confirmation of effects; investigation of cause) and for most disciplines a Level 1 trigger occurs if a value goes outside the MLWC MRV. Figure has been updated.<br><br>Management responses/mitigation are described in detail in Obj 4 and 6 - at this time Fort Hills is not planning to add this information to Figure 4.3-1. |
| 40 | 4-4 | The 2020 MLWC HGS Model was run for the pre-mining baseline, operations, active closure and far future (post closure to assess effects of climate change). There is no mention of changes to the watershed from construction activities. | **Co-Chairs** | Refining the modelling assessment by introducing the construction period, is not expected to change our assessment conclusions, because our mitigation plan also covers the construction period and the completed modelling assessment already covered the worst case scenario of instantaneous and complete cutoff. |
| 41 | 4-5 | The linkages to vegetation and wildlife are not discussed here, although the linkage to the vegetation assessment is later qualitatively discussed in Sec. 4.3.2.5.<br>The assessment of impacts to wildlife should include a discussion of the various linkages between ecosystem components. | **TAG - Wildlife** | See responses to items # 2 and #29. |
| 42 | 4-5 | Please amend the last paragraph to read focused on the integrated primary effects indicator metrics selected by Suncor within Objective 2. As noted in comments in Objective2 and 5, the SC provided a list of Early Warning Integrated Indicators, though based on the selection criteria developed by Suncor they were not included as the primary indicators. | **FCMA_FMMN** | First sentence in this paragraph has been updated to reflect "by Suncor", as requested. |
| 43 | | For those indicators that were not modeled, the qualitative risk assessment should be comparing the metrics to baseline (MRV)? If so, this should be acknowledged and if not, a discussion as to why this would not be the case is warranted. | **FCMA_FMMN** | For the indicators where a qualititative risk assessment were completed, the focus was on providing an overview of the types of impacts that could be expected if impacts were seen with the primary effects indicators. |
| 44 | | This section should include how the results of the numerical modeling and subsequent risk assessment will be validated, including by Indigenous knowledge. Though validation is spoken to in the HGS model (page 122), it does not speak to the value added by comparing outputs to shared IK to either (1) confirm modeling results to IK provided for the baseline scenario or (2) identify disparities that may require further work to be completed. | **FCMA_FMMN** | FHEC would be happy to work with the SC in future to validate the modelling work with IK. |
| **4.3.1 Description of Models Used** | | | | |
| 45 | 4-4 | Have the effects from the construction of the ditches, cut-off wall been included in the effects b into the Operations phase? The 2020 MLWC HGS Model was run for the pre-mining baseline, operations, active closure and far future (post closure to assess effects of climate change). There is no mention of changes to the watershed from construction activities. | **Co-Chairs** | See the response to item #14. |

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| 46 | 4-4 | A summary conceptual model, with a holistic view of the interconnectivity of adjacent landscape and the fen-lake complex should be provided in the first step of model description. Then a description of illustration of how the numerical model (HGS) is used in this context can follow. This should be shown along the description in section 4.3.2.1 and linkage assessments. | **TAG - Hydrology** | Succinct explanations of how the overall system works together are provided in the plain language summary and conceptual model appendix. A summary of the conceptual model is now provided in Section 4.3.1. |
| 47 | General comment | The term ”hydrogeology and surface water assessments” is used throughout. It should be clarified whether this is based on the conceptual model, numerical model, or both. | **TAG - Hydrology** | The final paragraph in Section 4.3 indicates that the quantitative risk assessment is based on the numerical integrated surface water and groundwater flow model and the EFDC surface water quality model. |
| 48 | 4-5 | Section 4.3.2.1.1 (Linkage Assessment): all the information should be clearly referred to on the conceptual model and map of the locations. | **TAG - Hydrology** | Fort Hills believes that this information is provided in numerous locations in the document already. With the full document available, this should help eliminate the need for the requested changes. |
| 49 | General comment | Table 4.3-2, and elsewhere. The order of the wells is alphabetical, which is essentially random. Group into eco-hydrologic units and provide descriptive labels so the reader can follow the interpretation. | **TAG - Hydrology** | Tables 4.3-2, 4.3-3, 4.3-4 and 4.3-5 have been updated to group the wells in EHZ. |
| 50 | General comment | Well names: Throughout, the name should make it clear whether this refers to a well or a piezometer, and what the average depth of the screen is for piezometers. This is required to interpret the effectiveness of the measurement in indicating surface and or groundwater. | **TAG - Hydrology** | Tables 4.3-2, 4.3-3, 4.3-4 and 4.3-5 have been updated to cleary delineate between wells and piezometers, as well as the average depth of the screen. |
| 51 | Page 4-5 | Figure 3-1 is cited; TAG assumes this is Figure 4.3-1 | **TAG - Hydrology** | Correct - this has been updated in the text. |
| 52 | Page 4-8 | Simulated pre-mining baseline. It is extremely difficult to follow this section and assess the approach and interpretation of the findings. | **TAG - Hydrology** | Fort Hills would like to further understand this comment, as it is not clear where the confusion is coming from. |
| 53 | Page 4-23 | Climate change. There are several typos in this section, please correct.<br>**Finish editing and updating the draft report** | **TAG - Hydrology** | This section has been updated and typos have been corrected. |
| 54 | Page 4-24 | Figure 4.3-6. Are the lines for min and max to designated ground surface? Please define. | **TAG - Hydrology** | The dashed lines indicate the minimum and maximum simulated water level using historical climate condition as input. |
| 55 | Page 4-25. | “.. risk assessment is elevation.” Clearly define what elevation, and what measurement properties or statistical summaries were or would be used. | **TAG - Hydrology** | Paragraph has been updated to clarify that the metric used is the change in elevation of groundwater levels. |
| 56 | General | App ***, Append *** appendix ***, section *** should not be presented in a draft to TAG. This objective relies on these citations, thus this objective is not finished.<br>Provide complete references to appended material. | **TAG - Hydrology** | These references have been updated. |
| 57 | General | Provide a synthesis of the Conceptual Model. | **TAG - Hydrology** | See the response to item #46 |
| 58 | General | Provide details on the Water Quality modelling | **TAG - Hydrology** | This will be provided as per the schedule provided in the October 7th SC meeting. |
| 59 | 4-4 to 4-5 | It is imperative that a construction scenario be separate from operation and be its own assessment scenario. This scenario should further be broken down by implementation of design features (pumping wells, platform, wall) through construction sequencing. | **FCMA_FMMN** | See the response to item #14. |
| 60 | 4-4 to 4-5 | The EFDC Surface Water Quality Model was not completed and not part of Objective 3 at the time of this review. Furthermore, groundwater quality was not assessed. As the triggers in Objectives 6 have linkages and conditional triggering based on both quality and quantity both groundwater and surface water quality assessment outcomes need to be reviewed to understand the management response proposed in Objective 6. Both need to be completed and reviewed prior to finalizing the plan. | **FCMA_FMMN** | This will be provided as per the schedule provided in the October 7th SC meeting. |
| 61 | 4-4 to 4-5 | The discussion on Prediction Confidence (4.3.1.1) requires more information. Namely, what was the confidence rating for each of the factors considered (i.e. high, medium, low) and what was that confidence rating based on. Please provide this information before finalizing the Plan. | **FCMA_FMMN** | The prediction confidence discussion in Objective 3 is meant to be focused on confidence in the numerical models, and also the uncertainty around the effects of climate change. This section will be further addressed once the water quality results are available. |
| **4.3.2 Assessment Results** | | | | |
| **4.3.2.1 Hydrogeology and Surface Water Hydrology** | | | | |
| 62 | 4-5 | Key aspects (e.g., changes in peat properties, changes in seasonality of flows) of the system need to be considered | **TAG - Hydrology** | The assessment is focused on the metrics that have been selected in association with the selected indicators and the primary effects related to the water management design features. Other key aspects would be part of future modelling activities (such as during future work on the water management design features) as well as included within the monitoring associated with the OP. |
| 63 | 4-5 | As recommended above, representative assessment periods should include a period specific to construction. If this is not included a discussion should be provided as to why this critical time is not examined to inform monitoring (Objective 5) and the management response (Objective 6) as this would seem to be an early warning time for all indicators (primary, complimentary, ESCT and site-wide). | **FCMA_FMMN** | See the response to item #14, though it should be noted that the early warning monitoring locations as specificed in Objective 5 will likely be utilized as a part of the construction monitoring carried out. |
| 64 | 4-5 | Please define ‘pre-mining conditions’ as it has been defined by MRV and simulated (i.e. in the conceptual model). This should also be differentiated with the use of ‘baseline’ both measured/observed and modeled/simulated as these terms are being used synonymously in some cases though they are different and used differently in the various Objectives. | **FCMA_FMMN** | The terminology within Objective 3 has been updated to clarify when there is reference to the observed versus simulated baselines. |
| 65 | 4-5 to 4-6 | Should the reference to the figure in the first sentence be 4.3-2? Please correct. | **FCMA_FMMN** | The reference should be to Figure 4.3-2 - this has been updated. |

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| 66 | 4-5 to 4-6 | With respect to the second paragraph, the second sentence should read 'these wetlands' or 'constructed closure wetlands' for clarity.<br>The second paragraph reads:<br><br>*The changes in wetlands will result in an increase in evaporative losses and provide storage to attenuate runoff and may impact the surface water and local groundwater flow patterns within the watershed. The cutoff wall will be removed over most of its length during closure, with the exception of the northwest portion, which will alter groundwater flow conditions, allowing flow between the non-mined portion of the fen and the reclaimed mined area during the far-future case.*<br>There is no clear linkage to Objective 5 (monitoring) and this should be reconciled. As well, these changes should be referenced in relation to changes in the closure landscape and deviation from the pre-mining or pre-development condition, particularly because it may have causal effects to use of the closure landscape. | **FCMA_FMMN** | The second sentence has been updated to read "The addition of constructed wetlands…". For the second part of the question, this paragraph is focused on identifying the potential linkages to impacts to groundwater due to the project - it is just meant to show that there are linkages that exist during the closure phase that could impact groundwater. |
| 68 | 4-6 to 4-16 | As mentioned above, this is the first and only Objective that moves from a pre-mining baseline defined by MRV to a simulated calculation. A brief discussion is provided along with a comparison table (Table 4.3-2) with graphs provided in Figure 4.3-1). It would be helpful to provide a sentence or two on the calibration methods to explain the 'generally comparable', 'generally higher' results (e.g. dependent on data sets selected) so that the reader does not have to read the Appendix to understand the results. This would be helpful especially because of the small scall provided in the figure – it seems that there is more discrepancy (e.g. no overlap between observed and simulated). | **FCMA_FMMN** | The text has been edited to remove "generally comparable" and includes the R2 value from the Aquanty work, and references the Numerical Model Appendix. |
| 69 | 4-6 to 4-16 | With respect to the forecast scenarios, it is recommended that the same language and description be given to the R0, R1 and S1 forecast scenarios. For example, the description on page 4-8 should be the same as that on page 4-1. | | This has been updated to use consistent terminology when scenarios are discussed in Objective 3. |
| 70 | 4-6 to 4-16 | There should be consistent language when referring to the unmined portion of the fen as is articulated in the 2018 proposal – to 'protect' the unmined portion of the fen. Similarly, when referring to the water balance the word 'maintain' should be used. Please make these global changes not only in this section but throughout the plan as previously recommended. | **FCMA_FMMN** | The verb protect is used when referring to the design features and their purpose, which is to protect the non-mined portion of the MLWC. Fort Hills is required to maintain ecosystem diversity and function of the non-mined portion of the MLWC and is used in this context throughout the OP. |
| 71 | 4-6 to 4-16 | As mentioned above, a construction time period should be included (2022 to 2042) – from the construction of the sedimentation pond starting in 2022, through to construction of the working platform that will cut off water supply in 2034 to completion of the wall in 2037 and finally installation of the pumping wells in 2042) – this should be in-line with Figure 5.8-1 in Objective 4 (the estimated schedule for construction/operation of design components). It should be consistent with the dedicated 'active closure period' so that effects from construction and deconstruction can be assessed. | **FCMA_FMMN** | See the response to item #14. |
| 72 | 4-6 to 4-16 | The R0 case should also be presented and not merely referred to in the R1 case with reference to see the Appendix. Given the importance to Indigenous communities the R0 case should be provided | **FCMA_FMMN** | The R0 runs during operations and closure would be identical to the Baseline R0 results because we use the same historical climate in all 3 time periods, so the R0 results are presented in Objective 1. |
| 73 | 4-6 to 4-16 | As natural variation was not derived, assuming observed ranges (current case) is being used to represent natural variation, the term as recommended for other Objectives must be characterized as MRV to be consistent with the language used in other Objectives. If this is something different then it should be identified and discussed. | **FCMA_FMMN** | This has been updated throughout Objective 3 to use consistent terminology with other objectives - i.e., "measured" instead of "observed" |
| 74 | 4-6 to 4-16 | As recommended above, baseline (observed/measured vs simulated) should be discussed within the context of MRV because the management response speaks to only MRV as the Level 1 – this is particularly true on page 4-13 in the discussion of predicted impacts where results are compared to a 'pre-mining baseline'. | **FCMA_FMMN** | See the response to item #64 |
| 75 | | The footnote for **Tables 4.3-7 and 4.3-8** reads:<br>*Pre-mining baseline results are from the HGS simulation rather than Objective 1*<br><br>This should be explained as these tables provide the outputs for each of the scenarios and conclusions. Namely:<br>*The predicted effect of mining, with water management design features, on the net groundwater discharge to the MLWC for the operational, closure, and far future scenarios is shown in Table 4.3-6 to Table 4.3-8. Groundwater discharge to the fen is simulated to remain relatively unchanged (i.e., less than 5 millimetres per year [mm/year] of difference) for the operational, closure, and far-future cases. The simulation results indicate an increase of groundwater discharge to the lake for the operational, active closure and far-future cases by 42 mm/year, 1 mm/year and 27 mm/year, respectively, compared to the pre-mining baseline case (Table 4.3-6 to Table 4.3-8).*<br><br>Are the modeled baseline results different if those identified in Objective 1 and how would they change the conclusions if used? | **FCMA_FMMN** | The observed data was compiled in Objective 1. This data was used to calibrate the numerical model which was used to create the simulated baseline data set and to assess the impact of the operational, closure, and far-future scenarios.<br><br>As we used the data compiled in Objective 1 to calibrate the numerical model and assess the impact, there would be no change to the conclusions. |
| 76 | | With respect to the hydrogeology assessment summary:<br>1. All cases should be discussed, including R0 (no development in the watershed scenario);<br>2. The results should include how this relates to the MRV and hence Objective 6; and<br>The assessment must include the construction period as a stand alone assessment case – it is extremely concerning that changes to groundwater hydrology was assessed WHEN THE DESIGN FEATURES ARE INSTALLED AND OPERATIONAL – this assumes that construction will not have any effects additional to an assumed fully functional design in place | **FCMA_FMMN** | 1. The risk assessment is focused on changes from R0, and as such, the summary is focused on the results from the S1 scenario.<br>2. See the response to items #14 and #63. |

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| 77 | 4-14 to 4-25 | Why was the Design Feature scenario for changes in the McClelland Lake water levels not modelled?<br><br>Please model this R1 scenario for comparison of effects to baseline, and to the operations and closure phases with design features. | **Co-Chairs** | The Design Features were modelled within the S1 scenario.<br>The R1 scenario was modelled for operation, but was not carried forward through active closure and into the far future, based on the impacts to hydrology that occurred during the operation period. |
| 78 | 4-16 to 4-17 | Assessment Cases and Simulation Scenarios – Surface water Hydrology<br>Recommendations for this section consistent with those in the hydrogeology section include:<br>1. Need for a stand-alone construction period assessment;<br>2. Use of the word 'protect' when referring to the unmined portion of the fen (i.e. not sustain or maintain); and<br>3. Use of MRV when discussing predictions and results. | **FCMA_FMMN** | 1. See response to #14<br>2. See response to #70<br>3. The MRV is used to define the Trigger levels (as discussed in Objective 6). |
| 79 | | Does the far-future period include leaving the NW portion of the wall in place? Please add to this section whether or not it includes the wall remaining in place. It would also be useful to assess the scenario in which the wall was entirely removed (e.g. no active or passive management required). | **FCMA_FMMN** | Yes, the NW section of the cutoff wall is still in place in the Far Future scenario. Please see response to item 17. Earlier test simulations did remove the wall entirely during the closure scenarios (which is how the model determined the NW section needs to stay using the current closure plan). Similar scenarios may be run during future engineering work. |
| 80 | 4-16 | The first sentence in the first paragraph on page 4-16 should also reference "active closure (2063 to 2075)" to be consistent with the rest of the information in this section. | **Co-Chairs** | The text has been updated to reflect this change. |
| 81 | 4-17 | At the end of the 2nd sentence**,** under Mining Without Water Management Design features it is unclear what, "two times" means. | **Co-Chairs** | This sentence has been updated to attempt to be clearer. Basically, the 25 year data series was used twice to represent the 50 years of climate data. |
| 82 | | The discussion on the R1 scenario should include, as the hydrogeology section does, the results of this scenario. Just saying it was substantial is not sufficient. | **FCMA_FMMN** | See the response to Item #77 |
| 83 | 4-20 | The discussion on Water Balance (page 4-20) states [emphasis added]:<br>*As shown in Figure 4.3-5, precipitation and surface water are the primary input to the non-mined portion of the fen and the McClelland Lake. Evaporation and evapotranspiration also play important roles in the water balance of the MLWC.* ***Contribution from local groundwater (i.e., inflow and outflow) are not significant*** .<br>However, the discussion on the Linkage Assessment on page 4-5 reads:<br>*As discussed in Section 5, the two main design features that will be used as mitigation are a cutoff wall and a surface water resupply system. These two features will serve to prevent groundwater from moving into or out of the MLWC and the mine pit, and supplying surface water to the MLWC that would have instead come from the mined portion of the MLWC…. The cutoff wall will be removed over most of its length during closure, with the exception of the northwest portion, which will alter* ***groundwater flow conditions, allowing flow between the non-mined portion of the fen and the reclaimed mined area*** *during the far-future case*<br><br>Additional clarity is required here as there seems to be two conflicting positions – either local ground water flow is insignificant to the water balance or it is significant hence the need to retain part of the wall. | **FCMA_FMMN** | Fort Hills does not believe that these statements are conflicting. The first statement indicates that contribution from local groundwater is not significant, while the second statement says that at closure, the cutoff wall will be removed, which is expected to alter groundwater flow conditions. |
| 84 | 4-25 | Under Summary of Risk Assessment (page 4-25) the wording should be amended to say 'without' as the reference is to impact of the assessed R1 scenario. | **FCMA_FMMN** | The first paragraph is in reference to the R1 scenario; however, the 2nd and 3rd paragraphs are in reference to the S1 scenario, and therefore, "with" is correct. The 2nd and 3rd paragraphs have been updated to clarify the reference to the S1 scenario. |
| 85 | 4-25 | Similarly in the first paragraph under 4.3.2.1.4 the reference to the S1 scenario is not 'operation and closure periods' it is 'with design features'. However, this discussion references Table 4.3-3 which doesn't show the scenarios (RO, R1, S1 but the periods – baseline, operations and closure) so there seems to be a disconnect with the what is being described. This holds true for the explanation of the surface water hydrology and reference to Table 4.3-9. This Objective may need to set out the different scenarios, periods, cases and ranges at the beginning to add clarity in the understanding of Objective 3 as well as how it links to the language used in the other Objectives. | **FCMA_FMMN** | Section 4.3.2.1.4 has been updated to clearly identify the scenarios that are being discussed. If additional clarity is required, Fort Hills would be happy to discuss. |
| 86 | 4-25 | What is the area of the non-mined MLWC that is affected by the drop in water level of 1 m nearest to the mine during 2047 and what is the potential duration of the effect, as this could lead to changes in vegetation as discussed in section 4.3.2.5. | **Co-Chairs** | The reference to the 1 m drop in water level in the area nearest to the mine in 2047 is related to the R1 scenario, which is Mining without Water Management Design Features. The text had an error, as it said "with" instead of "without" - this has been updated. As this scenario is not going to occur, no additional changes have been made. |
| 87 | 4-25 to 4-26 | Tables 4.3-11 through 4.3-13 as well as the paragraphs that proceeds them should provide the Trigger 1 and 3 values as opposed to saying it is below or in excess of. | **FCMA_FMMN** | Trigger values are provided in Objective 6, and are typically not a single number, but instead a range based on standard deviations and trends observed. To avoid duplication, Fort Hills would prefer not to present the same info from Objective 6 in Objective 3. |
| 88 | 4-25 to 4-26 | The risk assessments for changes in the hydrogeology and hydrology are stated as low risk, but this does not seem to take into account the uncertainty of the data and the focus of the assessment on the annual changes in water levels. **More effects due to changes in water levels would be reflected in monthly or weekly changes in levels which are always more extreme and more volatile than annual means.** | **Co-Chairs** | This information has been considered and reflected in Objective 6. |
| 89 | 4-26 | Table 4.3-13 Error. Should be labelled **McClelland Lake levels** not Wetland Primary Effect level. | **Co-Chairs** | The table is labeled correctly - the text below the table incorrectly refers to McClelland Lake, and has been updated to refer to the non-mined portion of the fen. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 3 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| **4.3.2.2 Surface Water Quality - Wetland** | | | | |
| 90 | General Comment | **NOT PROVIDED ON SEPTEMBER 20, 2021** | | Water quality modelling will be provided as per the schedule given to the SC at the Oct 7th meeting. |
| 91 | General Comment | It is difficult to not see this Objective in its entirety to be reviewed within the same sitting/time frame. Revisions to the other sections of this review should be done before another draft is provided to help provide insight as to how to approach the development of this section. | **FCMA_FMMN** | FHEC acknowledges the difficulty in reviewing the objectives out of sequence and has agreed to provide another round of review of the complete OP document by the SC and the TAG. |
| 4.3.2.3 Surface Water Quality – McClelland Lake | | | | |
| 92 | General Comment | **NOT PROVIDED ON SEPTEMBER 20, 2021** | | Water quality modelling will be provided as per the schedule given to the SC at the Oct 7th meeting. |
| 93 | General Comment | It is difficult to not see this Objective in its entirety to be reviewed within the same sitting/time frame. Revisions to the other sections of this review should be done before another draft is provided to help provide insight as to how to approach the development of this section. | **FCMA_FMMN** | See response to item #91 |
| **4.3.2.4 Aquatic Resources - Lake** | | | | |
| 94 | 4-27 | This section is confusing to review. The first paragraph outlines all the potential effects that could occur to the aquatic biota of McClelland Lake including changes to macrophytes, phytoplankton, periphyton, benthic invertebrates, zooplankton and fish due to changes in water levels and quality, however, the only indicator being measured in the lake is chlorophyll a, so none of these potential effects could be documented.<br>Please explain how changes in chlorophyll a are being measured, and how these act as a surrogate to represent changes to the other aquatic resources that could result from either change in water level or water quality in the lake. For example many potential changes in types and populations of benthic invertebrates due to change in water level and quality would not be represented by changes in chlorophyll a.<br><br>Area changes in aquatic vegetation along the shoreline of the lake due to water levels (increases or decreases) alterations beyond those predicted by modelling would not be captured as there are no plots for vegetation in the littoral zone. | **Co-Chairs** | Please see responses to Objective 2 comment #11, Objective 5 comment #70, and Objective 6 comment #39 regarding chlorophyll a.<br><br>Please see response to Objective 5 comment #3 regarding inclusion of shoreline vegetation. |
| 95 | 4-27 | When discussing the changes in the lake levels during operations and into the far future, add the measured range of variation for the lake for comparison. | **Co-Chairs** | See the response to item #78. |
| 96 | 4-27 | The modelled change in water levels with full mitigation are very low (decreases during operations of 0.5 to 0.9 cm and after mine closure 0.5 to 2.3 cm). However, these are modelled with mitigation.<br><br>This section should also list the potential maximum effects is mitigation is unsuccessful and not just the effects if mitigation is fully effective. This also applies to the vegetation section. | **Co-Chairs** | At this time, Fort Hills only modelled a scenario where no mitigation is applied, and a scenario where mitigation is applied and is functioning as designed. If mitigation is unsuccessful, it is assumed that results would move towards the R1 scenario. |
| 97 | General Comment | The introduction to lakes is very simplistic even for lakes in general. This indicates the writer has a lack of understanding of the variability in lake processes and boreal plains lakes in general. | **TAG - Hydrology** | Objective 1 provides specific information on McClelland Lake, while the information in Objective 3 is intended to be more general. |
| 98 | General Comment | The variability in water depth and area of sediment exposed over a season can be significant. This is an important consideration in short-term and long-term sediment storage and surface water nutrient concentrations, trophic interaction, and the like. But this is not considered. | **TAG - Hydrology** | Fort Hills recognizes that the suggestion is valid; however, would like to have further discussions with the TAG the SC prior to additional work being completed on this item, particularly as it pertains to reference sites. FHEC hopes to be able to table it at the workshops planned for 2022. |
| 99 | General Comment | General terms such as “an ion” are not acceptable. Be specific and demonstrate an understanding of the processes acting within the system. | **TAG - Hydrology** | Fort Hills believes the information provided is sufficient. |
| 100 | General Comment | **NO WATER QUALTIY RESULTS PROVIDED ON SEPTEMBER 20, 2021** | | Water quality modelling will be provided as per the schedule given to the SC at the Oct 7th meeting. |
| 101 | General Comment | Please provide this section in its entirety before review. Comments and recommendations at this time will be held until the entire section is provided. | **FCMA_FMMN** | Water quality modelling will be provided as per the schedule given to the SC at the Oct 7th meeting. |
| **4.3.2.5 Vegetation** | | | | |
| 102 | 4-27-4.32 | A simple, linear, positive feedback between climate drying and vegetation succession is assumed throughout. The multitude of positive, and importantly negative feedbacks between water balance – storage relationships, hydroperiod, peat properties and vegetation are not considered<br><br>Further evaluation of feedback mechanisms is required. | **TAG - Hydrology** | Fort Hills recognizes that the suggestion is valid; however, would like to have further discussions with the TAG the SC prior to additional work being completed on this item, particularly as it pertains to reference sites. FHEC hopes to be able to table it at the workshops planned for 2022. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 3 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 103 | Apr-28 | The vegetation assessment points to linkages between vegetation and surface water hydrology and surface water quality, respectively. In a wildlife assessment such links should be extended to wildlife ecology. A wildlife ecologist needs to know about the changes in both water and vegetation parameters. Unfortunately, this vegetation assessment is only a qualitative assessment based on a literature review. It would be preferable to show measurements or quantitative model predictions to allow for a quantitative assessment of wildlife habitat changes.<br>Suncor should assess the impacts to wildlife in a quantitative fashion, predicting the amount of habitat change. Data to allow for such an assessment already exist. | **TAG - Wildlife** | See the response to items #2 and #29. |
| 104 | 4-27 to 4-32 | This section, as presented, reads like a literature review and not a (qualitative) impact assessment. Each of the assessment scenarios R0, R1 and S1 should be discussed with linkages to both hydrology and water quality (it is noted that the summary is not complete as the water quality assessment has yet to be completed). Additionally, a discussion about baseline, construction, operations, active closure, reclamation and far future should be included. Please revise and update this section. | **FCMA_FMMN** | The approach for the indicators that are not being modelled is to present information on the potential impacts that could occur if impacts are seen in the primary effects indicators - such as hydrology, hydrogeology and water quality. The information provided in this section will help inform what effects could be seen if mitigation is not effective. |
| 105 | 4-32 | Although the heading alludes to a risk assessment, I fail to see where risks are concretely being addressed. A wildlife ecologist needs to understand the risk to vegetation in order to assess risks to wildlife<br>Suncor should develop a quantitative risk assessment for vegetation in order to allow for a wildlife assessment to be done. | **TAG - Wildlife** | See response to items #2 and #29. |
| 106 | 4-27 to 4-32 | Page number [4-25] REPEAT FROM SECTION 4.3.2.1.3 AS THIS COULD AFFECT VEGETATION<br>What is the area of the non-mined MLWC that is affected by the drop in water level of 1 m nearest to the mine during 2047 and what is the potential duration of the effect, as this could lead to changes in vegetation as discussed in section 4.3.2.5. | **Co-Chairs** | See response to item #86 |
| 107 | 4-27 to 4-32 | The modelled change in water levels with full mitigation are very low (decreases during operations of 0.5 to 0.9 cm and after mine closure of 0.5 to 2.3 cm). However, these are modelled with mitigation.<br><br>This section should also list the potential maximum effects is mitigation is unsuccessful and not just the effects if mitigation is fully effective. This also applies to the aquatic resources section. | **Co-Chairs** | See the response to item #96 |
| 108 | 4-27 to 4-32 | Area changes in aquatic vegetation along the shoreline of the lake due to water levels alterations beyond those predicted by modelling would not be captured as there are no plots for vegetation in the littoral zone. | **Co-Chairs** | Please see response to Objective 5 comment #3 regarding inclusion of shoreline vegetation. |
| 109 | 4-29 to 4-30 | Add a section on potential effects on aquatic vegetation due to potential changes in lake levels in Surface Water Hydrology (pgs. 4-29 to 4-30). | **Co-Chairs** | Fort Hills recognizes that the suggestion is valid; however, would like to have further discussions with the TAG the SC prior to additional work being completed on this item, particularly as it pertains to reference sites. FHEC hopes to be able to table it at the workshops planned for 2022. |
| 110 | 4-32 | Add a section on potential effects on aquatic vegetation due to potential changes in lake levels and water quality. | **Co-Chairs** | Fort Hills recognizes that the suggestion is valid; however, would like to have further discussions with the TAG the SC prior to additional work being completed on this item, particularly as it pertains to reference sites. FHEC hopes to be able to table it at the workshops planned for 2022. |
| **Appendix** | | | | |
| 111 | IK Integration: Conceptual Model Appendix: pages 17 – 23 | With respect to the Conceptual Model Appendix: pages 17 – 23 is well done and should set the example for the rest of this appendix (e.g. geology, topography, etc.). The integration of IK and its use in informing the discussion on pages 17-23 should serve as a model for the entirety of the plan with respect to integration and demonstration of how IK informed the content. | **FCMA/FMMN** | Thanks |
| 112 | Page 18 | The sentence "Indigenous Knowledge holders understand that water is co....." is muddled. | **Co-Chairs** | Thanks, revised. |
| 113 | Page 23 | First quote - Suggest noting that the person was referring to water levels in the lake in 2019. Water levels in 2020 and 2021 were higher in McClelland Lake than they were in 2019.<br>This first quote also suggests that shifts in aquatic vegetation communities along the lakeshore is a useful and important indicator for water levels. This understanding is the basis for SC recommendations to monitor changes in vegetation in culturally significant areas surrounding McClelland Lake (Objective 2 and 5), but the vegetation assessment presented in Objective 3 does not consider vegetation around McClelland Lakeshores.<br><br>Second quote *"You can't understand changes to lake levels without also understanding beaver activity and weather (rain and snow levels"*<br>This was said, but the model does not explicitly account for beaver, and there is not going to be any beaver monitoring, so should this quote be included? | **Co-Chairs** | 1st quote, edited to note 2019. 2nd quote: Beaver activity quote was moved to the end of appendix where beaver activity is discussed. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 3 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 114 | Page 25 | "*Indigenous knowledge holders have observed limestone outcrops along the Firebag River valley and noted it continues deep beneath the McClelland Lake and fen* ,<br><br>After this sentence, "limestone" isn't specifically mentioned anywhere else in the section. Is this what the conceptual cross section of regional geology also suggests? For example, what "formation" would Limestone be (Figure 4) ? How did this information about limestone inform the understanding of how groundwater flows/interacts with surface water? How does this affect the models? | **Co-Chairs** | All limestone in the MLWC watershed (and the surrounding region) is Devonian aged rock. So limestone = Devonian. On figure 4, this would correspond to the Devonian-aged Waterways formation. This will be clarified in the document |
| 115 | Page 44 | Appendix XX, Section X.X need to be updated. | **Co-Chairs** | It has been updated. |
| 116 | Page 49-257 | Although there was not time for a complete review of the Appendix, a few key HRAs were quickly reviewed to see how some of IK that had been shared by the AAG had contributed to the conceptual model and the numerical model. Based on this preliminary review at a minimum, it is recommended that community representatives review quotes included the text for each HRA with knowledge holders to confirm they are presented in the correct context. A preferred option would be for Suncor, TAG and IK holders to get together to discuss the assumptions and inputs into each HRA. For example the quote included in HRA8 on page 120 is associated with areas in HRA 18; the source of water for HRA 12 & 13 isn't completely aligned with some of the IK that has been provided for that area, or the arrows shown on Figure 31; some of the quotes in HRA 11 also pertain to HRA 18. There may also be gaps, for example complementary and relevant IK related to HRA 11 has been shared, but is not currently included in the Appendix. | **Co-Chairs** | The text has been updated and information moved to the appropriate HRA as suggested. Community representatives are asked during the review to assess the content for accuracy appropriateness and completeness - in order to validate and approve the use. |
| 117 | Page 49-257 | It would be good to review the assumptions/predictions for each HRA, and the final conceptual surface water and groundwater flow directions presented in Figure 31 with knowledge holders. After this review, it may be necessary to amend the other Objectives of the OP. | **Co-Chairs** | Pending the review and feedback by the community representatives, this may be an appropriate next step once the group can meet in person with community members. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 4 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| **5.0 Objective 4 - Establish Necessary Design Features and Contingency Mitigation Measures (Section 5 of the Operational Plan)** | | | | |
| 1 | General comments on Objective 4 | Add a new Section 5.8, that complements Section 5.6 (access management) and Section 5.7 (Cultural, Education and Learning) that outlines additional Mitigation and/or Compensation related to the effects on Traditional Land Users due to potential effects from development and changes in the environmental resources and hence to social, cultural and traditional economic values.<br>Add a new Section 5.9 that outlines the environmental Mitigations that are provided by the Fort Hill Project that are relevant to the environmental resources in the MLWC area (e.g. Noise, air, odor, visual, wildlife) (this is a recommendation that was made during the July 7 Non-Engineering Mitigation Meeting).<br>As we discussed in several meetings related to Objectives 1, 2 and 5, there will be effects during the construction phase (cut-off wall construction etc.), as well as during the operational and reclamation periods, and hence this phase should be mentioned. For example, on page 5-1, in the middle of the first paragraph the text should state "construction, operational and reclamation periods" … as these related to the MLWC. On page 5-4, first paragraph, add construction. On page 5-12, first paragraph, add construction.<br>Many of the figures are challenging to read, particularly the legends, so increase the size of the figures in the final Operational Plan.<br>The 2018 proposal suggests that Objective 4 of the OP will present final options selection and assessment of necessary design features and contingency mitigation plans, yet there are still a number of critical design features that have yet to be finalized. For example, the length of the wall may or may not be extended, the number of pumping wells may need to be increased and the source of surface water recharge has not been finalized. Please indicate when will these design features be finalized and if additional approvals or assessments will be carried out to determine the impacts associated with additional construction of the wall/installation of wells etc. | **Co-Chairs** | Part 1 - the mitigations provided in Section 5.6 and 5.7 are mitigations that were identified and recommended by the SC related to potential effects on social, cultural and traditional economic values. Mitigation related to effects on the environmental resources are outlined in the remainder of Objective 4 and in sitewide monitoring and mitigation plans (i.e. wildlife and air).<br>Part 2 - the mitigations that are part of other site-wide monitoring plans are contained within those plans.<br>Part 3 - See responses to Objective 3 re: not including construction period.<br>Part 4 - figures sizes were increased per recommendations<br>Part 5 - Figure 5.8.1 provides the timelines for the next stages of engineering design, construction, operation, reclamation, and closure of the various system components as well as the timeline for when further regulatory approvals will be sought from the AER to construct the features. |
| 2 | 5-1 to 5-3 | As discuss below, design components (mitigations) were the subject of at least 3 meetings that the SC was involved in however, there remains a number of outstanding actions items and a follow up meeting to the last meeting held in June has yet to occur.<br>•Please discuss the adaptive management framework or plan, including alternative measures to be taken, to deal with unintended consequences<br>•Please provide more information on the feasibility studies conducted for each selected mitigation and alternative<br><br>The above should be discussed with the SC and its Advisory Groups.<br><br>As should be provided in the Introduction for each objective, a concordance table with the 2018 Proposal should be included. It is unclear if the tasks have been completed as the assessment results were not shared for discussion with the SC and its Advisory Groups. | **FMCA/FMMN** | Discussion related to the mitigations and engineering design have been discussed for more than a decade with the SC and input and recommendations have been incorporated into the plan as presented. There are outstanding action items that came from the June meeting that need to be further discussed at the SC, in particular follow-up discussions on water modelling and reference sites. These follow up meetings are planned for 2022. Contingency mitigation measures are outlined in Section 5.5 and included as alternative design concepts throughout Objective 4.<br>Concordance tables can be found in the Introduction (section 1.0). |
| 3 | No page numbers | The title of the Objective is: "Establish Necessary Design Features and Contingency Mitigation Measures". The section contains very little information on alternatives for Contingency Mitigation Measures; Section 5.5 is three short paragraphs. The section does contain appreciable information on the (necessary) Design Features, at least from a conceptual and timing perspective. Overall, these seem suitable (although TAG does offer some preliminary comments below). But, how is it operated? How are the necessary flow rates (magnitudes and timing) determined? How frequently are they adjusted? How are snowmelt and storm events accounted for? How are the appropriate volumes determined? And where are they applied? How does operation relate to monitoring and modelling? Objective 6 indicates feedback from monitoring (and triggers) will only occur every quarter. Is that sufficient? When is the model updated? How does operation relate to observations from Reference Ecosystems?<br><br>In summary, this section of the Operational Plan does not provide sufficient information on how the system will actually be operated.<br><br>***Recommendation***<br>Provide descriptions of how the system will be operated, including linkages to modelling, monitoring and variations in climatic inputs.<br><br>The (conceptual) design figures are informative and help with understanding the design; however, the captions provide too little information. | **TAG - Hydrology** | See Section 5.4.5, Operating Philosophy, has been added to Objective 4. |

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 4 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| **5.1 Introduction** | | | | |
| 4 | 5.1.1 Approaches to Development and Execution<br>5-1 to 5-2 | Figure 5-1.1 Add the time frames for each of the steps in the framework i.e., Conceptual Design, Preliminary Design and Detailed Design. For example the time frame for the Operational Plan that is based on the conceptual design maturity will be December 2021.<br><br>Also add the time frames into the text for each of these stages to the text on page 5-1.<br><br>*Add the following paragraph at the end of Section 1.1:*<br>*Mitigation and/or Compensation related to the effects on Traditional Land Users from potential changes to environmental resources and hence to social, cultural and traditional economic values and functions are discussed in Section 5.6 (access management), Section 5.7 (Cultural, Education and Learning), Section 5.8 (ADD A NEW SECTION ON OTHER MITIGATIONS AND COMPENSATION) (see above) and Section 5.9 (ADD NEW SECTION ON MITIGATION FROM FORT HILLS PROJECT THAT ARE APPLICABLE TO THE ENVIRONMENTAL RESOURCES IN THE MLWC) (see above)* | **Co-Chairs** | The timelines for those steps are shown in Figure 5.8.1, they vary depending on the design feature and are shown in more detail there.<br>Regarding Section 1.1 (assuming this means 5.1), similar text will be provided (see response to #1 above). Content appropriate for site-wide monitoring and mitigation programs will not be included in the OP as discussed with the SC. |
| 5 | 5-1 to 5-2 | To be consistent with language in other documents (2018 Proposal, 2018 to 2020 Progress Reports) when referring to the function and biodiversity of the MLWC, the verb *protection* is used. When referring to water flows, etc. the verb *maintain* is used. Please correct this throughout the Plan.<br>As the plan is still in a conceptual state, please include that future stages will be carried out (developed) in collaboration with, or with input from, the Sustainability Committee, as directed in the 2002 report, the Sustainability Committee will "…critically evaluate proposed mitigation plans". | **FMCA/FMMN** | The verb protect is used when referring to the design features and their purpose, which is to protect the non-mined portion of the MLWC. Fort Hills is required to maintain ecosystem diversity and function of the non-mined portion of the MLWC and is used in this context throughout the OP.<br>The work of the Sustainability Committee will continue through operation and reclamation of the site. A statement has been added to that effect. |
| 6 | Figure 5.1-1 | Please put a box around everything but the CCR plan and label it as activities informed by SC. The 2-way arrow to and from the CCR plan will then show that the CCR plan will be informed by and will inform the rest of the work (i.e. will also be informed and will inform the SC and its advisory groups and not outside of the SC as it pertains to the MLWC).<br>Recommended rewordings include:<br>•'their lifetime' not *many years*<br>•'shared knowledge' not *told them stories*<br>•'non-mined portion of the MLWC' not *non-mined portion of the fen**<br>**note that the AAG and SC have emphasized that the functionality of the MLWC extends beyond the spatial scale of the fen*<br><br>Recommended use of consistent language<br>• Please use either non-mined or unmined - Objective 6 used unmined when describing the fen (MLWC) and this Objective uses non-mined<br><br>Reference is made to AAG, TAG and SC providing an improved understanding of the MLWC system and its connectivity as incorporated into Objective 3, yet Objective 3 has yet to be shared or reviewed to fully understand how it informed the model. Once Objective 3 has been provided and reviewed – this statement and its outcomes (i.e. how the model informed the evaluation of supply water quality and water supply/balance) should be re-reviewed and validated.<br>Not all input and actions have been included in this section that need to be included. This Objective needs to be updated as appropriate (see above text). | **FMCA/FMMN** | The intent of Figure 5.1-1 is intended to show the framework for ongoing design and construction of the MLWC design features and contingency mitigation measures. It is not intended to outline the scope of the MLWC SC. The work of the SC as outlined regulatory approval conditions and in other sections of the OP (including Objective 4) are clear that the SC will help provide input and critically evaluate the mitigations.<br><br>Changes made to figure 5.1-1.<br>Text revised. |
| 7 | 5.1.2 Sustainability Committee Input<br>5-3 | The SC proposed the mitigation related to Access Management and Culture, Education and Learning that are presented in Sections 5.6 to 5.8. The SC and AAG continue to work on developing the ESCT monitoring program, and potential mitigation/compensation for potential effects to ESCT functions, but due to time constraints related to filing of the Operational Plan these tasks could not be completed by mid-fall 2021. | **Co-Chairs** | Noted and FHEC is committed to working through the ESCT program with the SC in 2022 post-submission. |
| 8 | 5-3 | Based on the 2020 Progress Report, design features and mitigation measures, including those alluded to in EPA-related conditions as well as to address cultural values were to be worked on collaboratively with the SC to address the impacts of mine development on the MLWC. Objective 4 should be re-evaluated with respect to following up on action items (see below) as well as to understand how effects to the MLWC covered under site-wide EPA conditions (but possibly not mitigated for as the those conditions lacked the insight of Operation Plan details) and mitigations to offset effects of mining in the MLWC to cultural values that support MLWC functionality (both biophysically and bioculturally) can be brought into the plan as was identified in the 2020 Progress Report. | **FMCA/FMMN** | FHEC has committed to following up on the site-wide wildlife program with the SC to discuss the programs, share the findings and gather input on mitigations that can be incorporated into those programs. Adjustments to those programs need to be made through the appropriate applications and approvals and not through the Operational Plan. |
| 9 | 5-3 | TAG agrees, as mentioned by an ACFN Elder, that reclamation to a large flat area will be more conducive to the development of a wetland given that water in-flow is restored. | **TAG – Vegetation** | Noted and thank you for the feedback. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 4 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| **5.2 Evaluation of Water Supply to the Fen** | | | | |
| 10 | 5.2.1 Water Supply Objectives<br><br>5-8 | In the Post Closure plans what is the balance between surface water and groundwater resupplying the water the MLWC fen?<br><br>Are there any concerns related to damning by beaver of the surface water distribution system ditches so the surface water supplies will not reach and hence fully meet the needs of the MLWC fen? | **Co-Chairs** | Assuming that the balance being referred to is the ratio of surface water to groundwater supplying the MLWC fen in the post-closure period is what is being asked for, this ratio should be possible to extract from the HGS model results but this was not done for the OP. This ratio could be determined as the engineering work advances on the water resupply system and included in future design submissions.<br>It is technically possible that beavers could dam up a resupply water ditch and this will need to be monitored. Mitigation and/or management plans for this situation would be developed as part of the detailed design for the resupply system, as appropriate. |
| 11 | 5-3 to 5-4 | Please strike 'appropriate' and replace with *continued supply of water of a quantity and quality resembling baseline conditions.*<br>Please strike 'sustain' and replace with *protect*<br><br>These objectives were not collaboratively developed with the SC and need to go to the SC, AAG and TAG for discussion. For example, would bullet number #1 not also include the lake?; would routing of overburden disposal areas not be until after reclamation certification (not closure); is just sufficient the right word and do we not also want to make sure it carries over to the lake? | **FMCA/FMMN** | Fort Hills respectfully disagrees with this recommendation. "Appropriate" is the appropriate term in this instance it is meant to encompass suitable quantity and quality, and the term baseline has multiple definitions within the OP.<br>"Sustain" is also the correct word to use as per Fort Hills *Water Act* Approval Condition 3.11 which states"...develop an operational plan for the sustainability of the non-mined portion of the MLWC..."<br>Objectives to the SC - The objectives of the mitigation measures were discussed and presented at the SC in a number of meetings, however your comment is correct in that the language was often different (i.e. to keep the wetland wet). Since water resupply will be through the fen prior to entering the lake, the objectives of the water resupply presented are related to the fen. It is noted that the objective related to reclaimed overburden areas is "post closure", not "post reclamation". |
| 12 | 5.2.2 Operational Water Resupply Requirements<br>5-4 to 5-7 | In the first paragraph both the terms pre-development (bullet #1) and natural range (bullet #3) are used. Please clarify if these terms are describing pre-development as provided by IK and natural range as defined by the reference lakes or if this is something different. | **FMCA/FMMN** | It is clearly determined in the first paragraph that the pre-development, which is the same as baseline case, are defined based on the results of flows simulated using HGS model.<br>Bullet #3: changed "natural" to "pre-development" |
| 13 | Figure 5.2-1 | Please include a vertical line at 2034 and label 'working platform constructed' so that it is clear why there is such a jump in water resupply requirements. | **FMCA/FMMN** | Figure revised |
| 14 | Figures 5.2-1 – 5.2-4<br>5-4 to5-7 | Section 5.2 (Fig 5.2-1 to 4): Volumes are provided, these could also be reported as depth (mm) on the other axis. This helps greatly in interpretation of the range and confirms the region/area of concern.<br><br>Are these volumes to be added to only the Fen proper or the fen and Lake? It appears that only the fen is of concern; the lake should also be considered | **TAG - Hydrology** | - The volumetric information cannot be directly translated to fen water depth in mm in the same figures, because the fen water level has a complex non-linear relationship to the water inflow to the fen. The effects on the fen and McClelland Lake water levels without the proposed water resupply mitigation are described in Section 4.3.2.1.3 under Objective 3 (e.g., the McClelland Lake water level could be reduced by up to 1 m without the proposed water resupply operation).<br>- Water resupply to the system will occur as described in detail in Section 5.4.2.3: During construction of the working platform (short-term), distribution at the outlet of each pumping system would be a spray to not cause erosion; deliver the water from the water storage pond to the fen after platform constructed (long-term). Water supply is applied to the fen. However, since the inflow to the lake is mainly through the fen and the effect will indirectly help with the lake water level. Reference to McClelland Lake is added in the text to make it clear for addressing the second comment. |
| 15 | 5.2.3 Water Resupply Sources<br>5-8 | Please discuss the availability or constraints to withdrawal of water from the Athabasca River between 2060 and 2075 for the MLWC water supply, in light of the provincial Surface Water Management Framework that limits the rates and amount of withdrawal from the river by oil sand operators. | **Co-chairs** | Added sentence indicating the water withdrawal from Athabasca River considering SWQMF |
| 16 | 5-8 to 5-11 | Please discuss how FHEC plans to collaborate and seek input from the SC, AAG and TAG on continued evaluation of water resupply sources. As well, it would be helpful to understand how Indigenous knowledge informed the selection (e.g. was there discussion about using fresh water from the Athabasca River when Suncor actively presents that since the early 2000's, a series of water management projects were completed to reduce river withdrawals.) | **FMCA/FMMN** | The work of the Sustainability Committee will continue through operation and reclamation of the site. A statement has been added to that effect. A statement has need added to clarify that future stages of work to develop preliminary and detailed designs will be reviewed with the SC. We suggest this should be discussed at the SC to clarify priority areas for this review. |
| 17 | Table 5.2-1 | Please provide a definition for 'discharge requirements'. Based on discussions to date, any water being supplied to the fen was not going to degrade, at a minimum, existing water quality in the fen (and lake). Please clarify if this understanding is incorrect. | **FMCA/FMMN** | In this case, discharge requirements refer to anticipated Approval requirements around discharge water quality criteria. Fort Hills current approvals include such criteria for all releases to surrounding watersheds. It is anticipated that MLWC specific release criteria will be required in future and will be based on water quality requirements of the fen. |
| **5.3 McClelland Lake Wetland Complex Water Management System Layout Plans** | | | | |
| 18 | 5.3.1 Introduction<br>5-12 | Table 5.3.1. There should be a figure that illustrates each of the phases of the surface water management system components …. There is no figure for "Operation Stage 4 (2060-2063) and Reclamation (2064 to 2075)".<br>Add a figure that illustrates the "Operation Stage 4 (2060-2063) and Reclamation (2064 to 2075)"<br>On Figure 5.3-4 (pg. 5-18) the "water pumping system over the construction area of a working platform and the water distribution system for discharging to the fen" that are noted in Table 5.3.1-1, are not shown. | **Co-Chairs** | The water management system layout plan for the "Operation Stage 4 (2060-2063) and Reclamation (2064 to 2075)" is the same as that shown in Figure 5.3-8, so there is no need to create the requested new figure. Text revised to make this clear.<br><br>Note added in Figure 5.3-4 to address the comment |

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| 19 | Table 5.3.3. Figure 5.3-9 | Table 5.3.3. There should be a figure that illustrates each of the phases of the groundwater management and control system components …. There is no figure for "Operation Stage Two (2037-2063) and Reclamation (2064 to 20175)".<br>Add a figure that illustrates the "Operation Stage Two (2037-2063) and Reclamation (2064 to 2075)".<br>On Figure 5.3-9 (pg. 5-23) the Conceptual Closure Plan, the cutoff wall that will remain in place is not shown.<br>Add the cutoff wall to the figure. | **Co-Chairs** | The groundwater management system components for the "Operation Stage 4 (2060-2063) and Reclamation (2064 to 2075)" are illustrated in Figures 5.3-6 and 5.3-7. Text revised to make this clear.<br><br>Figure 5.3-9 revised to reflect the comment. |
| 20 | 5-12 to 5-13 | Please discuss how the MLWC Operational Plan and the larger site-wide CCR Plan will speak to each other and how specifically the SC will be involved in informing and being informed by the latter through the Plan and not through other initiatives or through bilateral discussions (see also comments above). | **FMCA/FMMN** | FHEC will continue to share the Mine and Reclamation Plans with the SC (for example as was done at the Oct 15, 2020 workshop). The SC can make recommendations regarding the MLWC portions of the plan and those will be considered by FHEC. Examples of past recommendations made and accepted/included are the relocation of North External Dump away from the fen and reclamation of the watershed to a large flat area. As future changes in the mine plan change elements of the mitigations for MLWC, the SC will continue to be engaged. |
| 21 | No page numbers provided | Figure 5.3-1: in the legend include the meaning of FHUC.<br>Figure 5.3-2: add meaning of treated ft: no clue what means ft? where is it on the drawing?<br>Change waterwater to wastewater?<br>Figure 5.3-3: meaning of sump? Ok found it in a dictionary but not an usual word - a pit at the lowest point in a circulating or drainage system<br>Where is on the map the area ready for reclamation?<br>Figure 5.3-4: idem sump? Treated FT? add: working platform of the cutoff wall? Hence to relate to figure 5.3-1<br>Figure 5.3-5: Treated FT = Athabasca river?<br>Figure 5.3-9: It would be useful to repeat the drawing of this figure without the contour line so that it is easier to see the closure channel and change in the watershed boundary. So here I would argue to have two figures. One with contour lines and one without. | **TAG - Vegetation** | Figures revised to reflect the comment |
| 22 | 5.3.2 Operational Water Management System<br>5-14 to 5-22 | Pg 5-14 to 5-22<br>To all the Figures 5.3-1 to 5.3-8 in this Section, add the boundary that shows the Non-mined portion of the fen that is to be protected. Do any of the components of the modified cut-off wall or wells extend into the non-mined portion of the fen?<br><br>Page 5-18<br>On Figure 5.3-4 the "water pumping system over the construction area of a working platform and the water distribution system for discharging to the fen" that are noted in Table 5.3.1-1, are not shown. Add these structures to the figure. | **Co-Chairs** | The boundary has been added to the figures. No, no portion of the wall nor the wells are within the non-mined portion of MLWC.<br><br>The system is designated by the arrows shown in Figure 5.3-5, they are not in figure 5.3-4 as they aren't constructed yet in 2029. |
| 23 | 5-13 to 5-22 | It was difficult to reconcile the activities listed in Figures 5.3-2 to 5.3-8 with Figure 5.8-1 (The Estimated Schedule for Implementing the MLWC Water Management System). Please provide additional detail for each of the system components listed in Figure 5.8-1 along with what stage it is currently in (not just when it becomes operational). It would also be helpful to understand the time frame for engagement with the SC on each of these plans. Also, please include a discussion on how, based on detailed engineering, additional monitoring, etc. adaptive management will be applied to account for unanticipated systems challenges or failures. Note that Section 6, the response framework does not currently include an adaptive management component (only adaptive monitoring, to a limited extent). | **FMCA/FMMN** | These figures are for illustrating the relevant spatial and temporal information of the system components, including the various stages of design, regulatory permitting, construction, operation, reclamation and post closure. The current stage of all other system components is at conceptual design level as already described in the texts.<br>The work of the Sustainability Committee will continue through operation and reclamation of the site.<br><br>For the adaptive management piece, please refer to the response item #2 and additionally, Objective 6 discusses how the adaptive monitoring will be used to adaptively determine what changes need to be made within the water management (design features) system. |
| 24 | Figures 5.3-2 to 5.3-4 | Section 5.3. Figure 5.3-2 to -4, covers 2025 to 2029:<br>• Industrial runoff is used as a source water pond, then fed into the fen. It is not clear how water quality can be maintained by just using a pond.<br>• The working platform for the cut off wall dissects the wetland in 2029, and it appears that the infrastructure is not in place to compensate for blockage of flow from above the platform. How will water flow in the fen below the platform be maintained until the pipes are set up in 2034 (Figure 5.3-5)? If no infrastructure, then what assumptions are made about the fen maintaining water levels? | **TAG - Hydrology** | · Water quality of muskeg drainage and overburden dewatering water is discussed in Table 5.2-1. In addition, Section 5.2.3 includes the following statement: "The FHEC plans to continue its evaluation of the above-mentioned water resupply sources, including confirmation of any water treatment requirements, as well as potential use of FHUC Quaternary aquifer water particularly during the initial water resupply period."<br>· Note 9 is added in Figure 5.3-4 regarding the water pumping and distribution system. |
| 25 | Figures 5.3-5 & 5.3-6 | Figure 5.3-5 & 6: There is 8 years from building the platform and placing in the cut-off wall. The area of "muskeg" drained for the earlier years seems quite small.<br>• Is it assumed there will be no runoff generated from the remaining fen, and thus little water and flooding at the working platform? This may not be the case. Is there any provision for transferring, storing etc. the water that may be generated from the peatland (muskeg) above the working platform? | **TAG - Hydrology** | The remaining fen upstream of the working platform will continue to generate runoff until it is mined out. Management of this runoff upstream of the working platform by pumping over the platform, is described in Section 5.4.2.3. |
| 26 | Figure 5.3-7 | Figure 5.3-7. By 2037, using water from overburden dewatering – will this match the chemistry of water generated near the surface of the peat?<br>• FHUC – pump water from Aquifer 4. How will this impact the stream that drains into the McClelland Lake? What does the modelling indicate is the proportional source of the stream to the Lake maintenance? The x-section Flg 5.4-7 indicates that withdraw from Aquifer 4 may impact this inflow stream. | **TAG - Hydrology** | Work continues to determine the quality of the overburden water and its treatment requirements, if any. There is current uncertainty in how pumping AQ 4 will influence stream/spring flows. FHEC is planning a pumping test taking place in winter 2021/2022 to attempt to partially instrument the spring(s) to answer this exact question. |

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| 27 | 5.3.3 Closure Landscape Plan and Drainage System 5-14 | Discuss the potential ramifications of the reduced size of the catchment area of the MLWC by 10% less (200 km2) to McClelland Lake (compared to the pre-development catchment area)? Will this affect water levels in the lake. Will this shift the NRV for water levels in McClelland Lake? | **Co-Chairs** | The post-closure watershed for MLWC is approximately 9% smaller than the pre-development watershed balancing the needs for water in other aspects of the closure drainage system with those of MLWC. The HGS model has predicted that water levels will remain within MRV during this period. Future evaluation of the drainage area to MLWC system will occur as a part of future iterations of the closure plan. |
| 28 | 5-14 and Figure 5.3-9 | Please discuss how input from the SC, AAG and TAG informed this section. More importantly discuss how IK informed the closure landscape and drainage plan and how, if at all, it resembles the pre-disturbance land and waterscape to return the area for traditional use and cultural practices. | **FMCA/FMMN** | This information is provided in Section 5.1.2. Previous iterations of the mine and closure plans were reviewed with the SC and resulted in changes such as the exclusion of tailings from the closure watershed for MLWC. More recently, FHEC reviewed and shared the closure plans with the SC, TAG and AAG in February and October 2020. Recommendations at that workshop around reclamation to a large flat area were incorporated into the plans. |
| 29 | Conceptual Closure – Fig 5.3-9 | Conceptual Closure – Fig 5.3-9. The original source will be modified. Once Objective 3 is completed, the assumptions on runoff and connectivity may be further addressed. At present it appears that final plan will have reduced the contributing area to the top part of the fen that direct water into the non-mined portion<br>• The overall catchment area has been reduced, but importantly the proportion of peatland (contributing areas) to forest upland has been reduced. The soil texture and vegetation structure of the forest must be presented, and hopefully is pine on sandy soil rather than aspen. If not this configuration of the headwater catchment may produce too little runoff<br>• The patterned fen on the northwest. It us unclear if there will be enough water to maintain the pattern ecosystem. With an overburden dump, and water injection, will the "oligotrophic" groundwater source that generated this peatland ecosystem be maintained?<br>• The overburden dump. Runoff arrows are drawn as if this forested site will generate runoff. The assumptions are likely not to hold. It is likely to have low average runoff, and high flow infrequently (Devito et al. 2012). Such flow regimes are not conducing to fen development | **TAG - Hydrology** | North External Dump (NED) will be reclaimed with predominantly jackpine on the plateau, and with jackpine, trembling aspen and birch on the slopes. Appropriate shrub species will be selected at the time of planting. The inclusion of NED in the closure watershed is important to maximize water supply to MLWC while still directing flow from End Pit Lakes away from the watershed. Keeping the NW section of the wall in place during closure helps to maintain the water levels within MRV. The area closest to NED sees the largest change in water levels. FHEC will continue to develop improvements to the closure plan and welcomes further input from TAG and the SC in doing so. |
| 5.4 Design Features | | | | |
| 30 | **General** | The overall engineering design seem reasonable, but this is TAG's area of expertise. It is the timing and location that should match with the conceptual understanding of hydrologic connectivity and if and how the operations interact with these engineered features. | **TAG - Hydrology** | Noted |
| 31 | **5.4.1 Introduction 5-24 to 5-50** | General comments/recommendation include:<br>•Please describe what, if any SC, AAG and TAG input was used to inform selection and dismissal of options/concepts and in particular whether IK or TAG input identified the need for further investigation;<br>•Please explain how meeting existing release criteria meets the intent of not degrading existing water quality in the fen/lake/watershed;<br>•Please explain how the SC, AAG and TAG input will be sought during further stages of design and for future investigations;<br>•Please discuss the ecological and cultural trade-offs of each option selected or dismissed (this will help better inform engineering and non-engineering mitigations i.e. these mitigations each have their own ecological and sometimes cultural effects), please include the length of the wall and include the shorter wall with injection wells as one of the alternatives considered earlier (i.e. it isn't just something that needs further investigation);<br>•With respect to Section 5.4.5.1 (closure landscape and drainage facilities) please discuss how IK informed the closure and drainage objective of traditional end land use; and<br>•The last reference in Section 5.4-5.5 (cutoff wall) is to a contingency mitigation plan (section 5.4.2) – there is no such 'plan' in the document – was this intended to be section 5.5? Please clarify. | **FMCA/FMMN** | 1) Refer to Section 5.1.2 for a description of SC, TAG and AAG input to the mitigation plans. 2) Release criteria were not meant to suggest existing criteria, it is anticipated that MLWC specific release criteria will be required in future and will be based on water quality requirements of the fen. 3) refer to response #16. 4) Eco and cultural trade-offs were not discussed so this may be an area to focus on going forward. 5) refer to Section 5.1.2. 6) Contingency Mitigation is discussed in 5.5 and the reference will be corrected. |
| 32 | **5-24** | Meaning of NED? Please to spell out at the beginning of a section even if in the list of acronym. Sumps? Not an acronym but unusual word – describe when first used. | **TAG -Vegetation** | Fort Hills respectfully disagrees with this recommendation, the OP is a very long document and the use of acronyms will help significantly in reducing its length, and repetitiveness. That said, NED is the North External Dump and is in the list of acronyms. A sump is a common term to describe a small pit that collects water - sumps are typically used in mining as a space where a pump can be placed to transfer water to another location. |
| 33 | 5.4.2 Surface Water Management Facilities | Section 5.4.2.1.3 Further Investigation. During one of the Water Modelling meetings with the SC/AAG/TAG, the use of snow in replenishing water supply to the fen was questioned as it could change the quality of water feeding the fen compared to the current water quality that feeds the fen. | **Co-Chairs** | This is still at the conceptual stage of development and FHEC will carry this option until it has been investigated further. |
| 34 | 5.4.2.1 Sedimentation Ponds 5-26 | Section 5.4.2.1.3 Further Investigation. During one of the Water Modelling meetings with the SC/AAG/TAG, the use of snow in replenishing water supply to the fen was questioned as it could change the quality of water feeding the fen compared to the current water quality that feeds the fen. | **Co-Chairs** | Refer to response #33 |
| 35 | 5.4.2.2 MLWC Water Storage Pond | This was an empty cell | | N/A |

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| 36 | 5.4.2.3 Fen Resupply Distribution System<br>5-29 to 5-30 | Error … extra words at end of 2nd paragraph that should be removed "but may be".<br><br>Figure 5.4-3 (page 30) - Is the pipeline flowing into the water pump on the cut-off wall pointing in the right direction. The current drawing looks as though the pump is pulling water from the fen. | **Co-Chairs** | Text revised - thank you. The pipeline provides water to the resupply system (to the recharge ditch and injection wells if required), not drawing water from the fen.<br><br>Figure 5.4-3 revised to reflect the comment |
| 37 | 5.4.2.4 Fort Hills Upland Complex Water Interception Ditch | Toe ditch – in Fig 5.4-4. Seems to be located above the swamp ecohydrologic areas. Could provide an excellent experiment | **TAG Hydrology** | Fort Hills respectfully disagrees with this recommendation, the OP is a very long document and the use of acronyms will help significantly in reducing its length, and repetitiveness. That said, NED is the North External Dump and is in the list of acronyms |
| | 5.4.3 Groundwater Management Facilities Use | This was an empty cell | | N/A |
| | 5.4.3.1 North Outwash Plain Injection Wells | This was an empty cell | | N/A |
| 38 | 5.4.3.2 Cutoff Walls Figure 5.4-9b. | Figure 5.4-9b. Add the total width of 115 m at the top of the figure (so it will parallel the total width shown in Figure 5.4.9a). | **Co-Chairs** | Figure revised to reflect the comment |
| 39 | 5-39: Text | Constructing the working platform is planned to involve stage loading of the muskeg where required, including a pre-load that is later removed.<br><br>What happens if there is significant peat burst causing elevation or compression of peat below ground to the surface water resupply? Could some of these effects impede water flowing towards the fen? | **TAG - Vegetation** | Pressure in the NOP sands will be maintained with the injection wells to prevent subsidence of the peat. |
| 40 | 5.4.3.3 Fort Hills Groundwater Pumping Wells<br>5-42 | ERROR - Figure 5.4-10 (pg. 5-42) shows 10 groundwater pumping wells, while Figure 5.3-7 to 5.3-8 (pages 5-21 and 5-22) show 7 groundwater pumping wells. | **Co-Chairs** | Figure 5.4-10 was a error and has been fixed. |
| 41 | 5.4.4 Water Treatment<br>5-45 | In section 5.4.4.3, add a discussion on any potential issues related to mixing different sources of water in the storage pond, and how this mixed water will be tested for water quality before the water is released into the fen. | **Co-Chairs** | No mixing of water from different sources is proposed. Water from muskeg drainage and overburden dewatering will be used during most of the operational period, and then Athabasca River water will be used for the remainder of the operational period as well as the reclamation period.<br>Fort Hills is required to test water prior to release and could not release water that did not meet Approval requirements. |
| 42 | 5-45 | *On this topic:*<br>*The Athabasca River water is planned to be used as the resupply water source in late mine life and during the reclamation period. A water treatment plant may be required for the river water before discharging to the fen, because the concentrations of some of the river water quality parameters (e.g., sodium and chloride) may be higher than the water quality requirements of the fen.*<br>*The water treatment plant, if required, would likely be located near the injection wells or the water storage pond. The treatment plant may involve raw water pre-treatment (i.e., removal of total suspended solids [TSS], turbidity, dissolved iron), parameters of concern (POC) treatment (e.g., Sodium), and post-treatment to meet the appropriate criteria before delivery for resupply (e.g., through blending,pH adjustment, chemical addition).*<br><br>*Main potential differences between the Athabasca River water and the fen could be pointed out. There is the water chemistry baseline of FH project and Vitt and House have indicated the natural range of variation usual in the fen. My main questioning is there really a treatment that can be applied for any base cations or metals that would be completely out of range. At this stage, the potential chemical element that is expected to be widely different (comparing river and muskeg water) could be identified so that a particular attention will be given to their monitoring and correspondingly what is expected to be used in term of treatment. Or more simply are the options presented for water treatment will cover all cases of differences. Is reverse osmosis membranes applicable to great quantity of water? Maybe a statement of each options on what element could be targeted by each treatment and the potential in term of water quantity and cost would help to see where this approach is leading.* | **TAG - Vegetation** | FHEC recognizes that Athabasca River water will likely require some sort of treatment prior to being used as resupply water for the fen. FHEC is committed to treating water used to an appropriate quality, if necessary, prior to using as resupply for the fen. At this conceptual stage, and considering the large time lag associated with when Athabasca River water would be required, FHEC will continue to work the treatment requirements in future. |
| 43 | 5.4.5 Closure Landforms and Drainage Features<br>5-47 | It is not possible, for a non-insider to all the reclamation plans, to understand why the emphasis about the design of a channel when we even do not know what is the NED will be reclaimed to: a jack pine forest? And where is that or those channel fit in the landscape and is connecting to. Or let us know if all this information about the reclamation plans will come later.<br>***Recommendation***<br>Add a spatial drawing showing the NED (8.2 km2) and the placement of channels draining towards what? Idem for the reclaimed North Pit and its relation to the constructed fen, have a vertical projection overview.<br><br>Constructed fen: more details about the conceptual and logistic plan will come later? | **TAG - Vegetation** | North External Dump (NED) will be reclaimed with predominantly jackpine on the plateau, and with jackpine, trembling aspen and birch on the slopes. Appropriate shrub species will be selected at the time of planting. Figure 5.3-9 and a new Figure 5.3-10 provide the layout plan showing the details of the drainage for NED and North Pit.<br><br>Yes further details of the reclamation and closure plan will come later as it is refined. |

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| 44 | 5-48 | 5.4.5.4. Design of Closure Drainage Channels<br>Could you point on one of the map (figure) to what you are referring here? | **TAG - Vegetation** | Reference to the constructed closure channels presented in Figures 5.3-9 and 5.3-10 added to the text |
| **5.5 Contingency Mitigation Measures** | | | | |
| 45 | 5-50 | Please discuss how SC, AAG and TAG informed this section, included how Indigenous knowledge informed the identified functional gaps and corresponding proposed contingency measures.<br><br>This section should discuss the possibility of multiple functional gaps potentially occurring simultaneously; or for malfunctions to effect one or more of the proposed mitigations. This section should also include an adaptive management plan or framework to account for unanticipated systems challenges or failures. | **FMCA/FMMN** | Refer to Section 5.2.1<br><br>The combination of the extensive monitoring program (environmental effects monitoring, operational monitoring, performance monitoring requirements for the cutoff wall) and the ERP will help manage any unanticipated system challenges or failures. More detail will be available as engineering design matures. |
| 46 | No page number | Insufficient detail (options) provided. | **TAG - Hydrology** | Noted. |
| 47 | 5-50 | It is well known that through years of research, the oil sands companies have developed a successful approach to restore boreal forest post-mining operations. It is also known that in the Fort McMurray region there is a real lost of wetlands and associate with loss of peatlands, comes the loss of several ecosystem services, particularly the long-term C sequestration function helping to mitigate climate change and warming. TAG welcome the effort that Suncor proposes following the recommendation of an Elder to restore a wetland on the area where a wetland pre-existed. BUT as the knowledge is not quite there with a warranty that the constructed fen will succeed, it would be wise to have a compensation plan to restore elsewhere good quality peatlands. Although this would be a loss to the local community for wildlife habitat for example, it would be a significant gain globally making sure that this project will maintain a no-net-loss of wetland. Agreed that this is not required to Suncor by the regulators, but it is good corporate citizenship. And this measure would be implemented if only the constructed fen ends up to be a failure in the form of not being an ecosystem having the capacity to accumulate peat.<br>**Recommendation**<br>As a contingency mitigation measure, have a plan to compensate the loss of fen areas (if it occurs) in proposing that the restoration of peatlands elsewhere in Alberta would then be implemented. | **TAG - vegetation** | FHEC and Suncor participate in numerous research and development efforts on wetland reclamation. Wetland compensation has not been included as part of the mitigation measures. |
| **5.6 Access Management** | | | | |
| 48 | 5-50 | Change the Title of Section 5.6 to Access Management and Site Safety Program.<br>This section should identify commitments from Suncor related to the recommendations provided from the Sustainability Committee.<br>For example, in the July 7 minutes on Non-Engineering Mitigation, it was recommended that the Guardianship program be expanded in the area of the MLWC to protect the area from vandalism, garbage and to increase safety. It was also suggested that the AER be contacted to assist with the guardianship program.<br>Change the first paragraph to include the words in bold:<br>The Sustainability Committee has shared the importance of mitigating some of the current and future potential effects on land users in the McClelland Lake area by providing safe, reliable access to areas important to local Indigenous community members while deterring access by non-local, non-Indigenous users. The Sustainability Committee has shared some ideas and recommendations around access and security including: | **Co-Chairs** | Text revised to Access and Security Management to reflect the wording provided in the SC work product provided to FHEC. Further work with the SC is required to frame and outline the recommendations, such as use of the guardian program, before commitments can be identified. FHEC is committed to working with the SC on these ideas to better understand them and determine next steps. |
| 49 | 5-50 to 5-51 | Access should be identified as a component of engineering mitigation (not unlike the working platform that acts like a 'road') for all phases of development for Suncor as well with respect to the additional or alternative access routes for those displaced during all phases, particularly given the length of the wall. As more direct routes will be cut off and alternative routes may be much longer and possibly unfamiliar to users this must also be dealt with in the Emergency Response Plan that has been recommended previously.<br>The list of access 'ideas' from the SC should be discussed, added to if necessary and then validated by the SC and AAG prior to being incorporated into the final version of the Plan. | **FMCA/FMMN** | This section is referring to access to areas of community use, generally areas outside of the Project footprint. Further work with the SC is required to frame and outline the recommendations, such as use of the guardian program, before commitments can be identified. FHEC is committed to working with the SC on these ideas to better understand them and determine next steps. |
| **5.7 Culture, Education and Learning** | | | | |
| 50 | 5-51 | The first paragraph should be rewritten to separate out the environmental resources from the SCT uses … the sentence is muddled.<br>In the bullets listed in Section 5.7, the term "supporting" needs to be more fully defined.<br>In Section 5.7 – Simply mapping access is not a mitigation. Mapping access routes used by communities to get to camping, staging and harvesting areas and a commitment to ensure safe, continued access along those routes is a mitigation.<br>Modify the sixth bullet to be "Support Learning initiatives" – it should not be limited to "e-Learning", although the students involved in the e-learning program in Fort McKay do attend specific activities at McClelland Lake, the MLWC supports many kinds of learning for all ages.<br>Expand the text of bullet 7 to say "signage and displays to recognize the important Indigenous history in the area indicating these are sacred grounds and to encourage respectful and proper use of the area (this was recommended in the July 7 Minutes Of Non-engineering Mitigation Meeting )<br>Add a new Section 5.8, that complements Section 5.6 (access management) and Section 5.7 (Cultural, Education and Learning) that outlines additional Mitigation and/or Compensation related to the effects on Traditional Land Users due to potential effects from development and changes in the environmental resources and hence to social, cultural and traditional economic values.<br>A new Section 5.9 that outlines the environmental Mitigations that are provided by the Fort Hill Project that are relevant to the environmental resources in the MLWC area (e.g. Noise, air, odor, visual, wildlife) this is a recommendation that was made during the July 7 Non-Engineering Mitigation Meeting). | **Co-Chairs** | 1) revised thank you. 2) supporting was the term recommended by the SC and further work is required to determine next steps. 3) Providing maps of access has been suggested as a potential mitigation by the SC. Further work is required to determine details and next steps. 4) added learning. 5) added the additional words suggested, however further work is required to determine details and next steps. 6) and 7) see response to recommendation #1. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 4 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 51 | 5-51 | This section should reflect terminology used in workshops with the AAG as 'Non-Engineering Mitigations'.<br>This section should be based on the MLWC wetland functions diagram (August 25, 2001 SC meeting, slide 14) and link the MLWC functionality with non-engineering mitigations. Those functions are:<br>• Provides clean water<br>• Provides habitat for diversity of wildlife and fish species, and microbes<br>• Supports diversity of plant communities, and primary production<br>• Supports nutrient processing, toxin removal and sediment detention<br>• Supports habitation and Indigenous culture<br>• Supports education and learning<br>• Supports health and wellness<br>• Supports moose and waterfowl hunting<br>• Supports trapping<br>• Supports plant harvesting<br>• Supports water use<br>• Stores carbon and regulates climate | **FMCA/FMMN** | Sections 5.6 and 5.7 have used the recommendations compiled from the AAG workshops around non-engineering mitigations and have been referred to in the OP as "Access and Security Management" and "Culture, Education and Learning" as these were how they were referred to in the SC work product shared with FHEC. A link has been made back to the wetland functions prepared by the SC included in Objective 2, thank you. |
| 52 | 5-51 | Supporting community driven initiatives such as … student training/learning programs.<br>Line Rochefort offers to do training and hands-on training on the restoration of peatland within the MLWC where exploration activities have degraded the fen surface. It would be a win-win situation where the people interested from the First Nations communities would do project on their own land (the non-mined portion of the fen).<br>***Recommendation***<br>To discuss with First Nations for possible educational/training program in ecological restoration. | **TAG - Vegetation** | Noted, should be tabled at the SC. |
| **5.8 Implementation Schedule** | | | | |
| 53 | 5-51 - 5-53 | Add text into Section 5.8 Implementation Schedule on the regulatory schedule that is shown on page 5-53. | **Co-Chairs** | Recommendation accepted, revisions have been made to the section. |
| 54 | 5-51 | Please include 'in collaboration with the SC and its Advisory Groups' to the end of the last sentence. | **FMCA/FMMN** | A sentence has been added to incorporate this comment. |
| **MCFN comments** | | | | |
| 55 | 5.2.3 | Are the current projections modest enough? It could be costly to treat basal water so that it is suitable to re-supply the fen. Similarly, have drought scenarios been explored in the water balance? | **MCFN** | The latest water balance analysis completed for Fort Hills has accounted for extreme wet and dry conditions, so the analysis has accounted for a full range of hydrologic conditions. Basal aquifer water has not been proposed at this time as a water resupply source. |
| **FMFN comments** | | | | |
| 56 | 5-4 - 5-8 | FHEC indicates that the simulated annual water resupply volumes are based on 75 years of historical climate record.<br>Recommendation<br>FHEC should indicate how it will update the simulation(s) of water resupply volumes: 1) as more years of MLWC hydrological data are collected, and 2) taking into account climate change scenarios/predictions. | **FMFN** | FHEC will continue to update the MLWC HGS model with new climate (weather) data as it is collected. As the water resupply system is operated, this data will also be used to update the MLWC HGS. Model updates will continue to occur on a regular frequency as long as the MLWC HGS model is needed to operate the water supply (the model's role in this is expected to diminish over time as FHEC gains experience operating the water resupply system). An initial set of climate change scenarios was produced for the MLWC OP. Climate change will likely impact the volume of water FHEC ultimately uses in the entire life of the water resupply system but is not expected to be factored in every two weeks or every month (whatever the planning period ends up being) when it is being determined how much water will need to be added to the system in the next 2 weeks, month, etc. Although climate change will not be accounted for in this water volume calculation, current weather conditions will be. |

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 4 | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 57 | 5-24 | Suncor indicates that the sedimentation ponds will be designed to contain the 1 in 10 year 24-hour rainfall and that the spillways that would allow the 1 in 100 year, 24-hour runoff to pass. The 1 in 10 year design is the regulatory minimum. Since McClelland Lake Operational Plan is meant to protect the existing fen and planning and design should be precautionary, and have a higher level of water quality protection.<br><br>Regarding the spillway, it is good that it is designed to a higher level of capacity than the sedimentation pond. However FHEC does not say what happens when/if the spillway carrying capacity is exceeded and how the water quality in the fen and lake will be protected.<br><br>Has FHEC taken into account climate change predictions (e.g. increased variability in precipitation) and changes in regional runoff (e.g. from forest fires) in its determination of hydrological design statistics and sedimentation pond design capacities?<br><br>Recommendation<br>We recommend that FHEC:<br>1)Take into account climate change predictions and regional changes in runoff (e.g. from forest fires) when developing its hydrological design statistics,<br>2)Design the sedimentation ponds for a higher capacity than 1 in 10 year,<br>3)Clearly describe what happens to water that exceeds the sedimentation pond design capacity and spillway capacity and how it is safely routed away from the fen and lake; and<br>4)Develop a contingency plan to show how water quality in the MLWC will be protected in the event of an exceedance of the sedimentation pond and spillway capacity. | **FMFN** | 1) Potential climate change effects on the design inflow volumes and rates will be considered in designing the sedimentation ponds, and appropriate design freeboards will be provided as necessary to address the potential risks associated with climate change.<br><br>2) FHEC considers that the 10-year design criteria for managing sediment outflows from the sedimentation ponds in the McClelland Lake watershed are still appropriate for the following reasons: a) they comply with the EPEA approval conditions; b) the additional inflows to the sedimentation ponds during flood events larger than the 10-year design event will be relatively small because of the local contributing drainage areas to these ponds are relatively small; and c) any potential sediment loading associated with the pond outflows during flood events greater than the 10-year design event will be relatively small compared to the overall sediment yields in the McClelland Lake watershed during such large flood events, so any potential sediment outflows from the sedimentation ponds are expected to have negligible effects on the sediment concentration of the water inflow to the non-mined portion of the MLWC.<br><br>3) The inflows beyond the design capacities of the ponds and spillways are expected to become overland flows, which may cause some local erosion. However, the sediment yield from such local erosion will be relatively small in comparison to the overall sediment yield in the McClelland Lake watershed during large flood events exceeding the 100-year design flood. Therefore, any potential local sediment yield due to the pond overflows will have negligible effects on the sediment concentration of the water inflow to the non-mined portion of the MLWC during such large flood events exceeding the 100-year design flood.<br><br>4) The water inflow to the non-mined portion of the MLWC will be monitored. If any exceedance of the inflow TSS concentration is detected, the causes will be identified and evaluated. Contingency operational measures such as routing the sedimentation pond outflows to the closed-circuit system will be considered and implemented if necessary. |
| 58 | 5-44 | FHEC indicates that for muskeg drainage and overburden dewatering that the only treatment required will be sedimentation ponds for settling and mixing with natural runoff. FHEC does not indicate what would be done if it turns out that the water quality of muskeg drainage and overburden dewatering is not sufficiently similar to the fen (within the measured range of variation) or it is somehow contaminated (e.g. exposure to lean oil sands)<br><br>Recommendation<br>FHEC should have a contingency plan and explain in the operational plan how it would address treatment of muskeg drainage and overburden runoff if it turns out that sedimentation ponds and natural mixing are insufficient to ensure that the water quality (from muskeg drainage and overburden dewatering) is within the range of measured variability of the fen. | **FMFN** | Water quality of muskeg drainage and overburden dewatering water is discussed in Table 5.2-1.If the water quality did not meet required specifications, the contingency would be to recycle to the industrial wastewater system if required. However, Section 5.2.3 also includes the following statement: "FHEC plans to continue its evaluation of the above-mentioned water resupply sources, including confirmation of any water treatment requirements, as well as potential use of FHUC Quaternary aquifer water particularly during the initial water resupply period." |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 5 | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| **3.0 Objective 5- Develop an effects monitoring program** | | | | |
| 1 | General comments on Objective 5 | Add discussion on the monitoring programs for the complimentary, and site wide indicators.<br><br>Please outline how the complimentary data sets will be used to support the understanding of the integrated indicators, as this is the function of complimentary indicators.<br>If changes occur in complimentary or site wide monitoring indicators how will mitigation or management responses to these changes be addressed | **Co-Chairs** | Complimentary data are collected at the same time as the primary effects indicator data, and will be used to help interpret the primary effects indicator results. The site wide programs will remain outside of the OP. Fort Hills is keeping these programs purposefully separate to avoid duplication and overlapping requirements. |
| 2 | General comments on Objective 5 | Outline how community members will be involved with western scientists in the Environmental Effects monitoring programs. For example, IK on water quality parameters such as odor, and color, have not integrated into the water quality program described in section 6.33 and the collection of information on culturally important plants have not been included in the Vegetation Section 6.3.5. | **Co-Chairs** | Fort Hills is open to the recommendation of having community members join field programs when it is safe to do so, however work to increase the scope and scale of the monitoring programs has not been fully assessed and it would be premature to include this in the OP. Fort Hills commit to working further with the SC on this recommendation in 2022. |
| 3 | General comments on Objective 5 | Add Sustainability Committee recommendations from the approved Indicators and Methods table for additional monitoring in the McClelland Lake area including:<br>• Add vegetation plots along lake shore (to reflect traditional use areas and culturally important plants such as the littoral zone that could be affected by changes in water levels or quality of the lake).<br>• Add one or two additional water quality plots at the lake near the shoreline and near the proposed vegetations plots and/or water levels plots. At the technical meetings on April 29/30 at least one new water quality monitoring site was recommended for the lake.<br>• Review the sites of two shallow water level plots that are currently being monitored by Suncor to ensure they reflect the best locations and if possible, proximity to the shall water vegetation and water quality plots (this is a revised recommendation as it was not clear earlier that these shallow sites would continue to be monitored).<br>• See recommendations for wildlife monitoring below. | **Co-Chairs** | Fort Hills respectfully disagrees with this recommendation at this time. Work to increase the scope, scale, and cost of the monitoring programs has not been fully assessed and it would be premature to include this in the OP. Fort Hills commits to continue discussing additions to existing field programs with the SC post-submission |
| 4 | General comments on Objective 5 | Hold the logistic workshops with TAG and AAG to finalize the locations of these proposed monitoring sites for wildlife, vegetation, and water.<br>Prepare a map of existing and proposed monitoring sites in McClelland Lake area (e.g., existing water level and quality monitoring programs; 20 ARUs (pg. 38; 202O Comprehensive Wildlife Report) | **Co-Chairs** | Fort Hills is committed to holding these workshops in 2022. |
| 5 | General comments on Objective 5 | There are several new monitoring sites being established that do not have historic data sets such as the new peat wells (page 6-13), and water and vegetation monitoring sites at Gypsy Gordon and Audet Lake, yet there were several indicators recommended by the SC that were excluded from consideration in the monitoring program as they did not have enough baseline information. The indicators excluded from the environmental monitoring program should be revised as this may not be a valid reason for exclusion from the monitoring program. | **Co-Chairs** | As discussed under comments on Objective 2, after meeting to review comments on Objectives 1 & 2, a number of items on the Objective 2 Indicator Selection flow chart were modified based on TAG and SC feedback. There was confusion around the box asking the question "if there sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not include anything in the OP for which there is not enough baseline to determine if its an effective indicator or not. |
| 6 | General comments on Objective 5 | Wildlife Monitoring:<br>• The lake area is where many Indigenous land users hunt, trap and gather resources. Hence, it is recommended that wildlife monitoring be extended into new areas along the west, north and southeast edge of McClelland Lake.<br>• TAG has recommended a wildlife program to detect early disturbance to wildlife from noise, activity and light e.g. moose, birds & waterfowl.<br>• The SC has recommended expanding wildlife monitoring sites along the west and north and southeast shore of the lake: by adding some cameras and evaluating whether data collected by ARUs for yellow rail could also be analyzed for birds and frogs (as per the current fen monitoring program). If this ABMI data cannot be used for the Fort Hills monitoring program,<br>then new ARUs should be added.<br>• The Before/After/Control/Impact (BACI) Design should be followed, hence new wildlife monitoring plots in lake locations should be placed as soon as possible with consultation of the communities and before the effects from mining begin. Suncor should be proactive and gather baseline information that can be used to show no changes or changes are occurring to wildlife as a result of the Fort Hills project. It will be too late to get good baseline data on wildlife in the more extensive lake area, if a changes in water quality or quantity, vegetation or wildlife are observed in fen.<br>• Most mitigation proposed in the site wide monitoring program are not applicable for use in the non-mined portion of the fen (see wildlife table). Some mitigations specific to potential effects on the wildlife indicators recommended by the SC should be developed. | **Co-Chairs** | Wildlife indicators are monitored through the Fort Hills WMMP, not through the OP. Fort Hills is committed to workshop with the SC and Advisory Groups in 2022 to discuss and review input on the wildlife program at that time. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 5 | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 7 | General comments on Objective 5 | Describe how ITK informed the development of the Effects Monitoring Program. | **Co-Chairs** | Section 6.1.1 describes the SC input into the monitoring programs and how the SC identified values and functions of the wetland. Additional context has been added to characterize SC involvement in the current monitoring program design, as well as a commitment to ongoing engagement on the program. |
| 8 | General comments on Objective 5 (More details in Submission) | Objective 5 should be revised based on the recommendations for Objectives 1 and 2 and then re-visited for review. | **FMCA/FMMN** | Objective 5 has been updated to reflect changes in earlier sections |
| 9 | General comments on Objective 5 (More details in Submission) | It would be helpful to have at a minimum some information as to the contents of Objectives 3 and 4 prior to finalizing input into Objective 5. For example, it is typical that an assessment of potential impacts would occur prior to developing mitigation and monitoring so that they can be designed appropriately. | **FMCA/FMMN** | FHEC acknowledges that the out of sequence review was challenging and hopes that the additional time given to review the document as a whole will help show how it fits together. |
| 10 | General comments on Objective 5 (More details in Submission) | This section must be revised to reflect how SC, AAG and TAG information informed this section as well as to integrate the IK that has been shared with respect to the monitoring program. | **FMCA/FMMN** | Section 6.1.1 describes the SC input into the monitoring programs and how the SC identified values and functions of the wetland. Additional context has been added to characterize SC involvement in the current monitoring program design, as well as a commitment to ongoing engagement on the program. |
| 11 | General comments on Objective 5 | The comments and suggested improvements for Objective 1 and 2 must be incorporated first, to direct and modify the effects monitoring program. Problems associated with monitoring baseline conditions, and lack of key parameters in Objective 1 and 2, greatly decrease the effectiveness of the monitoring program proposed in Objective 5. Furthermore, the details of Objective 3 (the conceptual and numerical models) and Objective 4 (the proposed modifications to the system) are required to understand what should be monitored and where, and to what degree the system might be expected to vary. That is, use the outcomes of Objectives 3 and 4 (including parallel work on Reference Ecosystems) to target monitoring locations.<br><br>This reporting on the Objective 5 design is so high level that the effectiveness, robustness, and rigor of the science in this program cannot be evaluated at this time. More details and all the background information are required. | **TAG - Hydrology** | FHEC acknowledges that the out of sequence review was challenging and hopes that the additional time given to review the document as a whole will help show how it fits together. |
| 12 | General comments on Objective 5 | Revisit Objective 5 after modifying Objectives 1 and 2. A major gap in the effects monitoring is failing to assess how the operations (i.e., Objective 4) may affect different source areas, the flow paths and substrate geology interaction that influences the water chemistry moving to and through the MLWC and lake. The effects of operations are contingent on how they interact with sources of water to MLWC and the lake. This is controlled by the hydrologic setting (i.e., the HRA). Using a representative EHZ is inadequate because it only provides information on similar types of vegetation and water levels present. Integration of the EHZs with the HRAs will be necessary to direct sampling locations. | **TAG - Hydrology** | Recommendations that were incorporated in to previous Objectives have been carried through subsequent Objectives as necessary. The integration of the EHZs with the HRAs has been considered and is discussed in the Conceptual Model Appendix of Objective 3. Different source areas, flow paths and substrate geology have taken in to consideration when choosing monitoring locations and the text has been updated to reflect that. As the design features move from a conceptual plan to detailed engineering, monitoring plans can and will evolve to include more locations as necessary. Also, please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4. |
| 13 | General comments on Objective 5 | The same EHZ on the south and north side of the MLWC receive different types and flow paths of water and chemistry. Thus, both sides should be monitored for all EHZs. For example, a selection in EHZ4 on the south (base of Ft Hills) is not representative on the potential impacts of different operations that occur on the north. Both sides should be monitored as there are different operation procedure occurring on the north and south watershed. EHZ 1, 2 and 4 that receive waters from NOP require better characterization and monitoring. | **TAG - Hydrology** | Both sides will be monitored as part of the early warning monitoring program. The "early warning monitoring zones" shown on Figure 6-3 were meant to delineate where further early warning monitoring will occur in the future once the location of the design features is better understood. There are many suitable locations in those areas that have sufficient baseline data and additionally, locations will continue to be examined in future, for example during the 2021 field season, and during the 2021/2022 drilling programs. Points that were shown on Figure 6-3 were not the only locations that will be included going forward. However to address the question, water level monitoring locations have been expanded to capture flow from NOP. Please see updated figure and text. |
| 14 | General comments on Objective 5 | AQ3 and 4 are likely sources for the mineral-rich pattern fen portion, these should be included in the monitoring program. Currently, effective monitoring of all possible impacts by operations and mitigation strategies has not been proposed. | **TAG - Hydrology** | See response to item #13 and additionally, FHEC has added locations in the FHUC to capture these areas as recommended. These were added under item#58 below. Please see updated figure and text. |

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 5 | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 15 | General comments on Objective 5 | A detailed list of possible and perceived impacts should be provided (see comments on Objective 2) and monitoring placed into the context of addressing these potential impacts. | **TAG - Hydrology** | The reader should be pointed back to the driver-stressor-response section in Objective 2. The impact pathway diagram provided there was recommended and approved by the SC. The diagram also shows the full suite of potential impacts and where they are addressed (OP vs. other site-wide monitoring vs. ESCT). The primary effects indicators to be included in the OP are further discussed at the beginning of Section 6.2. |
| 16 | General comments on Objective 5 | The information provided on monitoring of the reference systems (Audet, Gypsy Gordon) does not allow the advisory panels to assess the effectiveness of the site location or parameter election, and thus effectiveness in general. Some consideration of HRA integrated with EHZ is required for the reference sites, and comparison with equivalent type sites in MLWC and Lake are required to effectively assess/trigger early warning signals and correctly interpret the BACI design. Description of this in some detail is needed. Without such detail it appears that only a simple, general idea has been conceived and is being presented, with the intent to "work it out later". Without careful consideration of the nuances required to direct an early warning system and to assess changes at both the reference sites and MLWC, there could be serious misinterpretation and incorrect actions. | **TAG - Hydrology** | FHEC acknowledges that more information is required for the reference sites and is committed to progressing this work in 2022. See responses to items #7, #8 and #15 on Objective 1. |
| 17 | General comments on Objective 5 | Becoming more and more aware of the global rising of annual temperature overall of boreal Canada and associated droughts (already experienced and forecasted more precisely within the latest IPCC report of August 2021 - IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press), it becomes absolutely imperative to have reference ecosystems to discriminate between a potential drying created by the presence of the wall versus the expected general global warming.<br><br>TAG-vegetation reinforcing this comment from TAG_hydrology:<br>A detailed list of possible and perceived impacts, should be provided and monitoring placed into the context of addressing these potential impacts | **TAG - Vegetation** | See response to Item #16. |
| **6.1 Introduction** | | | | |
| 18 | 6-1 | Please write out the conditions 3.13 c, d, e | **Co-Chairs** | This information is provided in Section 1: Introduction. |
| 19 | 6-2 | The Monitoring Program currently outlines monitoring using Early Warning Indicators and hence indicators for important values recommended by the AAG, TAG and SC are not discussed. Discuss what will trigger the inclusion of the other recommended indicators into the Effects Monitoring Program?<br><br>The Spatial scope for the EEM as defined in this section is narrowly confined to the fen. The MLWC has been defined in the Suncor's proposal to include the fen, lake and surrounding watershed; hence the SC monitoring program should be extended beyond the fen. | **Co-Chairs** | Monitoring of important values will be carried out under the ESCT monitoring program, and while full details of that program will not be ready prior to OP submission, Fort Hills has committed to working with the SC to finalize that program post-submission (by the end of 2022).<br>In terms of spatial scope, see figure 1-1 in Section 1: Introduction for the delineation of the spatial boundaries for the Operational Plan. Condition 3.11 of Fort Hill's Water Act Approval 151636-01-00 (as amended) requires that an operational Plan be developed for the sustainability of the non-mined portion of the MLWC. As such monitoring programs have been focussed on this area. |
| 20 | 6-2 | Sentence at the top of the page that reads: It was emphasized in this workshop to select indicators that would be sensitive to potential environmental changes from the Fort hills Project and indicators with sufficient baseline data to measure changes. The last part of the sentence is incorrect as the amount of baseline information was NOT uses as a criterion for indicators selection. This criterion is not supported by TAG or the SC. | **Co-Chairs** | See response to item #5. |
| 21 | 6-2 | The classification system for indicators documented in Section 2 was presented at the April 29 and 30 meeting Suncor's recommendations were provided a couple of days before 2-day meeting, and although there was some feedback from the participants during the meeting there was no time to schedule a meeting where the SC, TAG and AAG could provide a fulsome feedback to Suncor on the classification system and how the indicators would be monitored. There was no agreement provided by SC on classification system.<br><br>Further discuss is needed between the SC and TAG, and Suncor on the classification of indicators and the monitoring that would be conducted because of this classification. There was no agreement provided by SC on classification system | **Co-Chairs** | See response to Objective 2, item #2. |
| 22 | 6-12 | The design and methods of monitoring, the data analysis, and the consequence of observed changes in trends needs to be defined. For example, trend analysis could be evaluated using the Mann Kendall test<br>that is discussed on pg 6-12 of Objective 5. | **Co-Chairs** | This is the subject of Objective 6: Develop a Response Framework, and the details can be found there. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 5 | | | | |
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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 23 | 6-1<br>(More details in Submission) | The introduction should reflect the description of Objective 5 provided in the 2018 Proposal, namely: The planned approach for developing the effects monitoring program is to:<br>• Evaluate existing pre-disturbance baseline and historical data at the McClelland Lake Wetland Complex,<br>• Evaluate existing reference site data,<br>• Design draft Effects Monitoring Program and review with Sustainability Committee,<br>• Submit an Effects Monitoring Program framework as part of the Operational Plan,<br>• Refine the Effects Monitoring Program framework as required based on data collected. | **FMCA/FMMN** | Note that not all of these fit within Objective 5 (bullets 1and 2 are reflected in Objective 1). A sentence was added at end of Section 6.1 for bullets 3-5. |
| 24 | 6-1<br>(More details in Submission) | There should be a concordance table with the 2018 Proposal tasks. Based on review of Objective #5, the effects monitoring program needs to align with the assessment endpoints – the assessment (Objective 3 is not complete) and therefore the monitoring program at this point is a best guess. This concordance table then needs to identify when specific tasks will be completed or developed once the project moves from a conceptual plan to the detailed design plan. | **FMCA/FMMN** | Concordance tables are provided in Section 1: Introduction.. |
| 25 | 6-1 to 6-3<br>(More details in Submission) | As this section is about the monitoring program itself it should speak to the SC input into what indicators and methods were recommended and how that information was included. | **FMCA/FMMN** | Content and context was added to Section 6.1.1 to better describe SC input into the monitoring programs. |
| 26 | 6-1 to 6-3<br>(More details in Submission) | The reference to Figure 6-1 (Linkages Between Environmental and Socio-Cultural Functions) should also be discussed with respect to the functionality of the MLWC and tied back to Objective 2 (Section 3.3.1, Figure 3-2 and Table 3-1) as revised based on recommendations provided for Objectives 1 and 2 (e.g. baseline, definition of functionality). The effects monitoring program must include how (approach, methods) these linkages will be assessed and/or monitored through time and carried into the response management framework | **FMCA/FMMN** | As per several recommendations from the SC, linkages between the Objectives have been made more clear throughout the document (introduction sections of each objective). |
| 27 | 6-1 to 6-3<br>(More details in Submission) | The indicator groupings and indicator selection criteria have been developed by Suncor and not adopted by the SC, AAG or TAG. Both must be brought forward to the SC for discussion, revision if necessary and approved before they can be adopted and used in the Plan. | **FMCA/FMMN** | See response to item #21 |
| 28 | 6-3 | Several of the linkages are missing, such as 1. clean water and how that supports trapping. 2. Regulates water movement and provides clean water. | **MCFN** | This figure is a final approved work product of the SC resulting from the indicator workshops in 2019-2020 and FHEC is unable to edit it. Note that this figure was included in Objective 2, and has been replaced with an updated version illustrating the monitoring program in context with the MLWC functions. |
| 29 | 6-1 | There is insufficient information on earlier objectives and how they tie into this objective. The advisory committee cannot make informed decision on the effectiveness of Objective 5 without reviewing Objectives 3 and 4 (i.e., Objectives 1 and 2 are not enough). | **TAG - Hydrology** | See response to item #11. |
| 30 | 6-1 to 6.2 | Page number [ 6-1], Here, as in objective 2, it is misleading to indicate that many workshops where conducted and this justifies or validates the direction taken in this objective. There were many workshops, but finalization of the monitoring program was not completed, and in addition this report does not act on many of the recommendations that were made<br><br>Last paragraph page 6-2 (and first paragraph of Section 6.2): Effectively dropping the committee's recommendations and choosing a convenient subset. SUNCOR requires much better justification than what is provided here | **TAG - Hydrology** | Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss comments on draft sections of the OP and many modifications have been made based on SC and TAG feedback. As well, the final list of recommended indicators that was provided by the SC (Final Approved Short Early Warning Indicators and Methods, May 29, 2021) was used as the basis for Objective 2 and subsequently the effects monitoring under Objective 5. Ultimately, the classification of indicators and where they sit within the framework of monitoring for Fort Hills is a Suncor decision but has been made using the list of indicators and other recommendations provided by the SC. The rationale behind why some have not been included is provided in the text of Objective 2 and also in this response document. |
| 31 | 6-1 | TAG_Vegetation agrees with TAG hydrology assessment:<br><br>*There is insufficient information on earlier objectives and how they tie into this objective. The advisory committee cannot make informed decision on the effectiveness of Objective 5 without reviewing Objectives 3 and 4 (i.e., Objectives 1 and 2 are not enough).* | **TAG - Vegetation** | See response to item #11. |

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| 32 | 6-1 to 6-2 | TAG_Vegetation strongly supports the view expressed by TAG_Hydrology:<br><br>*Page number [ 6-1], Here, as in objective 2, it is misleading to indicate that* ***many workshops where conducted and this justifies or validates the direction taken in this objective.*** *There were many workshops, but finalization of the monitoring program was not completed, and in addition this report does not act on many of the recommendations that were made.*<br><br>*Last paragraph page 6-2 (and first paragraph of Section 6.2): Effectively dropping the committee's recommendations and choosing a convenient subset. SUNCOR requires much better justification than what is provided here.*<br><br>What is the practical use really of Figure 6-1, who will take time to decode it? How is all these linkages will help to asses the effect of the mining activities. I see it as the general definition of ecology of the 60s and 70s. | **TAG - Vegetation** | Figure 6-1 was a final approved work product of the SC. See response to #28 above. |
| **6.2 Monitoring Program Overview** | | | | |
| 33 | 6-4 | Air deposition, land clearing, road building and other "drivers" result in stressors in social-ecological systems that are not discussed in page 6-4.<br><br>Figure 6-2 should be modified to show the connections across all the indicators:<br>o Add double headed arrow from Data collected under site wildlife program indicators (such as wildlife to the Data collected under the SCT program (potential changes in wildlife could affect traditional land use)<br>o Add an arrow from Complement data to the Data collected under the SCT program (e.g. water quality)<br><br>Direct effects on indicators such as noise, activities and air quality have not been discussed in the methods section. As noted above under the general comments for wildlife Suncor will be modelling noise and air emission concentrations in the MLWC | **Co-Chairs** | Figure 6-2 was found to not be useful or needed and was removed. |
| 34 | 6-5 | Should add recommendations to address complementary indicators and site wide monitoring indicators such as wildlife. | **Co-Chairs** | See response to item #1. |
| 35 | Figure 6-3 | Prepare a map of existing and proposed monitoring sites in McClelland Lake area, similar the map shown in Figure 6.3 for the fen e.g. existing: 2 shallow water levels sites and 1 deep water level and quality site, water outlet on McClelland Lake,(from pg. 6-16) 20 ARUs, and proposed water quality and vegetation plots etc. The legend on Figure 6-16 is very difficult to read and interpret. Recommend revising the legend.<br><br>The legend on Figure 6-16 is very difficult to read and interpret. Recommend revising the legend | **Co-Chairs** | Revised lake water quality sampling methodology: water samples will be collected as TWO composite samples from shallow and deep areas SEPARATELY. Text and figure updated to reflect this change. Sampling protocol to be revisited if no significant differences between shallow and deep lake water chemistry are found. Please provide specific recommendations to improve the figure legend if it is still problematic. The wildlife monitoring locations will not be added as these are not included under the OP monitoring program. |
| 36 | 6-8 | Table 6-2 says vegetation is not applicable to the lake monitoring. This conflicts with the IK of local trappers who say vegetation is one of the main "indicators" of water depth along the shores of McClelland Lake. TAG has recommended adding vegetation monitoring around the Lake shore.<br><br>Table 6-2 Lake monitoring: with respect to vegetation, delete "Not applicable" and replace with "three new monitoring locations for vegetation". | **Co-Chairs** | Fort Hills respectfully disagrees with this recommendation at this time. Work to increase the scope, scale, and cost of the monitoring programs has not been fully undertaken and it would be premature to include this in the OP. Fort Hills commits to continue discussing changes to existing field programs with the SC post-submission. |
| 37 | 6-3 to 6-5 (More details in Submission) | Based on the 2018 Proposal definitions and principles, Objective 5 must be rewritten to include the whole of the effects monitoring program for the unmined portion of the MLWC (not just the fen), integrate western science and indigenous knowledge, carried over in its entirety to the forthcoming response framework (Objective 6) and informed by SC recommendations. Objectives 1 and 2 must also be revised accordingly. | **FMCA/FMMN** | See figure 1-1 in Section 1: Introduction for the delineation of the spatial boundaries for the Operational Plan. Condition 3.11 of Fort Hill's Water Act Approval 151636-01-00 (as amended) requires that an operational Plan be developed for the sustainability of the non-mined portion of the MLWC. As such monitoring programs have been focussed on this area. |
| 38 | 6.4, Figure 6-2 (More details in Submission) | Figure 6-2 is not reflective of the discussions with AAG, TAG or the SC and needs to be revised and be aligned with revisions previously recommended in keeping with indicator groupings and criteria, baseline and its linkage to engineering and non-engineering mitigations (that should be based on Objective 3 that has not yet been provided) and the response framework. Both Figure 6-2 of Objective 5 and Figure 3-3 of Objective 2 need to be revised and provided to the SC for discussion, revision if necessary and approval prior to use in the Plan | **FMCA/FMMN** | See response to Objective 2, item #2. |
| 39 | 6.4, Figure 6-2 (More details in Submission) | The text following Figure 6-2 is misleading and comes off as the rationale for the 'short list' of 'integrated indicators' as early warning. If retained, the text must be changed to '*potential stressors to the ecosystem that were identified as integrated indicators* ***by Suncor*** *under Objective 2…… "* | **FMCA/FMMN** | See response to Objective 2, item #2. |
| 40 | 6.4, Figure 6-2 (More details in Submission) | Key questions to define the effects monitoring program should have been developed through discussion with the AGG, TAG and SC. The SC needs to review and discuss the key questions that form the effects monitoring program. Once the key questions are established through the SC Objective 5 needs revision accordingly. | **FMCA/FMMN** | See response to Objective 2, item #2. |

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| 41 | 6-5 to 6.6 (More details in Submission) | This section should describe the monitoring in the MLWC (watershed, water basin, lake and fen) along with the reference sites (i.e. it should take a spatial scale approach, getting finer in scale based on the monitoring components for which indicators and methods have been identified). For example, what is being monitored to detect if any affects occur at the watershed level, water basin level, the lake and finally the unmined portion of the fen. Based on recommended changes to Objective 2, Section 3.4 of Objective 2 (Selected Indicators) should be detailed in each of the remaining sections of the report. In the case of site-wide monitoring, clear linkages with indicators identified by the SC, AAG and TAG should be drawn<br>and appropriate spatial scales for monitoring change to the MLWC confirmed (i.e. upon review of the draft Comparison of Suncor Site-Wide Wildlife Program for Fort Hills vs Needs of MLWC Wildlife Monitoring Program, the site-wide monitoring plan for wildlife is either not applicable or requires an expansion of scope to cover the MLWC at a spatial scale to detect change to the functionality of the MLWC).<br>In the case of Community Participation in MLWC Effects Monitoring Program (via proposed environmental monitoring or through the interview and observation log methods) this needs to be detailed to the extent possible prior to submission of the plan (i.e. provide the proposed framework, identified methods and any other information as that area is further developed through workshops, etc.). | **FMCA/FMMN** | As per the Proposal, "The effects monitoring program will be designed to detect changes in the non-mined portion of the McClelland Lake Wetland Complex and to determine whether these changes are a result of activities associated with the Fort Hills Project." Condition 3.11 of Fort Hill's Water Act Approval 151636-01-00 (as amended) requires that an operational Plan be developed for the sustainability of the non-mined portion of the MLWC. As such monitoring programs have been focussed on this area. See figure 1-1 in Section 1: Introduction for the delineation of the spatial boundaries for the Operational Plan.<br>In terms of community participation in the effects monitoring program, those details are still being discussed at the SC. Suncor has committed within Objective 5 to continue to work this aspect with the SC and to have it largely complete by a firm date (end of 2022). |
| 42 | 6-5 to 6.6 (More details in Submission) | 'MLWC' is referenced throughout this section which does not align with the definition of the MLWC.<br>Please change all references to ether the 'fen' or 'lake' as appropriate, particularly in Table 6-1. | **FMCA/FMMN** | FHEC has reviewed usage of "MLWC" in this section and believe it is consistent with the definitions in the introduction. See response to item #37 |
| 43 | Proposed Sampling Locations | It is not clear how monitoring locations were informed by Indigenous knowledge or input from AAG or TAG. This needs to be included. | **FMCA/FMMN** | Context was added to Section 6.1.1 to highlight SC and Advisory group involvement in monitoring program design over the past 16 years. |
| 44 | 6-6 to 6-10 (More details in Submission) | Sampling locations should include all monitoring for all identified indicators, starting with the watershed. See also comment above pertaining to recommended revisions to 6.2. | **FMCA/FMMN** | See response to item #41 |
| 45 | 6-6 to 6-10 (More details in Submission) | Spatial and temporal gaps should be identified for each indicator and a plan to fill those gaps discussed. | **FMCA/FMMN** | Spatial gaps at MLWC will be filled as shown on updated Figure 6-1 (formerly Figure 6-3); temporal gaps will be filled by collecting additional pre-mining baseline data before the start of mining within the MLWC watershed.<br><br>Spatial and temporal gaps for reference sites are outlined in Section 6.2.2.2; these will be filled by adding additional monitoring and collecting pre-mining baseline data before the start of mining within the MLWC watershed |
| 46 | 6-6 to 6-10 (More details in Submission) | Page 6-10 discusses the BACI design approach and the applicability to the reference sites (control) and MLWC sites (impact) yet identifies that **pre-mining data (baseline) still needs to be collected to adequately meet the requirement for a BACI design. This is in contradiction to the indicator selection criteria, one of which is 'are pre-mining datasets sufficient'**. Based on the selection criteria, the use of the BACI and reference sites would fall out and not be included in the proposed effects monitoring program. This further highlights the need to revise the criteria (see recommendation above) – based on the recommended revisions in this review (and for Objective 2), this contradiction would not exist. | **FMCA/FMMN** | See response to Objective 2, item #2. |
| 47 | Overview of Analytical Approach 6-11 to 6-12 (More details in Submission) | Paragraph 2 on page 6-11 should include a clarifying sentence that 'normal range', based on the proposed MRV is not meant to be interpreted as the 'natural range of variability'. See also recommendations provided for Objective 1 with respect to use of MRV and NRV | **FMCA/FMMN** | Section 6.2.3 has been updated to clarify how different analyses will be used. This included taking out the detailed normal range analytical approach because it is included in Objective 1. Hopefully between the updates in Objective 1 and Objective 5, the approach and difference between NRV, MRV and normal range is more clear. |
| 48 | 6-11 to 6-12 (More details in Submission) | This section should also describe the approach to be taken to quantitatively and/or qualitatively ascertain the natural or normal range of variability, conduct BACI analysis (for example by using ordinal ranking), measure temporal trends, etc. for the ESCT indicators. | **FMCA/FMMN** | This recommendation is premature at this point, the ESCT program is still be worked at the SC and full details will not be available prior to submission. |
| 49 | 6-4 | When it comes to mitigation plans, I see that the site wide operational plan (where the wildlife monitoring) has been proposed to reside does not have a mitigation plan linkage to the mitigation under the operational plan. Would like to reiterate MCFN's position of getting the wildlife mitigation under the operational plan rather than a site-wide mitigation plan which likely has a different trigger for a response that the MLWC area. | **MCFN** | The Fort Hills WMMP does have mitigations associated with it and the CWR are submitted to the regulator every 3 years. The wildlife monitoring at MLWC will continue and will remain under the WMMP for Fort Hills. |

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| 50 | 6-4 | The number of locations for groundwater levels and quality monitoring (two) although technically feasible does not provide enough variability in the locations for monitoring such an important parameter. These two parameters are possibly the most fundamental of all the metrics under the monitoring plan. | **MCFN** | FHEC has added locations in a NNW/SSE trending transect across the fen (4 wells); 2 of the wells are in shallow sand, 2 are in deeper. FHEC plans to install shallow peat wells to have integrated monitoring at these locations. There are currently 21 proposed early warning locations for groundwater levels; 11 of these include groundwater quality sampling. In addition, there are currently four proposed integrated wetland monitoring locations that include groundwater levels and quality. While some of the early warning monitoring locations outside of the cutoff wall will be lost as the mine advances, the early warning locations inside the cutoff wall (12) will be monitored for the duration of the project. |
| 51 | 6-3 to 6.4 | Page number [6-3 and 4, Fig 6-2]. This is so high level as it provides little information on the potential impacts of operations and the effectiveness or robustness of the monitoring program. | **TAG - Hydrology** | A brief description of potential impacts (further detail in Objective 3) and water management design features (further detail in Objective 4) was added for additional context; however, now that the reader has all Objectives, this may not seem like such a large gap. |
| 52 | 6-5 | Page 6-5 and Table 6-1. Some maps showing the sampling at the reference sites are required. Page 6-5. Monitoring will be at randomly selected points. Why not target specific points that the conceptual models and numerical models (i.e., the integrated analyses) indicate will be most susceptible? | **TAG - Hydrology** | Citations to Objective 1 figures showing reference site monitoring locations were added in Section 6.2.2.2. Instead of using randomly selected grid points, we are now planning to sample either the full or partial grid; partial grid sampling includes five points recommended by Dale Vitt as having potential to show early effects. Please see updated text in Section 6.2.2.1. |
| 53 | 6-2 | For sampling location outside of the MLWC and the lake, consideration of the source of water (aquifer, etc.) and connection or flow path to the MLWC, as well the geochemistry are considered. As for monitoring the wetland, it appears that EHZ are used as representative zones, but these do not integrate<br>the difference in sources. Thus, for early warning or long-term monitoring more sites that integrate EHZs with HRAs are required. | **TAG - Hydrology** | See the responses to items #13 and #14 - Please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4. |
| 54 | 6-6 to 6.9 (Similar recommendation in General comments) | Non-mined portion of the MLWC. The same EHZ on the south and north side of the MLWC receive different types and flow paths of water and chemistry. Thus both sides should be monitored for all EHZ, a selection in EHZ4 on the south (base of Ft Hills) is not representative on the potential impacts of different operations that occur on the north. Both sides should be monitored as there are different operation procedure occurring on the north and south watershed | **TAG - Hydrology** | See responses to items #13 and #14. |
| 55 | 6-6 to 6.9 | Groundwater and surface water. A location in EHZ 1 and 2 mid-way between the wall and the lake would represent “average “condition with less influence from the wall and the lake. The north side EHZ 4 and 5 water sampling and water level recording is required to assess the potential of dewatering in the NOP. Base of Ft Hill EHZ 6 sampling is required. This is likely a significant surface water generating area for the MLWC | **TAG - Hydrology** | See the responses to items #13 and #14. |
| 56 | 6-6 to 6.9 | Potential linkages and controls of water level and water quality from AQ3 and 4 should be included in the monitoring | **TAG - Hydrology** | See the responses to items #13 and #14. Note please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4. |
| 57 | 6-6 to 6.9 | Climate. The NOP is unique, provide recharge to the sand aquifer important for the MLWC and Lake. A climate station should be on this HRA. | **TAG - Hydrology** | 11 climate stations are already in use including an ET tower at NOP north. Additionally, we have snow surveys in the watershed. FHEC feels that climate is adequately covered and does not support adding more climate stations. |
| 58 | 6-9 to 6-10 | Page number [ 6-9], Table 6-2. Number the sites so Table 6-2 and Figure 6-3 may be integrated and interpreted. Comments on table<br>• AQ4 and AQ3 on southwest slopes of Ft Hills should be characterized<br>• Integrated Monitoring<br>• Changes in water levels mid-way between the wall and lake in EHZ 1 and 2 would be a more effective location to determine average/overall changes in these EHZ, The north side and south side receive different waters, different source and flow path and different chemistry. So, the representative HRA should be included with the EHZ. Water levels in EHZ 4, 5 and 6 on both the north and south should be included<br>• Grid based. Please justify the random selection. For effective monitoring you should follow the same location to detect change<br>• Lake. Why is vegetation not considered? This is confusing. The shallow areas represent 2/3 of the lake and the littoral is very important habitat. The shoreline vegetation should be monitored. | **TAG - Hydrology** | The early warning monitoring locations have been revised based on this feedback, thank you. Please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4.<br><br>Please see response to #52 regarding revised grid sampling plan. These changes have been made to the grid sampling program based on several pieces of TAG feedback.<br><br>In terms of littoral vegetation recommendations, please see the response to Item #3 above. |

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| 59 | 6-10 | Page 6-10, Table 6-3: The range in settings of the sample locations, and an estimate of the integrated HRA/EHZ of each that can be compared with those on the MLWC and Lake need to be used to allow for direct comparison and interpretation of the BACI etc. | **TAG - Hydrology** | FHEC recently did work to define EHZs at reference sites and this work shows that the reference sites are good for vegetation and chemistry and additional work may be required for hydrology and hydrogeology. The reference sites can be used to detect climate change/regional effects. FHEC has been unable to date to find a reference site in the area more similar to MLWC. FHEC is committed to examining the option of adding groundwater monitoring at the Audet Lake Wetland Complex (via hand driven piezometers) starting in 2022. |
| 60 | 6-9 to 6-10 | Conceptual models of the reference systems are required to properly place monitoring locations. | **TAG - Hydrology** | See response to item #60. |
| 61 | 6-11 to 6-12 | No mention of water levels and gradients (i.e., flow rates) (except as part of a multivariate correlation). What about the interpretations? | **TAG - Hydrology** | Analytical approaches for water levels (groundwater and surface water) provided in discipline sections; the Analytical Approach section was intended to provide an overview of analyses used by more than one discipline. |
| 62 | 6-4 | Furthermore, from TAG Vegetation: for Fig. 6-2, the meaning of the colors should be explained in the figure caption as the meaning of ESCT. Fig. 6-2 would need a lot more explanations to fully grasp its meaning and purpose. | **TAG - Vegetation** | See response to item #33. |
| 63 | 6-5 | Page 6-5: Precise the type of organisms upon which biodiversity is projected to be assessed. | **TAG - Vegetation** | The way in which biodiversity is being accounted for under the ESCT monitoring is to be determined and requires community input. Fort Hills is committed to continuing this work in 2022. |
| 64 | 6-5 to 6-6<br>Types of Monitoring | **Just so complicated to no obvious advantage.**<br>See my suggestion of change directly on the main objective 5 document.<br><br>Is the types of monitoring only related to vegetation and its associated chemistry? Does Status monitoring relate to any component of figure 6-2?<br>What is the meaning of Integrated when using the term Integrated Trend Monitoring?<br>This whole description is rather cumbersome as even the status monitoring will be compared in time (compared to the baseline reported by Vitt and House report) – it is the type of statistics employed that will be different to assess if any change occurred in time. I think it would be just best to state the monitoring sampling design associated with each suite of indicators (groups).<br><br>The first split by category of the monitoring types is useless and make things so complicated. Just include Vitt and House spatial grid (with random selections of sampling points) within the column Monitoring type called Integrated wetland monitoring. The analyses of Vitt and House will accomplish the same goals but with a wider spatial coverage.<br>The two approaches of permanent plots and random sampling within a spatial grid covering the whole wetland complete each other nicely. This is a sound sampling design to catch different potential effects. It is just that this whole separation and creation of terminology of 6.2.1 complexifies things for no real purpose.<br>Here is how the table could be reorganised:<br><br>*Permanent, Integrated Wetland Monitoring*<br>Climate: Eight existing climate stations<br>Groundwater level, Surface water hydrology, Groundwater quality, Surface water quality, Vegetation: • Two fully integrated locations for groundwater levels, surface water hydrology, groundwater quality, surface water quality, and vegetation; ○ Two existing groundwater well locations with two wells each; ○ Two new surface water hydrology locations at existing groundwater locations; ○ Two new surface water quality locations; ○ Two existing vegetation locations[4]; • Ten locations for surface water quality and vegetation; ○ Ten[5] new surface water quality locations; ○ Ten existing vegetation locations<br>*Grid-based Wetland Monitoring*<br>~~Groundwater level~~: ~~Not applicable~~<br>~~Groundwater quality~~: ~~Not applicable~~<br>~~Surface water hydrology (water table)~~, ~~Surface water quality~~, ~~Vegetation~~: ~~Subset of eight randomly selected grid locations (three in EHZ 1 and five in EHZ 2) for each survey event~~<br>*Lake Monitoring*<br>Surface water hydrology: Two existing locations for surface water hydrology on shore<br>Surface water quality and aquatic health: One composite sample + depth profiles[6] within lake<br>Groundwater quality: Not applicable<br>Vegetation: Not applicable<br><br>LIROC 2021-08-10 12:50:34<br>• Subset of eight randomly selected grid locations (three in EHZ 1 and five in EHZ 2) for each survey event for water table, surface water quality and vegetation | **TAG - Vegetation** | Please see updates in Sections 6.2.1, 6.2.2 and associated table - monitoring types were simplified as suggested.<br><br>Addressed for item #64. |

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| 65 | Pg 6-6 to 6-10 Proposed Sampling Locations | From text we read: *Because different monitoring components vary at different spatial scales, it is not necessary to include groundwater level, surface water hydrology and groundwater quality at every integrated vegetation and surface water quality monitoring location.* That is why I would not make such a fuss about status and integrated monitoring as done in Table 6-1 as it will not be every where that the monitoring is integrated.<br><br>Overall, in agreement with vegetation sampling design. | **TAG - Vegetation** | Addressed for item #64. |
| 66 | Pg 6-11 to 6-12 Overview of Analytical Approach | All good approaches but some other very simple analyses would nicely. Change of ratios between vegetation groups should definitively be considered (e.g. comparing ratio changes in time between the abundance of graminoid plants and abundance of mosses) or check some correlations as for example the height of shrubs and density in time compare to moss diversity. I suspect that these simple descriptive statistics displayed in a graphic form would me more informative than complicated multivariate analyses for both in interpretation and as clear warning changes | **TAG - Vegetation** | Added some of these suggestions to Section 6.3.5.4.1. FHEC looks forward to discussing this further in the 2022 Vegetation workshop. |
| **6.3 Methods** | | | | |
| 67 | 6.3.2 Surface Water Hydrology<br>**6-15** | As discussed in the introduction, review the sites of two shallow water level plots that are currently being monitored by Suncor to ensure they reflect the best locations and if possible proximity to the shall water vegetation and water quality plots (this is a revised recommendation as it was not clear earlier that these shallow sites would continue to be monitored).<br>Beavers are not mentioned in this section 6.3.2.1, but in Section 6.3.2.2 (page 6-17) and Section 6.3.2.3 it says that beaver activity is documented during each field visit (page 6-17 and a 6-18). Are beaver surveys still going to be carried out? | **Co-Chairs** | See response to item #3 above.<br>Beaver activity mentioned in hydro section but these would be incidental observations, further beaver surveys are not planned at this time. |
| 68 | 6.3.3 Water Quality 6-20 | Add one or two additional water quality plots at the lake near the shore line and near the proposed vegetations plots and/or water levels plots.<br><br>Discuss how the complimentary indicators for water will be used to supplement the integrated water quality parameters. Please outline how the complimentary data sets will be used to support the understanding of the integrated indicators, this is the function of complimentary indicators<br><br>Add qualitative indicators for water quality that could be collected by Indigenous community monitors at the same time as the western science water quality is being collected. These could include parameters such as odor, color and levels of water. | **Co-Chairs** | Water quality is being measured at several locations around the lake, including locations near shore.<br>Regarding additions to the vegetation program, please see response #3 above. Water quality indicators that can be assessed through the ESCT program are still to be developed and we encourage these ideas to be brought forward at the SC. |
| 69 | 6.3.3 Water Quality 6-20 | Explain why water quality parameters that could reflect potential operational water seepage, such as naphthenic acids, PAH, hydrocarbons are not included as integrated indicators rather the complimentary indicators, as one of the concerns related to the MLWC are changes in water quality as a result of operations. | **Co-Chairs** | PAHs, naphthenic acid, and hydrocarbons do not make good indicators because they are not conservative and can biodegrade along the flowpath. The OSPW has elevated chloride which is conservative, is included in the MLWC monitoring as complimentary data as well. The site wide monitoring also includes all of these parameters and should there be a concern of operational water seepage moving towards MLWC, the data will be available to be examined and interpreted. |
| 70 | 6.3.4 Aquatic Resources<br>6-22 to 6-23 | Concern that only chlorophyll a (algae) is the only indicator representing aquatic health. Historically benthic invertebrates were monitored, and this baseline data has been included in Objective 1.<br>Recommend another indicator of aquatic health is added. | **Co-Chairs** | Fort Hills will be collecting water quality and water level data at McClelland Lake. As previously discussed with the TAG and the SC, data collected to date has had high variability and shown that a program to monitor aquatic invertebrates would take many years (or decades) of baseline data collection and is unlikely to result in adequate statistical rigour to detect meaningful changes. |
| 71 | 6.3.5 Vegetation 6-24 to 6-26 | At a minimum, culturally important plants should be monitored in the permanent and grid-based monitoring plots. Add meandering surveys for culturally important plants.<br><br>Add vegetation plots along lake shore (to reflect traditional use areas and culturally important plants such as the littoral zone that could be affected by changes in water levels or quality of the lake).<br><br>Note that plants in the MLWC can be affected by air emissions, especially NOX this close to the mine site that can cause changes to plant growth | **Co-Chairs** | Culturally important plants will be documented if present in the plots. Addition of new programs needs to be further discussed and evaluated - please see response to #3 above. |

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| 72 | 6.3.6 Environmental, Social, Cultural and Traditional Economic Values and Land Use | Rewrite this Section to outline how CBM Programs, Western Science programs in which communities will be involved, and Community Observation Logs and Interview Protocols will be used to identify changes in trends of SCT indicators | **Co-Chairs** | Monitoring of important values will be carried out under the ESCT monitoring program, and while full details of that program will not be ready prior to OP submission, Fort Hills has committed to working with the SC to finalize that program post-submission. |
| 73 | 6-28 and 6- 29 | Add the Final Table prepared by AAG during meetings held May 28, June 10 and July 15 This Table has not yet been approved by the Sustainability Committee due to urgency in providing the table for the Operation Plan. Attachment 2: Framework for Community Participation in the MLWC Effects monitoring program.<br><br>Review Table 6.7 with the Final Table from AAG Meeting held on July 15, as some of the indicators are missing eg Water Quality and Levels | **Co-Chairs** | See the response to item #72. |
| 74 | Methods 6-12 to 6-29 | This section should include all of the methods for all indicators identified for the MLWC by spatial scale to follow the preceding sections (e.g. watershed, water basin, lake, fen). This would include all applicable data collected under the 'complimentary' and 'site-wide' data collection and demonstrate that it is appropriately measured to detect change (e.g. tie back to monitoring locations, sensitivity, etc.). | **FMCA/FMMN** | See response to item #41. |
| 75 | 6-28 to pg 6-29 | The Community Participation in MLWC Effects Monitoring Program (via proposed environmental monitoring or through the interview and observation log methods) needs to be detailed to the extent possible prior to submission of the plan (i.e. provide the proposed framework, identified methods and any other information as that area is further developed through workshops, etc.). This should also include it's linkages to the development of thresholds and triggers to support in them for inclusion in response management. | **FMCA/FMMN** | See response to item # 73. |
| 76 | 6.3.5 Vegetation 6-27 | Collecting data digitally on the field has its benefits but also can lend to data loss/manipulation without paper copies for backup. How will this be mitigated? | **MCFN** | Please see Section 6.3.5.3: Screenshots will be automatically uploaded to the cloud, serving as a backup to ensure the original data remain available. |
| 77 | 6.3.6 Environ, Social, Cultural and Traditional Economic Values and Land Use | Indicators are vague in their measurement scale, and leaves enough room in the lack of specificity to allow for measurements that may not indicate any significant change. Say for example, ice thickness if measured in feet may not indicate much change however, if measured in cm, the likelihood of identifying change could be much higher. Also, indicators like harvest effort are very subjective unless defined by something more tangible | **MCFN** | Details on the ESCT program require further work to develop methodology and approaches. Measurements of indicators will need to be accurate and precise enough to be meaningful and can be communicated in units that are appropriate. Specific to ice, FHEC believes that ice formation is governed primarily by climactic factors (such as temperature and snow) and varies considerably through the winter, affecting its utility as an indicator of Project-related effects. We agree that assessment of many of the ESCT indicators identified are subjective in nature and this should be further discussed at the SC with support from the Advisory groups. |
| 78 | Hydrogeology 6-12 to 6-15 | Relative changes in water levels between points must be evaluated. This provides a measure of changes in flow.<br><br>Page number [ 6-13] Table 6-4. Using groundwater monitoring wells for representative EHZ is not adequate. The watershed monitoring outside the MLWC seems fine (except AQ3 and 4 could be better characterized), but the sampling within the MLWC needs modification to assess difference in source to the north and southern portions<br><br>Table 6-5: EHZ 1 and 4 within NOP HRA are very important and should be included.<br><br>Page 6-13. TAG does not understand this statement: " A total of eight two locations with a total of 16 four wells are proposed." | **TAG - Hydrology** | Please see revised Figure 6-1 (formerly Figure 6-3) which shows additional monitoring locations in EHZ 1, 2, 5 as well as AQ3 and AQ4. |
| 79 | Surface Water Hydrology 6-15 to 6-18 | Surface water levels and chemistry of the EHZ 2, 4 and 5 that receive water from the NOP, and those receiving water from the Fort Hills should be monitored and compared through time.<br><br>What happens if the measurements are outside of the 4 mm difference? Are the data discarded and you end up with a progressively smaller dataset? Or, otherwise? That is, how are corrections to be made?<br>Why delete data for an entire period if the datalogger is found dry. Why not interpret the data to determine which data are still useful/good? | **TAG - Hydrology** | Please see updates in text: If the difference in water level elevation surveyed from two or three benchmarks is more than 0.004 m, the survey will be repeated until the difference is within acceptable range (i.e., 0.004 m or less). |

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| 80 | Water Quality 6-19 to 6-22 | Some representative organo- and metal- contaminant should be included, see comments on Objectives 1 and 2 | **TAG - Hydrology** | While it is unclear exactly what TAG is referring to under the term contaminants, many of the parameters that would typically be considered as contamination, such as hydrocarbons, are included in the water quality portion of the environmental effects monitoring program under complimentary data. |
| 81 | Water Quality 6-21 | Page 6-21: what is the difference between specific conductivity and electrical conductivity? | **TAG - Vegetation** | Generally the conductivity of a solution increases with temperature. Specific conductivity measured in the field is temperature compensated conductivity (corresponding to 25°C). Please see updated in text. |
| 82 | Vegetation 6-24 to 6-28 | See comments on Objectives 1 and 2. Growth rates of trees indicate hydrologic change, and should be measured | **TAG - Hydrology** | Since providing this section to the SC and the TAG, subsequent meetings have been held to discuss the classification of indicators. After the July 19, 2021 meeting a number of items on the Objective 2 Indicator Selection flow chart were modified based on TAG and SC feedback and shared and modified during the Aug 25, 2021 and Sept 7, 2021 meetings. There was confusion around the box asking the question "if there sufficient baseline data available". That didn't adequately capture the question, really the question is "Are pre-mining baseline data sets sufficient to assess efficacy as an indicator". Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if its an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission, and potentially developing programs to determine their effectiveness in future. A future workshop with the TAG to discuss vegetation is planned for 2022 and this can be discussed at that forum. |
| 83 | 6-24 to 6-28 (More details and pictures in Submission) | Noted that TAGvegetation still needs to revise Objective 1 and 2 but before any change in general plant community as will be done with the permanent plots and the random sampling with spatial grid covering the whole MLWC, I reiterate that shrub encroachment from the margins of the strings (or constrictions from their present range) or changes the growth rates of trees (larch trees on strings – dendrochronological study) could give earlier warnings of changes than plant communities. Dwarf birch is a clonal species colonising a band actually larger on the downside of the water flow through the strings of the patterned fen and could react rapidly to drying or wetting. There is numerous papers in the boreal tundra showing shrubs to be a plant component quite responsive to environmental changes.<br>Here are some examples of such studies:<br>Johansson T, Malmer N, Crill PM, Friborg T, Aakerman JH, Mastepanov M et al. Decadal vegetation changes in a northern peatland, greenhouse gas fluxes and net radiative forcing. Global change biology. 2006 Dec;12(12):2352-69.<br>Myers-Smith IH, Forbes BC, Wilmking M, Hallinger M, Lantz T, Blok D et al. 2011. Shrub expansion in tundra ecosystems: dynamics, impacts and research priorities. Environmental Research Letters. 2011 Dec 20;6(4):045509.<br>McManus, K. M., D. C. Morton, J. G. Masek, D. D. Wang, J. O. Sexton, J. R. Nagol, P. Ropars, and S. Boudreau. 2012. Satellite-based evidence for shrub and graminoid tundra expansion in northern Quebec from 1986 to 2010. Global Change Biology 18:2313-2323.<br>Walker, M. D., C. H. Wahren, R. D. Hollister, G. H. R. Henry, L. E. Ahlquist, et al.. 2006. Plant community responses to experimental warming across the tundra biome. Proceedings of the National Academy of Sciences of the United States of America 103:1342-1346.<br>Summary of Walker et al. 2006 paper: The decrease in plant biodiversity of the study is explained by the augmentation of the height and density of shurbs, graminoid plants and herb plants, which consequently caused a diminution of lichens and mosses intolerant to shade. | **TAG - Vegetation** | See response to item #82. |
| 84 | 6-24 to 6-28 | <u>Recommandation as early warning signs</u>:<br>1) Monitored the width occupied by birch on the downside of 10 strings and this for both MLCW and the reference sites.<br>2) Have a good discussion with dendrochronological specialists as to what could be easily detected with cost-effective sampling. I have not done so myself. | **TAG - Vegetation** | See response to item #82. |
| 85 | 6-25 (More details in Submission) | Table 6-6 is not needed for the OP. Delete. | **TAG - Vegetation** | This table needs to be included to show the site and plot naming convention. |
| 86 | 6-26 (Section 6.3.5.2.1) | **Page 6-26 section 6.3.5.2.1 : Why not add the average height of abundant species** as so often discussed in past 2 years or at least by some defined functional group (grasses, sedges, birch, willows, some abundant herbs)? Idem for grid-based vegetation – height? | **TAG - Vegetation** | See response to item #82. |

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| 87 | 6-26 (section 6.3.5.3) (More details in Submission) | Page 6-26 section 6.3.5.3. Quality Assurance and Quality Control: At the beginning of every day, calibration with known **calibration charts** should be performed and compared between the different surveyors of the day. | **TAG - Vegetation** | FHEC agrees with this recommendation and has included this within the OP as recommended. Please see Section 6.3.5.3: At the beginning of each day, surveyors should perform and record a calibration of cover estimates; known calibration charts should be examined, surveyors should together estimate cover of one quadrat and compare their estimate to the chart, then surveyors should individually estimate cover in one quadrat and compare estimates to each other and the chart. |
| **Comments from FMFN** | | | | |
| 88 | 6-4 to 6-5 | In Objective 2 (Figure 3-2), the overall pathway diagram show potential pathways of effects from items that are monitored through EPEA (i.e. the purple coloured boxes). This includes wetland area, emissions in the environment, noise/light, and fish and wildlife. The monitoring indicators that FHEC has selected and the effects monitoring program focuses on the items in the blue coloured boxes on the figure. This includes surface and groundwater hydrology, surface and groundwater quality, vegetation and aquatic resources. This approach seems an appropriate area of core focus. However, it should not be to the exclusion of these other important data and pathways.<br><br>***Recommendation***<br>We recommend that the effects monitoring program (objective 5) and the response framework (objective 6) formally document how these data (EPEA) will be linked to and inform the MLWC Operational Plan.<br>We suggest a separate subsection in each of these objectives that explains (e.g. by way of flow charts or pathway diagrams) how FHEC plans to formally link results of EPEA monitoring (e.g. dust fall, air emission deposition, wildlife monitoring programs); complementary data ( see list in figure 3-4); and MLWC Environmental, Social and Cultural indicators with the response framework and at what type of results would trigger a formal examination of the data for impacts on the MLWC, potential interactions, response, need if any for additional investigations and necessary mitigation. | **FMFN** | These links are covered in Objective 6 and more clarity has been provided there as to how the programs are linked. For example should a level 1 trigger exceedance be observed, other data such as the complimentary, ESCT, and site-wide will be examined, as applicable, during the investigation of cause. It should be noted that only the primary effects indicators within the OP have triggers associated with them. |
| 89 | 6-6 | Table 6-1 and Figure 6-3 are very clear. The early warning monitoring sites are good.<br><br>***Recommendation***<br>What mechanisms does FHEC have internally or thresholds/triggers is FHEC using to determine if there are early warning changes? And how/when will it act (i.e. what information will trigger a decision to further explore and/or mitigate? How will FHEC communicate with Indigenous Communities if early warning sites indicate there is a change outside the MRV or trending in that direction?<br>The above questions should the addressed in the response framework (Objective 6) | **FMFN** | Additional clarity has been added to Objective 6 to address the early warning monitoring program and what it will trigger in terms response. FHEC anticipates that communication of triggers of the response framework will happen via the SC. |
| 90 | 6-7 | The map (Figure 6-3) of proposed wetland monitoring locations in the MLWC is a very good clear map and corresponds to Table 6-2, which lists the monitoring locations by type. For the reference areas (Audet Lake Wetlands Complex and Gypsy-Gordon Wetland Complex) there is only a table presented, but no map.<br><br>***Recommendation***<br>Provide maps of sampling locations for Audet Lake Wetlands Complex and Gypsy-Gordon Wetland Complex, similar to Figure 6-3, which shows sampling locations for the MLWC | **FMFN** | These maps are provided in Objective 1. |
| 91 | 6-9 (6.2.3 Overview of Analytical Approach) | Section 6.2.2.2 describes two reference sites –Audet Lake and Gypsy-Gordon wetland complexes. It is good to see that FHEC is using two reference sites – it will provide valuable regional context, and allow for a Before-After-Control-Impact (BACI) design, to interpret whether any changes at McClelland Lake fen are project-specific or regional in nature.<br><br>The description of the various statistical techniques that will be used determine the normal range [measured range of variability (MRV)] is clear. We will be interesting to understand how monitoring results that fall outside the normal range e.g. water quality (page 6-22) would be addressed as per the Response framework (pending).<br><br>***Recommendation***<br>Ensure that the response framework (Objective 6) explains how monitoring results that fall outside of the normal range will be interpreted and also, since groundwater water quality (Table 2-24) parameters and surface water quality parameters (Table 2-23) recorded to date show a fairly wide ranges how FHEC will interpret data that are not outside the normal range but appear to be changing or trending towards the outside of the range. | **FMFN** | Additional clarity has been provided in Objective 6. |

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| 92 | | ***Recommendation***<br>Permanent vegetation plots will use MRV and BACA approaches for analysis. What is the rationale (section 6.3.5.4.2) only using the MRV approach wetland grid plots. It appears that the appropriate data are being collected at the two reference sites (ALWC, GGWC) to allow a BACI approach for wetland grid plots. | | The grid plots are meant to provide additional spatial coverage at MLWC and are not being considered for Audet nor Gypsy Gordon at this time. |
| 93 | 6-28 to 6-29<br>(Section 6.3.6) | FHEC indicates that at the time of the report the work of the AAG on community indicators (including development of an community observation log or interview questions) was still in progress.<br><br>***Recommendation***<br>Since the FHEC MLWM program is focused around indicators that have early warning potential, AAG may also want to consider community indicators that have early warning potential and that are responsive to change. | **FMFN** | FHEC welcomes this input to future SC discussions on the ESCT program. |
| **Comments from MCFN** | | | | |
| 94 | General | I didn't have time to look thoroughly. Is there mention of how the Gipsy Gordon and Audet Lake systems may be different from MLWC? This might help account for differences between the systems. | **MCFN** | Yes this is discussed in Objective 1 and also in the memo that was provided with FHEC's responses to SC and TAG comments on Objective 1. |
| 95 | 6.2.3 | Since this is based on statistical normality, are we sure that this will be protective of the environment? It might be better to identify end points for indicators to make sure that certain parameters aren't being exceeded. Statistical normalitydoes not mean that conditions on the ground will actually be normal since these are very sensitive environments. | **MCFN** | Additional clarity aroudn the use of the normal range has been provided in the revised Objective 6. |

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| **7.0 Objective 6- Develop a Response Framework** | | | | |
| 1 | **General comments on Objective 6** | It is challenging to review this section when there is still ongoing discussions on finalizing the inclusion of other indicators. The value statements in *Table 7.2-1 Proposed Limit for Each Integrated indictor note that that the Functionality and Biodiversity within the MLWC, including McClelland Lake are sustained* … yet other than water quality and quantity, and *Chlorophyll a* no other functionality or biodiversity measures are being monitored.<br>This section often uses the term "wetland monitoring" which is a bit misleading. Monitoring is only occurring in a portion of the fen, but not in other types of wetland communities that make up the MLWC. | **Co-Chairs** | See figure 1-1 in Section 1: Introduction for the delineation of the spatial boundaries for the Operational Plan. Condition 3.11 of Fort Hill's Water Act Approval 151636-01-00 (as amended) requires that an operational Plan be developed for the sustainability of the non-mined portion of the MLWC, which includes McClelland Lake. As such monitoring programs are focussed on this area.<br>The term "wetland monitoring" is used in the document to refer to monitoring that is proposed to occur within the fen, in contrast with the monitoring that is proposed to occur within the lake, or early warning monitoring, which includes some upland locations. |
| 2 | | The content of Objective 6 was not discussed or workshopped (as were other sections of the Plan) with the SC, AAG or TAG to allow it to be informed by the SC and its Advisory Groups. This Objective is a key piece in ensuring that the functionality and biodiversity of the unmined portion of the MLWC is protected, or at a minimum maintained and yet the response framework as proposed envisions varying degrees of change are acceptable, conditional and, in some cases, a judgement call. Therefore, this Objective needs to be discussed at length with the SC, AAG and TAG and revised as necessary to meet the intent of the 2002 decision report. | **FMCA/FMMN** | Key elements of the Response Framework were shared as a pre-read and discussed during the April 29-30, 2021 workshop. During those workshops, the approach outlined in Objective 6 was discussed and feedback solicited. Questions were asked about how the framework applied the Natural versus Measured Ranges of Variability, and additional context was added throughout the section to help clarify. FHEC welcomes further discussion at the SC about how the Response Framework can be applied to MLWC and updated as additional information and details are developed. |
| 3 | | Unresolved comments on Objectives 1, 2 and 5 remain, and Objectives 3 and 4 have yet to be reviewed. Consequently, some aspects of Objective 6 may change after previous Objectives are revised. TAG finds it difficult to provide fulsome feedback on a piecemeal basis.<br>Reference ecosystems (and associated monitoring sites) are not adequately considered for groundwater and surface-water levels (e.g., Table 7.2-2 and elsewhere). See TAG comments on previous objectives.<br>Modelling. For MLWC (and surrounding area), plus Reference Ecosystems.<br>Where are comparisons to the numerical model incorporated into the analysis? That is, actual data need to be compared to prior model predictions. Do they agree or are they diverging? What is the action if they are diverging? That is, what happens if the outcomes demonstrate that the understanding of the system is incorrect? One possible outcome is that triggers and responses must be re-evaluated. This eventuality does not seem to be considered.<br><br>Management Responses (e.g., Section 7.2.3, Section 7.3.1.4 and elsewhere).<br>Level 1 – identify possible actions, but don't start anything.<br>Level 2 – start doing something.<br>This is a typical reactionary approach; however, reactions may be worth implementing earlier in many cases. For instance, management of water levels and flowrates (the primary management knob) can have an immediate effect on downstream water levels. Why not adjust them earlier than a Level 2 exceedance? A similar argument may be made for chemistry – the input water chemistry is easily controllable. In a similar manner, management responses follow directly from monitoring (quarterly) results.<br>Consequently, optimization (i.e., changes) can only occur every quarter. That doesn't make sense. Changes should be made when the amount of available water (e.g., precipitation, snow melt, ET, etc.) changes, not following when infrequent, regimented monitoring results are obtained.<br>Finally, monitoring (and evaluation) frequency must increase as management adjustments are made to determine whether the "optimizations" are having the desired impacts. Adaptive management requires adaptive monitoring and evaluation.<br><br>Trends. Clarify that trends are also important for evaluating triggers. Specify how trends are incorporated in the triggers (including water levels).<br>Triggers. Numerous AND conditions do not appear to be appropriate (see specific examples below). | **TAG - Hydrology** | Reference Ecosystems: See the response to Objective 1, item #8.<br>Modelling: the text of Objective 6 has been clarified to incorporate more of the adaptive nature of the response framework including re-evaluating triggers and responses through time.<br><br>Level 1 is intended to provide an early warning of potential effects, and implementation of investigation of cause occurs right away so that we can understand the nature of the effect (or whether it may have been a measurement error). Please see updates to text in Management Response and Trigger Assessment Frequency sections<br><br>Trends are now discussed more explicitly throughout the document and are included in triggers where applicable. For surface water levels, a Level 1 trigger is reached if water levels exceed one standard deviation of the mean and a statistically significant trend is documented. Comment about numerous AND conditions is addressed below. |

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| **7.1 Introduction** | | | | |
| 4 | **General Comments 7.1** | Once again, it was challenging to review this section because, as stated in the last sentence in the Introduction: The response framework builds upon information provided in the previous five objectives. FMMN and FCMA have repeatedly requested a 'coles notes' version of forthcoming sections as well as responses to our previous recommendations to help inform review of Objectives as they come out so that the recommendations provided are based on what can be expected in the Plan in its entirety. This information should be provided and then Objective 6 should be revisited for comments and input.<br>The SC and AAG were not involved in the development of the framework, its fundamental principles, limits, triggers or management responses. The review of Objective 6 was the first time that this information was presented even though it essential to ensure the protection of the of the MLWC and more importantly that potential effects do not result in irreversible harm to its functionality or biodiversity. This Objective should be rewritten collaboratively informed by both technical.<br>As should be provided in the Introduction for each objective, a concordance table with the 2018 Proposal should be included. It is unclear what the action plans are and whether they exist beyond doing more or less monitoring or developing a monitoring response plan (at which time mitigation actions may be identified). There are no details and more importantly there is no detail provided with respect to measurability or timeliness demonstrating that the Plan is still in a conceptual phase of development. | **FMCA/FMMN** | FHEC acknowledges that the out of sequence review was challenging and hopes that the additional time given to review the document as a whole will help show how it fits together. Key elements of the Response Framework was discussed with the SC and supporting Advisory Groups during the April 29-30, 2021 workshop. FHEC supports further discussions and workshops on the application of the approach to the indicators with the SC. |
| 5 | **7-1.1 Sustainability Committee Input 7-1** | There were no discussions with the Sustainability Committee (SC) on the details of the Response Framework, Limits and Thresholds before this section of the Operational Plan was provided to the SC for review.<br>It is recommended that a workshop be held with the SC so the Response Frameworks may be adequately developed for all wetland values that will be affected by the FHOP<br>Modify the existing text in Section 7.1.1 to include the bolded words below. "Indigenous communities have shared with Fort Hills that they are concerned that mining part of the fen will put the entire MLWC at risk and participants in the Sustainability Committee (SC) have expressed concern that FHOP will not be able to sustain **the function of** the unmined portion of the **MLWC** and that it can never be replaced | **Co-chairs** | Key elements of the Response Framework were shared as a pre-read and discussed during the April 29-30, 2021 workshop. During those workshops, the approach outlined in Objective 6 was discussed and feedback solicited. Questions were asked about how the framework applied the Natural versus Measured Ranges of Variability, and additional context was added throughout the section to help clarify. FHEC welcomes further discussion at the SC about how the Response Framework can be applied to MLWC and updated as additional information and details are developed. Text has been updated as suggested. |
| 6 | **7-1** | Recommended rewordings include:<br>• 'their lifetime' not many years<br>• 'shared knowledge' not *told them stories*<br>• 'unmined portion of the MLWC' not *unmined portion of the fen**<br><br>The use of the term precautionary approach, if it is to be adopted, must demonstrate that it is being applied through the management response – i.e. are the limits set appropriately? Are the triggers for each level appropriate? This has not been discussed with the SC, AAG or TAG and therefore a discussion on whether the principles, limits and triggers are reflective of a precautionary approach. This is particularly true as it relates to the functionality of the fen as it supports cultural use and practice, informed by Indigenous knowledge.<br>The Limit and associated trigger that considers a cessation of mining activity in the MLWC must be included in all figures and should not be the System Limit as identified in Figure 7.2-3 as this is the point that the system will or may collapse. Therefore, and in keeping with the precautionary approach, cessation must occur once a level 3 trigger has been exceeded until such a time as effective mitigation can be identified and implemented and shown to be effective (for example through a staged and planned restart of activity [mining]).<br>Please see above comments and recommendation regarding absence of SC, AAG or TAG input into the development of the framework, its fundamental principles, limits, triggers or management responses and the need for a collaborative re-development and associated re-write of this section. | | Text has been revised as suggested.<br>Key elements of the Response Framework were shared as a pre-read and discussed during the April 29-30, 2021 workshop. During those workshops, the approach outlined in Objective 6 was discussed and feedback solicited. FHEC welcomes further discussion at the SC about how the Response Framework can be applied to MLWC and updated as additional information and details are developed.<br>As stated in Section 7.2.3.3, part of the management response should a Trigger 3 exceedance be reached, is that FHEC will consider stopping further development within the MLWC watershed until the cause of the trigger exceedance has been identified and an effective mitigation solution is developed and implemented. FHEC will not wait until the system limit is reached for this to happen.<br>For the last line please see the response to item #4. |
| **7.2 Response Framework Overview** | | | | |
| 7 | **General Comments 7-1** | The text states "Should an effect related to Fort Hills Project mining activities be detected during the effects monitoring program (located in the fen) , a corresponding management action will occur. One of the management actions proposed if there are changes in the fend is extending the number of monitoring location in the area.<br>However, if there is a change in the indicator in the fen, it may be too late to get good baseline information from new monitoring sites installed in the lake or along the lake shore to see if changes have occurred or will continue to occur. That is the reason the SC has recommended extending monitoring sites into the lake and lake shore at the beginning of the monitoring program, particularly in areas closer to the fen.<br>Extend monitoring sites for vegetation and wildlife into the lake area now, before effects are detected in the fen. | **Co-chairs** | Fort Hills respectfully disagrees with this request. There are many vegetation plots that are being monitored throughout the fen and these will detect changes well before any changes occur in the lake. Wildlife monitoring is done through the Fort Hills WMMP not through the OP. |

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| | | The text in Section 7.2 states: "the level of action taken depends on the magnitude, frequency or severity of the effect relative to an assessment threshold." How is magnitude different than severity? How are these terms applied to different wetland values within the context of cumulative effects and the current "state" of the indicators (environmental and socio-cultural)?<br>Terms used in the first paragraph e.g., magnitude, severity of the effects should be defined for this document, as there are several definitions in the regulations and literature.<br>The text in Section 7.2 states "This will be accomplished by implementing appropriate management actions at pre-defined trigger levels, which are initiated before a significant adverse effect occurs." Are there plans to re-evaluate "pre-defined trigger levels"? What is the significance criteria being applied to each indicator? | | Text revised to use "magnitude" only, which is how data are compared to trigger threshold values.<br><br>Pre-defined trigger levels are intended to be re-evaluated with each iteration of pre-mining baseline data collection and should not be considered static at this point. "Pre-defined" removed to help with clarity. Triggers are provided conceptually for each discipline in Section 7.3. |
| 8 | **7-2** | The last sentence in the last paragraph states "Environmental, social, cultural, and traditional (ESCT) indicators and complementary data will be used to better understand observed effects and their impacts and causes."<br>Add "Site wide programs including wildlife will also be used to better understand observed effects and their impacts and causes".<br>Explain how information related to ESCT indicators, complementary data and site-wide monitoring programs will influence management responses. | **Co-chairs** | The text has been partially added to state that data from site wide programs may also be examined. |
| 9 | **7-3** | Some of the complex figures are very challenging to read and understand; the legibility is very poor.<br>Figure 7.2-1 is very complex and needs more explanation associated with figure. Even after reading the fundamental principles, not all aspects of the figure had been explained.<br>Add a MLWC Site Wide Monitoring Program box along with the ESCT and Complementary data boxes feeding into the First Blue Box in the diagram. This will help tie the data from all 4 sets of monitoring indicators together, especially with respect to Triggers and Monitoring Response.<br>The two round circle that say Monitoring Response Plan need more explanation. | **Co-chairs** | Figure legibility was improved by moving the figure to a larger page size. A paragraph was added to provide more context for Figure 7.2-1 where it is first introduced. Please note that "monitoring response plan" was changed to "management response plan" throughout as per suggestion heard in meeting with the SC. Additional information about the intent of the management response plan was added to Section 7.2.4. |
| 10 | 7-1 to 7-2 | It is concerning that Objective 6 is based on the assumption that the wall (i.e. the mitigation) is going to generally work. The Framework does not speak to the scenario of the wall not working and what happens in that instance. What if there are physical or engineering complications and (1) construction of the wall fails (i.e. the integrity of the wall itself) or (2) once constructed, multiple triggers are reached simultaneously. To this end, the Framework does not envision the need for an emergency response plan. This must be included in the Framework. | **FMCA/FMMN** | Fort Hills has a site-wide Emergency Response Plan (ERP) which describes a response framework for a wide range of emergency situations. In special cases, the site-wide ERP makes reference to specific ERPs (e.g. for a dam breach) or Emergency Operating Procedures (EOPs). As design features are matured through additional engineering, the appropriate steps will be taken to ensure that their specific risks are captured within the ERP. For example, this may include generation of a cut-off wall specific ERP or EOP. Risk and mitigation plans will also be developed through typical processes such as HAZOPs. |
| | | Please define magnitude, frequency and severity and specifically the difference between magnitude and severity and how it is applied. If the intent is to apply effects classification criteria to make such judgements then the following is recommended:<br>Geographical Extent: the spatial area over which the effect is measurable<br>Duration: the length of time over which an environmental effect occurs<br>Frequency: the number of times an activity occurs<br>Reversibility: the potential for an environmental effect on a measurable parameter to be returned to the conditions that existed before the Project<br>Magnitude: the amount of change to a key indicator or key indicator species | | See response to item #7 |
| | | Please provide definitions for Limit, Threshold and Trigger that clearly articulate the relationship between them including their relationship to adaptive management. Currently the framework focuses on adaptive monitoring once a trigger is reached with little on the management and mitigation actions. For example, based on defined limits (that should describe both ecological and culturally defined limits of change) how are the thresholds defined (both biophysically and bioculturally) so that once a trigger is reached the management actions are focused on preventing further degradation (ecologically and culturally). The monitoring program, that includes monitoring for more than just the primary indicators (e.g. collection of complimentary data, ESCT information and data, site wide data), should be part of informing the investigation of cause allowing that tier of monitoring to be more efficient and effective and the use of these sources of information to inform and understand thresholds and triggers should be clear. | | Limits and triggers are defined in Section 7.2.1, and the relationship between triggers and adaptive management is shown in Figure 7.2-1 (limits are not shown in Figure 7.2-1 because they are not to be reached; however, the relationship between triggers and limits is shown on Figure 7.2-3). If a trigger is reached, management actions will be focused on understanding the cause of the effect, then implementing mitigation to reverse the trend. |

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| 11 | Figure 7.2-1 | Please change the level of saturation of color in the figure as the words are illegible give the dark coloring (particularly in the green and blue).<br><br>This figure is confusing in that it describes the monitoring response but it is unclear how the management response (see page 1 that states the management framework is to respond to results) ties in to reverse trends. The most evident example is upon reaching Level 3 activity stops and 'effective mitigation' is applied and then it is assumed that surveillance monitoring will ensue. How will we know it is effective – what are the steps that will be taken to ensure the mitigation is effective? The monitoring response plan kicks in at Levels 1 and 2 but the linkages are unclear to if management/mitigation occurs and how this is then linked to the triggers. The site-wide information should also inform surveillance monitoring - it is unclear why it is illustrated as an 'end result' – i.e. if it is a regional cause it still is resulting in a trigger being exceeded and needs to be responded to (i.e. it is not in and of itself a response). This diagram needs to be vetted through a workshop with the SC and, if necessary, an accompanying management response framework needs to be developed. MONITORING IS NOT MITIGATION AND DOES NOT REVERSE EFFECTS IN AND OF ITSELF – IT IS MEANT TO INFORM THE RESPONSE BUT IS NOT THE RESPONSE. | **FMCA/FMMN** | Figure legibility issues have been addressed by moving the figure to a larger page size.<br>Additional text has been added where the figure is first introduced to explain that mitigation is first applied if a Level 2 trigger is reached; the blue box asking whether the mitigation is effective is where iterative management responses are made until the answer to "Effective Mitigation?" is yes and the effect magnitude drops below Level 1 trigger exceedance and monitoring returns to the surveillance tier.<br><br>The site-wide data would be examined if a trigger were to be exceeded so the link in to surveillance monitoring isn't correct.<br><br>We agree that monitoring is not mitigation. Wording around implementation of Confirmation and Investigation of Cause tier and Investigation of Solution and Mitigation tier changed. Both tiers include actions that lead directly to management response, not just continued monitoring. |
| 12 | **7-1** | "A trigger is defined as a level that indicates changes are occurring, but triggers are set early enough that significant adverse effects have not yet occurred."<br>This is an assumption based on prior interpretations of the system with a limited amount of data. It is misleading to cast this as a definitive statement.<br>***Recommendation***<br>Clarify the inherent assumption in the design basis (i.e., the definition of a trigger). | **TAG-Hydrology** | Triggers are directly linked to quantitative pre-mining baseline and reference site data. Triggers will be refined until ditching and draining activities begin in the MLWC watershed. Please see text in Section 7.2.1.3. |
| 13 | **7-2** | "For example, a monitoring value that falls within the normal range calculated from pre-mining baseline data, or is well below an applicable benchmark value, would not result in a trigger exceedance."<br>This statement leaves the impression that trends in data are unimportant; however, they may be the more important component.<br>***Recommendation***<br>Clarify that trends in data are also considered and may be relevant.<br>NOTE: These adjustments/clarifications are required throughout the Objective document. It is not always clear how (or even whether) trends are accounted for.<br>Incorporate trends in trigger criteria. | **TAG-Hydrology** | We agree that trends in the data are relevant and important. Text has been added throughout the document to emphasize where trends are considered. Trends are tied to triggers where appropriate. |
| 14 | **7.2.1 Fundamental Principles 7-4** | Separate out the Baseline Conditions and MRV, from the monitoring tiers. It makes more sense to have only 3 monitoring tiers that are designed to detect change from the Baseline and MRV: Surveillance, Confirmation and Investigation of Cause and Investigation of solutions and Mitigation.<br><br>List the programs that require additional baseline data and which of those programs will begin in 2022.<br><br>State clearly under the Baseline Conditions and MRV, the range of years of baseline information that will be required before surveillance monitoring starts.<br><br>Concern: If the date of surveillance starts in 2025 (noted on pg. 7-29 in section 7.4 Reporting), there will be different levels of robustness in the data sets used to define the Baseline and MRV for various indicators, as some indicator baseline collection has not yet been started. | **Co-chairs** | The baseline tier needs to remain, it is what the effects monitoring program is compared back to and is fundamental. Also fundamental is that FHEC is only including indicators that we have sufficient baseline for as per the flowchart in Objective 2.<br>Data collected under the baseline tier comprise an integral part of the response framework and will be used as a basis for comparison under all higher monitoring tiers.<br>Some new monitoring locations have been included (monitoring locations are described and shown in the Objective 5 document). In Section 7.2.2 (Table 7.2-2) baseline tier monitoring frequencies show that a minimum of three years of additional baseline data will be collected for all components. While the newer monitoring locations will always have less data than the older locations, these additional pre-mining baseline data will be added to the existing datasets and used to refine trigger values. |
| 15 | **7-5** | Table 7.2-1 suggestions:<br>**Use the term MRV when talking about variance**<br>**Aquatic Resources**: Talks about trophic status of McClelland lake, yet currently the monitoring program only INCLUDES CHOLOROPHYLL A, AND NO OTHER TROPHIC LEVELS. Hence The Systematic Limits Not to be reached is too vague and cannot be measured.<br>Vegetation: The system limit "Not to be Reached" is too vague and would be hard to measure. | **Co-chairs** | Table 7.2-1 does not include discussion of MRV/variance. FHEC is uncertain how to address this component of the request.<br>Trophic status will be informed by chlorophyll a concentrations (primary effects indicator) and nutrients (complementary data).<br>The system limit for vegetation was updated to provide more clarity "...as expressed by a departure from pre-mining baseline plant community characteristics". |

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| 16 | **7-6** | Add a **second Trigger Diagram that reflects the Level 1 and 2 Tigger Exceedance for Biological Responses**. The biological responses will show the downward trends that would be expected for aquatic resources, vegetation etc. Figure 7.2.2 only represents changes in chemical responses. Both diagrams are necessary in the report.<br>Need to have a discussion with the SC about using the Regional Normal Range or Standard Deviations as a Trigger. This entails taking regional values from the reference sites and applying them to evaluate change in the MLWC. The wider range of variance expected from other reference wetlands might lead to unacceptable changes and effects on environmental resources in MLWC.<br>I believe the original intent of the Reference Sites was ONLY to assess regional changes in climate or other natural effects and that this information would be used to separate natural changes and effects from the changes and effects on MLWC from the Fort Hills Project (using the BACI design).<br><br>Clearly explain why mitigations and management measures are not implemented after a level 1 trigger is exceeded. Additional monitoring will not stop adverse impacts.<br><br>As is shown on Figure 7.2-1, the Level 3 trigger could lead to the stopping the development in the MLWC until effects are mitigation or managed. This information should be added to the discussion on Level 3 in this section (it is only shown on the diagram).<br>*Recommendation:* ***(See Attached Summary Table of Triggers from DRAFT Objective 6 – Judy Smith – August 27, 2021)***<br><br>The triggers for all the indicators are summarized in the Summary Table of Triggers from DRAFT Objective 6 – Judy Smith – August 27, 2021 attached below. Based on this summary, the following concerns/questions have been identified:<br><br>Column 1<br>Using the reference site fens to see if there is a change related to climate or other natural regional causes makes sense in the monitoring program, so that it can be determined if measured changes at MLWC are due to natural regional changes or due to effects from the Fort Hills Project. This comparison of MLWC change to reference site changes has not been documented in trigger discussions from several indicators … but not for hydrogeology in the uplands or fen; or groundwater quality.<br>Also, wildlife is being monitoring at the reference sites, but this document is silent on triggers and management responses at MLWC for wildlife.<br><br>Column 2:<br>There are very different numbers and types of triggers used for the various indicators.<br>Water Levels: Why are simulated water levels added with the MRV to define the upper and low limits for triggers for surface water hydrology? Is this justifiable?<br>Surface Water Quality: There are four requirements of WQ before a Level 2 Trigger can be triggered to result in a response and mitigation …. Is this excessive?<br>Groundwater Quality: Is it appropriate for this trigger to be dependent on groundwater levels as this is already a separate trigger?<br><br>Level 3 Triggers – Should the Level 3 Trigger levels be determined before the monitoring program is started?<br><br>Column 3:<br>Does using the range of change in an indicator at the reference sites and applying a regional level of change as the trigger for an indicator in the MLWC make sense … could this not potentially put the function and biodiversity at MLWC at risk?<br>The reference sites are different enough from the MLWC that they could increase or decrease the levels of triggers for environmental resources beyond the MRV at MLWC and that may result in changes to the biodiversity and function of MLWC when indeed mitigation should have been put in place to reverse the change earlier. | **Co-chairs** | Figure 7.2-2 is intended to show a response for water level, water quality, or biological indicators alone. It would be possible to design a figure showing a response in the physical environment with a response in the biological indicators lagging; however, we feel that would unnecessarily complicate what is intended to be a straight-forward relationship between an increase in measured data (for any indicator/metric) and intersection with Level 1 and Level 2 triggers.<br>The purpose of the reference sites is twofold: (i) assess regional effects using a BACI model, as described in request #16; (ii) characterize the physical and biological characteristics of similar patterned fen ecosystems in the region to understand the full range of characteristics that can occur within patterned fens. For example, if the reference sites have a broader range of water quality characteristics and still support a diverse and functional patterned fen ecosystem, then it may be acceptable for water quality characteristics to occur outside the MLWC normal range but within the reference site normal range without expecting a decline in ecosystem function.<br>The Level 1 trigger is intended to provide early warning that an effect may be occurring; the response includes confirming whether an effects has actually occurred - we don't want to mitigate if a measurement error has occurred, for example. Please see updates to text in the Management Response section.<br><br>This text is already in the Level 3 trigger section.<br><br>FHEC cannot use reference sites for groundwater as the data has not been collected. As discussed with the SC, there will be no triggers or management responses for wildlife in the OP.<br><br>Please see updated text for surface water hydrology (Section 7.3.2.1) and surface water quality triggers (Section 7.3.3.2), which is intended to address these points. For groundwater quality: a change in groundwater level could affect water chemistry and actions initiated for groundwater level change will include additional water quality actions.<br><br>Regarding Level 3 triggers: The WLWB guidance document indicates that numeric values should be set for the lowest trigger level when establishing a response framework, however, a conceptual approach is initially sufficient for Level 2 and Level 3 triggers. We have gone beyond that to set numeric values for both level 1 and Level 2 triggers. With proper monitoring and actions based on Level 1 and 2 triggers, there should never be a need for Level 3 trigger levels, hence why having a conceptual model only for Level 3 triggers should be sufficient.<br><br>See response under first part of item #16 |

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| 17 | 7-4 to 7-8 | The fundamental principles including the monitoring approach, proposed limits and triggers were not discussed with the SC and are not informed by SC or its advisory groups. This section needs to be taken back to the SC, AAG and TAG to collaboratively develop and validate. Of particular concern is Table 7.2-1 that sets out the proposed limits that have been put forward for each integrated (primary) indicator, described by a value statement (this is a critical piece that should have been co-developed AND be consistent with the MLWC wetland functions diagram that provides the values, (August 25, 2001 SC meeting, slide 14), and ultimately the system limits. None of this information has considered the vast amounts of valuable Indigenous knowledge that has been shared nor considered limits informed to sustain the cultural values of the MLWC.<br>The monitoring approach has been adapted from a draft COSIA 2017 draft report for monitoring wetlands that was inaccessible on the COSIA website. Please provide this document for review.<br><br>There should be a reference to including ESCT data and information under baseline to begin as early as 2022.<br>Under the Investigation of Solution monitoring tier there should be a sentence on the action to be taken if the solution employed is not effective.<br>As discussed in the comments on Figure 7.2-1 there should be linkages to how the complementary data, ESCT data/information and site-wide monitoring data inform all tiers to support the proposed integrated (primary indicators). As well, there is no discussion of what happens if, once draining and ditching occur and throughout operation if significant effects to those indicators occur. Understanding that the integrated (primary) indicators chosen by Suncor may be considered the early warning indicators, given the non-consensus by the SC, AGG and TAG on the indicator selection criteria and subsequent chosen indicators concentrated on the narrowly defined unmined portion of the MLWC to be the unmined portion of the fen only, a discussion of downward trends of any indicators is warranted, particularly if they are without a management response. | **FMCA/FMMN** | Refer to response #4 above. Unfortunately, the COSIA document is not available to be shared.<br><br>FHEC is clear in Objective 5 that it is committed to working the ESCT program with the SC with a commitment to finalizing by the end of 2022. That may not allow for data to be collected as early as 2022.<br>Investigation of Solution the arrow in Figure 7.2-1 does complete the loop, i.e. is the solution isn't effective more investigation is required.<br><br>Please see updated document: sentence added on action to be taken if the solution is not initially effective. |
| 18 | Table 7.2-1 | Please provide the quantitative numerical ranges for each of the integrated indicators as an additional column (e.g. from Objective 1 MRVs).<br><br>Please note that the Environmental quality guidelines for Alberta surface waters [2018] does not protect for consumption purposes. This needs to be discussed with the SC as to the appropriateness of this guideline for the purposes of protecting cultural and social values.<br><br>Please add the Level 3 Trigger as well as the System Limit to all relevant tables and figures, for example, Figure 7.2-2.<br><br>The description of the Level 1 to 3 triggers does not demonstrate a precautionary approach. In essence they are described much like a 'pollute up to level' that is no longer acceptable approach to environmental management. Each range (MRV, regional) accounts for some variability vis a vis the use and accounting of standard deviations therefore, what occurs should reflect movement towards reversing the trend as early as possible with the ends being to prevent triggering the next level. Level 3 should be added to the figure and should be red, illustrating 'situation critical'.<br><br>Please clarify 'regional normal range' – in later section in the document it is characterized as being defined by the reference sites unless the reference site range is more narrow than the MRV at which point the MRV will be used instead.<br><br>As discussed above there is no discussion about the possibility and the action to be taken if multiple triggers are exceeded simultaneously whether for the same indicator or multiple indicators. This again reflects the need for discussion and revisions to this section, including the need for an emergency response plan with actions and timelines. | **FMCA/FMMN** | FHEC will not use the drinking water quality guidelines as they are not meant to be used for raw water, they are for treated water. FHEC also notes that in many cases the drinking water quality guidelines are less stringent than the guidelines for the protection of aquatic life.<br><br>Quantitative numerical ranges are not provided because these are expected to be refined in the coming years as additional pre-mining baseline data are collected. Providing numerical values would suggest that they are static (and they are not).<br><br>Consumptive water quality guidelines are not applicable here. Environmental water quality guidelines are mentioned as an available tool, but will be used only if and when applicable (e.g., pH in McClelland Lake).<br><br>There are two similar figures in this section: Figure 7.2-2 and Figure 7.2-3. Level 3 triggers and the system limit are shown on Figure 7.2-3.<br><br>The description of the Level 1 to 3 triggers is intended to follow a "pollution prevention" principle, not a "pollute up to" principle. Limits are intended to protect the environment and minimize contaminant loadings by describing thresholds to avoid, not thresholds that are safe to approach. Therefore, management actions may be recommended to stop a negative trend, even if limits are being approached, but are not yet reached.<br><br>See updated "Analytical Approach" sections in Objective 1 and Objective 5 documents. If the reference site normal range is narrower than the MLWC normal range, then the MLWC normal range will apply.<br><br>See beginning of Section 7.2.4, which describes a scenario in which Level 1 and 2 triggers are surpassed within a single monitoring period - an accelerated response would likely be warranted. |

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| 19 | **7-4** | About this statement:<br>New locations or parameters added under Objective 5 will initially have a limited pre-mining baseline dataset; therefore, monitoring will begin as early as 2022 to provide an adequate characterization of pre-mining baseline conditions for these locations/parameters at the MLWC. Data will also be collected from reference sites during the same time period to support the before-after-control-impact (BACI) model.<br>A list in a telegraphic style would be useful as a reminder.<br>***Recommendation***<br>Either after this paragraph or elsewhere in this section add a listing of the new locations/parameters that will be monitored from 2022. | **TAG - Vegetation** | Monitoring locations are provided in Section 6.2.2. of Objective 5. Data will be collected from locations at MLWC (shown in Figure 6.2-1 in Objective 5) and reference sites as per commitments under the baseline tier in Table 7.2-2 in Objective 6. |
| 20 | **7-6** | Consider temporal trends with the vegetation data (for both monitoring program – permanent transects and plots and the spatial grid system) such as visualization of the ratio between graminoid plant abundance and mosses or shrubs: mosses. A significant change in this ratio would have a direct on the peat accumulation function | **TAG - Vegetation** | Some of these ideas are now included in Section 6.3.5.4.1 (Objective 5). |
| 21 | **7-4** | A standard, reactionary approach is proposed.<br>***Recommendation***<br>Implement a proactive approach with more frequent analysis of water level (and, perhaps, water quality) data to optimize the management system in real time.<br>Baseline tier. As with previous Objectives - are there sufficient baseline data, including for the Reference Ecosystems? "Baseline" should include an understanding of the system and how it functions so that changes may be evaluated within the context of physical, chemical, and biological processes.<br>***Recommendation***<br>Evaluate whether sufficient data are available and integrate triggers with conceptual understanding and numerical simulations of the systems. MLWC (and surroundings), plus Reference | **TAG - Hydrology** | Please see new Trigger Assessment Frequency section in which commitments for frequency of data analysis and assessment of triggers is provided.<br><br>There are sufficient baseline data to have evaluated the efficacy of each metric, as discussed under Objective 2. Some new monitoring locations are being added at the reference sites, and baseline data will be collected from these new locations for a minimum of three years prior to commencement of ditching and draining activities in the MLWC watershed. Trigger values are not static, and will be refined once additional pre-mining baseline data are collected. |
| 22 | **7.2.2 Monitoring Frequency**<br>7-7 and 7-8; Table 7-2.2 | The monitoring frequency should be confirmed through the Logistics Workshops that were recommended by the SC for the vegetation, water quality and quantity, and wildlife.<br>Some methods and logistics were listed and recommended in the SC document "*Methods for Measuring Change in Environmental and Social, Cultural and Traditional Economic (SCT) Indicators that would be Sensitive to Potential Effects from the fort Hills Project related to the conditions in the approvals and outlined in the Operational Plan (July 17, 2021)"* that was attached to and provided to Suncor under Objective 2.<br>Include a discussion on the Site Wide Wildlife Indicators in Table 7.2.2 and this section even though the wildlife program is part of the Site-Wide Monitoring program outside the Water Act and under the EPEA. The data in this site wide program that should be designed to look for changes in the MLWC area due to the mining of the fen will need to be assess in conjunction with the complementary and ESCT indicator data sets.<br>Add vegetation under lake monitoring in Table 7.2.2<br>**POTENTIAL ERROR.** Aquatic health (chlorophyll a is listed as being monitoring once per year in the summer at McClelland L, Audet L and Birch L for baseline and surveillance (Table 7.2.2) , but in the text it is indicates once each monthly sampling during baseline monitoring during the summer at all three lakes (pg 7-23) | **Co-chairs** | FHEC is happy to discuss the monitoring frequency with the SC and the TAG. The monitoring frequency for the permanent integrated monitoring locations is standard for environmental effects monitoring. It should be noted that for the early warning monitoring locations, the monitoring frequency will adapt depending on what is happening with the design features, more text has been added to the section clarify this.<br>FHEC will not be including discussion of wildlife monitoring in the OP as it is a separate monitoring program. And as discussed in the recent SC meeting, as there was not consensus at the SC on the referenced table, it will not be included in the OP, including the lake vegetation recommendation.<br>The table has been corrected, thank you. |
| 23 | 7-7 to 7-8, Table 7.2-2 | Confirmation and Investigation of Cause should be focused on targeted monitoring, additional sites if needed and additional parameters if needed as opposed to a continuance of the surveillance monitoring. That is NOT how EEM and adaptive monitoring is carried out.<br><br>Investigation of Solutions and Mitigation again needs to be descriptive and specific, even if TBD is provided as the description it should include a factor of timeliness as opposed to the frequency used in the baseline and surveillance tiers that may not provide information in a timely enough manner to test if applied mitigation is effective | **FMCA/ FMMN** | The confirmation and investigation of cause tier as described in Section 7.2.1.1 is intended to confirm effects by: increasing monitoring frequency (i.e., collecting additional data than would be collected under the surveillance tier) and/or collecting data from additional locations and/or considering other data (ESCT, complementary, data from other primary effects indicators). It is only a continuation of surveillance monitoring in the sense that, at a minimum, the monitoring locations and frequencies described for surveillance monitoring would continue. However, the intention is to add more locations or increase frequency of data collection until the effect and its cause are confirmed.<br>Please see end of Level 3 Trigger Exceedance section (7.2.4.3) for commitment around timeliness of mitigation. |

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| 24 | Table 7.2.2<br>Page 7-8 | To get a good idea of the normal range of variation for Surface water quality, it is really good to sample 3 times in a year, but it should not be governed by spring, summer and fall. What is important is the weather that prevailed 2 to 3 weeks prior sampling. The sampling should be done 1-2 days after a good period of rain, after 2-3 weeks of drought and in a period of what is considered normal rainfall in the region. So, one sampling could occur after 3 weeks of drought and a second sampling 3 days after that drought period if significant occurred. So you do not want to always sample in wet weather periods where the water chemistry is diluted by the rain and neither to fall the 3 times of the year in drought periods where the solute within the water samples are concentrated.<br>***Recommendation***<br>Make sure that surface water quality sampling takes into account the weather of the season, it is better to get a variety of weather conditions then to plan sampling according to spring, summer and fall to establish the normal range of variation.<br>***Recommendation***<br>Alternate the vegetation permanent transect program with the grid-based wetland monitoring. | **TAG - Vegetation** | During water sampling, flow and water levels will be documented and water quality data will be assessed in context of that data and precedent weather conditions. Typically, spring sampling occurs during or shortly after snow melt, summer sampling is often associated with rainfall conditions, while fall sampling occurs during drier period of the year.<br><br>Vegetation data will be collected from permanent transects at MLWC and reference sites for a minimum of three years under the baseline tier, and vegetation data will also be collected from the full grid for a minimum of three years under the baseline tier. Both types of plots need to be surveyed intensively at the same time for three years to ensure adequate baseline data are collected from MLWC before ditching and draining activities begin in the MLWC watershed. Once the surveillance tier commences, permanent vegetation transects will be monitored every four years, and the partial grid will be monitored every two years - thus, the grid is monitored more frequently, and the permanent transects are monitored less frequently in an alternating pattern. |
| 25 | 7-7 | As above, consider more frequent analyses to develop a proactive management system. Increase the frequency after implementing management responses.<br><br>Table 7.2-2. ALWC, and GGWC are only mentioned for surface-water quality and vegetation. It appears that groundwater and surface-water levels are to never be monitored in any Reference Ecosystem.<br><br>***Recommendation***<br>Develop a robust monitoring program for the Reference Ecosystems.<br>Adaptive management requires adaptive monitoring (and evaluation). | **TAG -Hydrology** | FHEC has added additional text around the data analysis frequency.<br>Basic EHZ's have been generated for both reference sites. It is also acknowledged that both sites placed much greater emphasis on having similar vegetation to that of MLWC than consideration of site hydrology. The shallow flow system at MLWC derives all of its incoming flows from precipitation with no apparent regional water inputs. The patterned fens at the MLWC also sit in groundwater discharge zones supplied from the surrounding landscape. These conditions also exists at the reference sites (although the potential for regional inputs at both sites needs to be analyzed further once more data is available). In my FHEC's opinion, an argument could be made that, based on available information, the reference sites are hydrological comparable to the MLWC. FHEC is committed to further examining the reference sites post-submission. |
| | **7.2.3 Management Response**<br>7-8-to 7-9 | The time required to determine the effectiveness of mitigation has not been discussed in this section of the document. Does the continued monitoring need to indicate there is a decrease or increase in change before further action is taken?<br><br>Under 7.2.3.1 Level 1 Trigger Exceedance<br>Add to the sentence: Consider applicable ESCT monitoring data, complementary data and relevant site wide data (air, noise, wildlife etc.). This will be an important way to integrated ALL THE DATA SETS COLLECTED FROM ALL THE MONITORING INDICATORS IN THE MLWC. | **Co-chairs** | The time required would be very much dependent on what parameter was being triggered, and the nature of the effects and mitigation. And it would depend on the scenario, but likely further action wouldn't be taken unless the situation was not improving.<br>A reference to the site wide data has been added. |
| 26 | 7-8 to 7-10 | This is not in line with taking a precautionary approach. The content in this section needs to be re-evaluated with input from the SC, AAG and TAG including the need for clear goals of the response plan for each level of exceedance (e.g. the goal for the response plan for a Level 1 exceedance should be to NOT reach a Level 2 exceedance) and the need for both adaptive management as well as an emergency response plan to deal with instances in which a timely response is required<br><br>Level 1 Trigger exceedance should include:<br>•Consideration of site-wide monitoring data under Investigation of Cause<br>•The Goal of the response plan should be first and foremost to PREVENT a higher level trigger to be exceeded<br>•Model assumptions must also be explored<br>•Identified mitigative actions to prevent and escalation to Level 2 should be implemented<br>•Explanation provided as to why the triggers may be refined (for example if after installation all indicators are trending above the MRV that is NOT reason to change the trigger) | **FMCA/ FMMN** | The goal for the response plan to a level 1 exceedance is to find out what is causing the exceedance. The Level 1 trigger is very conservative and really is an early warning that something is changing.<br><br>Some of these concepts were added to the text. However, because the Level 1 trigger exceedance is essentially an early warning trigger, mitigation won't occur until a Level 2 trigger exceedance occurs.<br><br>Triggers will be refined as additional pre-mining baseline data are collected and a larger sample size is achieved. Triggers will NOT be refined to avoid a management response. |

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| | | With respect to Level 2 Trigger exceedances:<br>•Investigation of Cause in the case that a Level 2 trigger happens without an initial exceedance of Level 1 must happen immediately, adaptive management should kick in and if this has occurred in more than one indicator or metric consideration to employing an Emergency Response Plan must be included<br>•Why are benchmarks or guidelines being developed? The regional range would already have policy or regulatory guidance in place. If this is not the case then they should be identified for each metric now and these should be developed BEFORE an exceedance occurs.<br>•Why are Level 3 triggers being developed here? If this is the case, they are the system limits. We have gone past the regional range and are approaching irreversible effects to functionality and biodiversity. Please note from the 2002 EUB decision report:<br>*The Board recommends that Alberta direct TrueNorth to convene a committee of stakeholders and regulators, as proposed in the MLWC Sustainability Plan, to oversee the collection of baseline monitoring data, establish the natural variability of the wetland,* ***establish criteria to protect the biotic diversity and function of the no-surface-access zone*** *, critically evaluate proposed mitigation plans in relation to the protection criteria, and evaluate postconstruction monitoring data and adaptive management.*<br><br>The Level 3 trigger exceedance must be to stop all activity until mitigation is applied and activity can responsibly resume using a staged approach to ensure the metrics are trending towards MRV. | | See the response to item #10 for how the Emergency Response Plan (ERP) will interact with the MLWC. The Fort Hills ERP has its own triggers for establishing a response plan to a wide range of emergency situations.<br><br>Benchmarks are being developed for parameters where guidelines do not exist. They will be site-specific and data-dependent and will be developed if needed. MLWC baseline data and regional ranges will be used to assess water quality triggers; benchmarks will only be developed as a management response if and when a Level 2 trigger is reached.<br><br>Please see response to #16: With proper monitoring and actions based on Level 1 and 2 triggers, there should never be a need for Level 3 trigger levels, hence why having a conceptual model only for Level 3 triggers should be sufficient. System limits occur beyond the Level 3 triggers.<br><br>If a level 3 exceedance occurs, FHEC will consider stopping further development within the MLWC watershed until the cause of the trigger exceedance has been identified and an effective mitigation solution is developed and implemented. |
| 27 | **Figure 7.2-3** | This figure is misleading and needs to be adjusted to include:<br>•The ranges the bands represent as described on page 7-6 (i.e. L1 green = MRV + SD; L2 yellow = regional normal range + SD; L3 orange = outside of regional range; dark orange should be a red line of System Limit<br><br>•The colored boxes depicting Triggers on the right are misleading and lead to there being 4 levels when there is only 3 before the system limit is reached (refer to Figure 7.2-2)<br><br>•The graph should illustrate all triggers being reached and for Level 2 and Level 3, according to this section is where mitigation measures are applied which either continue an upwards trend or are successful | **FMCA/FMMN** | There are two similar figures in this section: Figure 7.2-2 and Figure 7.2-3. The ranges represented by the bands are provided on Figure 7.2-2, which is intended to show how data and trends relate to the triggers. The ranges are not shown on Figure 7.2-3 because it would make the figure cluttered, and the intention of Figure 7.2-3 is to show how successful mitigation can reverse a trend in the data.<br><br>The coloured boxes correspond to the black lines or threshold levels on the graph and are correct as drawn - there are three trigger levels/lines before the system limit is reached. The system limit is the fourth level, or the ceiling on the figure.<br>The intent is that a Level 3 trigger is never reached; therefore, this scenario was not included on Figure 7.2-3. |
| **7.3 Response Framework Implementation** | | | | |
| 28 | General<br>7-11 to 7-28 | This section needs to be re-written with more input from the SC, AAG and TAG and based on the recommendations provided above.<br>Overall recommendations for media being measured include:<br>•Please provide more detail on the description of upper (and lower) limits (e.g. some are benchmarks some are broadly defined endpoint (e.g. change in trophic status, self-sustainability) including what is considered acceptable vs. not acceptable change understanding the intent of the plan is to protect the unmined portion of MLWC<br>•Please explain how SC, AAG and TAG input informed the determination of limits<br>•Please provide more detail on the triggers, how they are intended to be precautionary in the protection of the unmined portion of the MLWC, and provide specific quantification of each in relation to the level, MRV, regional normal range, modeled range; provide the rationale as to the use of AND OR with respect to each trigger level when used; and please eliminate subject determinations to trigger a management response (e.g. instead of professional judgement determining when action is 'actually required' it should instead be used to assess if the action is appropriate)<br>•Please explain how the SC, AAG and TAG were involved in developing the criteria for different levels of triggers<br>•Please explain how IK was used to inform the triggers for each of the respective media<br>•Please explain what happens in the case of not having 3 to 5 years of data for hydrogeology and surface water hydrology, particularly in the case where change is significant<br>•Please explain the 'optimization of the water management system' and discuss the water supply that is envisioned to reduce or increase water levels as may be needed | **FMCA/FMMN** | FHEC welcomes further discussion at the SC about how the Response Framework can be applied to MLWC and updated as additional information and details are developed.<br><br>An overview of the limits is provided in Section 7.2.1.2, and additional information is provided for each limit under each discipline in Section 7.3.<br><br>Additional information on interpretation of triggers with many AND and OR statements is provided in Section 7.3.<br><br>Professional judgement statement revised. |
| 29 | 7.3.1 Hydrogeology<br>7-11 | Modify the text in the first sentence of this section to: "..the Fort Hills Project has the potential to alter surface water hydrology which can result in changes to ecosystem and aquatic resources in the MLWC, many of which are important cultural resources including food and medicine.<br>Text in 7.3.1 states that "traditional knowledge as helped improve understanding of connectivity of groundwater and surface waters. Please be more specific in describing how this knowledge has informed the conceptual water balance, assumptions in the water models, the locations of existing and planned surface water and ground water monitoring in the MLWC and thus, the mitigations and management responses being proposed. | **Co-Chairs** | Text modified as suggested. Reference to Objectives 1, 2, and 3 provided for further details on how ITK improved understanding. |

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| 30 | 7-11 | "The natural range of variability of groundwater relates to surface water variability."<br>This statement is not true; it is reversed from reality. The natural range of variability of groundwater is directly related to precipitation, including snowmelt, inputs into the groundwater system. Surface water variability is related to the same inputs, plus groundwater discharge to surface water (often in some delayed fashion).<br>"Level 1 trigger: two standard deviations above/below the mean for gradients across the sand/peat interface AND surface water levels at nearby monitoring locations that exceed the surface water hydrology Level 1 trigger."<br>TAG does not understand the rationale for the AND criterion. Surface water is dependent on groundwater, not the other way around.<br>**Revise.**<br>Presumably a change in gradient direction would be elevated in importance relative to magnitude; the trigger is silent on direction.<br>**Recommendation**<br>Correct the statement and adjust the triggers accordingly.<br>Include changes in gradient direction (in addition to magnitude) in the triggers. | **TAG - Hydrology** | The statement on groundwater and surface water relationship was not meant to imply dependence. However, it has been revised in the document.<br><br>The vertical gradient trigger should NOT include direction explicitly. Most of the GW gradients in the fen area are right around neutral, and can fluctuate around neutral (positive and negative), as detailed in Objective 1. If a change in direction is a trigger, these wells have the potential to exceed the trigger often, and for results that are within the normal range for the well pair. What is important is when the size of the gradient exceeds historic values. If the gradient in a well pair is always upward, using the historic range will cause a trigger if it flips to downward automatically; for wells that fluctuate, fluctuation that is within the normal range is allowable. |
| 31 | 7.3.2 Surface Water Hydrology<br>7-15 | Text in 7.3.2 suggests that Traditional knowledge has helped improve understanding of flow, water levels and connectivity to the plants and animals in the fen and the lake", yet there do not appear to be any monitoring programs to track changes in plants and animals that will be affected by changing water levels in the lake or other important harvesting areas in the MLWC. Please explain how this gap will be addressed. | **Co-Chairs** | See the response to item #1. |
| 32 | 7-17 to 7-18 | Some of the complex figures are very challenging to read including Figure 7.3.4 on page 7-17.<br><br>What would the triggers and management responses if there are changes in the lake level … at either the deep or shallow water level monitoring sites?<br><br>Section 7.3.2.4 suggests on to the management response to be "The rate of water supply can be altered (reduced or increased). If increased rates of surface water are required, where will this water come from? | **Co-Chairs** | Figure 7.3-4 is already on 11X17, perhaps zooming in electronically will help read the figure.<br>Lake levels are measured via elevation so it would be the same whether it was measured at a deep or shallow site. Triggers are provided in section 7.3.2.2 and potential management responses were provided in section 7.3.2.4. The expected changes in water levels at all locations (shallow area or deep area) are expected to be consistent. Hence the management triggers apply for all locations.<br>Additional water supply will come from Athabasca River as described in Objective 4 - please see updated text in Section 7.3.2.4. If increased rates of water are required this will be accounted for in the system design to ensure adequate volumes are available. The source will be dependent on volumes required and stage of development of the design features. |
| 33 | 7-15 | Triggers include comparisons to simulated results. Is the calibration and predictive capability of the model sufficient? (Requires Objective 3.) Why is a similar approach not taken with groundwater triggers?<br>***Recommendation***<br>Clarify the use of models in defining triggers and reactions. Demonstrate that the triggers are appropriate for the current and future understanding of the system. | **TAG - Hydrology** | See updates to the text in Sections 7.3.1.2 (hydrogeology) and 7.3.2.1 (surface water hydrology). |
| 34 | 7.3.3 Water Quality<br>7-19 | Section 7.3.3 states :"...the Fort Hill Project has the potential to alter water quantity and quality, which can result in changes to wetland plant communities and aquatic resources within McClelland Lake. Traditional Knowledge has improved the understanding of water quality and connectivity to plants and animals in the lake and the fen." and yet no wetland plants or aquatic resources in/surrounding McClelland lake are being monitored. Please explain this disconnect in FHOP's improved understanding and lack of lake of monitoring and management.<br>Modify text to read: Observations of declines in regional water quality and experience with other industrial developments have raised concerns related to existing water quality in McClelland Lake and future water quality in the lake during FHOP construction and operation. While these concerns have reduced the willingness to drink water in McClelland Lake, indigenous people continue to use water from McClelland Lake for other domestic purposes. Access to clean/safe water is critically linked to traditional land use and the ability to exercise indigenous rights in the MLWC.<br><br>The Indigenous Communities (ACFN, MCFN and FMFN) involved with the SC have developed Indigenous water quality indicators for the Athabasca River and Peace Athabasca Delta based on risk from contamination of water, traditional plants and wildlife etc. They are very knowledgeable on Triggers and Limits, yet the Sustainability Committee (SC) was not included in the discussions on this aspect of the Operational Plan before it was prepared by Suncor.<br>Discuss water quality triggers and limits with the SC.<br>Section 7.3.3.1 states: water quality limits for McClelland Lake will consist of water quality guidelines for protection of aquatic life (when those exist)... Please be more specific in what "aquatic life" includes and how these other guidelines for aquatic life will apply to McClelland Lake. For example, there are a number of aquatic and semi-aquatic species (i.e., mint, cat tails, water lilies) that are important to local land users, but FHOP does not intend to monitor these species or any other aquatic life in the littoral zone/shoreline of McClelland Lake. | **Co-Chairs** | Water quality, water levels and aquatic resources are being monitored in McClelland Lake as per Objective 5. Vegetation is being monitored in several locations in the fen as well.<br>Text edited as suggested.<br><br>We have inquired into these Indigenous water quality indicators and were informed that these were not finalized and not ready to be shared. Perhaps when this work is completed we can revisit this suggestion in the future. |

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| 35 | 7-20 | Figure 7.3-5: Add a legend for the colors or if not needed, only construct the graphs in black and white, it will be easier to see the thresholds. | **TAG Vegetation** | Legend to colours included for Figures 7.3-5, 7.3-6, 7.3-7, 7.3-8. |
| 36 | 7-20 | Have a discussion with Dr Kelman Wieder (Villanova University, USA but having a good knowledge of Ft McMurray peatland region with Vitt) on the best approach to set thresholds with N and how best to follow the temporal trends. (see text in Line's TAG Vegetation submission for details).<br>Is the water quality of the rainwater will also be analyzed for samples coming for the non-mined fen location? Important for N analyses between the MLWC fen and the reference sites. | **TAG -Vegetation** | Nitrogen is not included as a primary effects indicator; therefore, thresholds/triggers have not been set. Nitrogen data will be collected as complementary; FHEC will consider moving this to a primary effects indicator if needed in the future.<br>Analyses of rainwater chemistry are not currently included. |
| 37 | 7-21 | Page number [ 7-21] : From text: Surface water and groundwater quality sample collection in the wetland under the baseline and surveillance monitoring tiers will be conducted annually, three times per year (spring, summer, and fall).<br>See TAG VEGETATION comments under 7.2.2 | **TAG -Vegetation** | Addressed with TAG vegetation comments under 7.2.2. |
| 38 | 7-20 | The Level 2 trigger has **three** AND conditions, meaning that **four** conditions must occur before triggering a response (recall, there is no real response for a Level 1 exceedance). This appears to require an excessive number of conditions to be met prior to implementing changes.<br>***Recommendation***<br>Justify the multiple AND conditions in the Level 2 trigger. | **TAG - Hydrology** | The responses to a Level 1 trigger are meaningful and consist of elevation of monitoring effort to the confirmation and investigation of cause tier, and development of a monitoring response plan. Briefly, the objectives of the monitoring response plan are to (1) address key uncertainties (2) explore relationships among metrics, (3) explore modelling results where applicable, (4) identify potential mitigation, and (5) review and refine triggers. Therefore, a Level 1 trigger would initiate a set of actions that are non-trivial, and useful to prepare for mitigating potential continued increasing trends. Two additional conditions are included in the Level 2 trigger: exceedance of the regional normal range, and indicator value above 75% of the benchmark. The first of these is an appropriate condition for a Level 2 trigger, because it indicates an additional change of a meaningful magnitude, which is unusual for the region. The last condition in the Level 2 trigger is tied to benchmarks, based on the rationale that water quality changes might be acceptable if they do not affect functionality or biodiversity of the wetland. An increased concentration resulting from a development that is at 75% of the benchmark is not expected to result in adverse toxicological effects, but indicates a level of concern that requires mitigation to reverse the trend before the benchmark is reached. |
| 39 | 7.3.4 Aquatic Resources<br>7-22 – 7-23 | As with the previous Sections, Section 7.3.4 states that "traditional knowledge of aquatic resources has included information on fish populations in the lake, lake vegetation and aquatic birds" but it is not clear how this knowledge influenced the scope of the monitoring programs or response frameworks. Please explain.<br><br>Chlorophyll *a* only represents one trophic level in the lake and although it could be considered an early indicator, measuring this one indicator do not represent the biodiversity or functionality of the lake that is comprised of several trophic layers that reflect community values.<br><br>After an exceedance of triggers, Management response seem to focus on increased monitoring. What mitigation measures will be implanted to "control the change in lake trophic status". Please explain more fully. | **Co-chairs** | We agree that chlorophyll a represents only one of the trophic levels in McClelland Lake, and provides useful information on only one aspect of the phytoplankton community (i.e., productivity). However, as mentioned in Section 7.3.4.1, its inclusion in the effects monitoring program is to serve as an early-warning indicator of changes to aquatic resources in the lake related to primary productivity.<br>As mentioned in Section 7.2.4.1, a management response plan will be developed upon a level 1 trigger exceedance, and will depend on the nature of the exceedance combined with results from other monitoring components. For example, if a change in trophic status is observed and additional monitoring reveals an increase in nutrient concentrations from operations, then possible mitigation measures could include reducing nutrient inputs to the lake. Mitigation would likely occur following more detailed studies of the lake aquatic ecosystem to confirm and characterize the observed effect and the causes of the effect. |

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| 40 | 7.3.5 Vegetation<br>7-24 | Please modify the 3rd and 4th sentence in Section 7.3.5 to read " Some culturally important plant species are now less common, but a number of important plants continue to be harvested in the MLWC, especially around McClelland Lake. Community members are concerned that the FHOP will negatively affect the health and purity of plants in the area, particularly those that grow in the littoral zone as they are most likely to be affected by changes in water levels and water quality.<br><br>Section 7.3.5 only talks about limits for vegetation in the fen. This is a gap. Much of the Traditional knowledge related to shifts in vegetation in response to changing water levels pertain to McClelland Lake, McClelland Creek, as well as in the fen. Please explain how this knowledge has influenced the OP.<br><br>The value statements in *Table 7.2-1 Proposed Limit for Each Integrated indictor* note that that the Functionality and Biodiversity within the MLWC, including McClelland Lake are sustained…<br>Yet the recommendation from the SC to extend monitoring into the McClelland Lake for vegetation (and wildlife) does not appear to have been considered in this section. For example, Vegetation is discussed only for the wetland (fen) and not the lake.<br><br>Add Lake Vegetation to Section 7.3.5 (pg 7-24)<br>The frequency of monitoring of vegetation needs to be confirmed with the other logistical aspects of vegetation during the SC Logistics Meetings. | **Co-chairs** | See the response to item #7. Additionally, as stated in responses to Objective 2, Fort Hills will not include any indicators in the OP for which there is not enough baseline to determine if its an effective indicator or not. That said, Fort Hills is open to discussing these metrics further with the SC and the TAG post-submission. |
| 41 | 7-27 | Statement on page 7-27. "However, if effects are related to other aspects of the Fort Hills Project, mitigation will be applied through feedback from other site-wide monitoring programs related to other approval conditions."<br><br>This is the first time we have heard that other aspects of the Fort Hills Project might affect the MLWC.<br><br>Section 7.3.5.4 suggests "the nature of the effect would inform the potential management response". What are these potential management responses? Please reference where this information can be found. | **Co-chairs** | Other Fort Hills Project effects are described under Objective 2. This linkage back to site-wide programs was removed, as it is addressed in Objective 2. |
| 42 | 7-24 | Text report: Plant community diversity metrics and relative abundance of plant functional groups were selected for inclusion in the effects monitoring program and response framework under the vegetation indicator.<br>The relative abundance of plant functional groups does not appear to be represented in the section **7.3.5.2. Triggers**. Triggers will apply to the following vegetation metrics…<br>***Recommendation***<br>Add *relative abundance of plant functional groups* in the metrics that will be analyzed. | **TAG - Vegetation** | The plant functional groups to be examined are already included as metrics to be analyzed; wording was adjusted to clarify this. |
| 43 | 7-25 | From text: An example of how measured values will be compared to normal ranges for baseline data at the MLWC and reference sites is shown in Figure 7.3-7 and Figure 7.3-8. And later… and applying best professional judgement<br>In Figure 7.3-8 we see in S5 a variation in species richness going from 65 to 40 species. With the stability of the system that Vitt and House 2020 are reporting, it is really hard to believe that there is not bias in the data related to the ability of the botanist to identify and collect species from the field. TAG reiterate that change in the structure of the vegetation will be much more reliable (everybody knows what is a grass (including sedges), mosses and shrubs and other herbs. It is this relative change that can respond quickly to water table change.<br>***Recommendation***<br>Add similar visualization in time with temporal relative abundance of functional groups having pairs of data within the same graphs with different symbols (e.g., x for graminoid plants and for mosses). | **TAG - Vegetation** | We explored the data as recommended by Line and found that similar variation existed even when data were summarized by strata. Moving forward, Line's recommendations for calibration of field crews estimating percent cover will be implemented. Hopefully a more accurate dataset can be collected in the future. |
| 44 | 7-27 | From text: As a component of permanent, integrated wetland monitoring under the surveillance monitoring tier, monitoring at permanent vegetation plots will be completed once every four years<br>Although TAG has recommended to space out the vegetation sampling during the collection of data for the baseline data – that is in the absence of any major disturbance in the MLWC - it is a different matter once the dewatering and mining activity will be in full development.<br><br>***Recommendation:***<br>Once mining within the MLWC starts in a significant way, have a more frequent vegetation monitoring (permanent transect) sequence then every 4 years to be re-evaluated later on (once the wall is installed and all water pumping is stabilized for example).<br>***Recommendation:***<br>Reiteration from my expert knowledge of peatland on the very little confidence given to this exercise with biodiversity indices. | **TAG - Vegetation** | The grid plots will be surveyed every two years, and will provide more spatial coverage within the patterned fen than the permanent transect plots.<br><br>Diversity metrics were removed from the list of metrics because they are unlikely to show early change. |

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| | | A management response will be initiated if a vegetation metric surpasses or falls below a Level 1 trigger value. Because plant species diversity is evaluated through a suite of metrics (i.e., species richness, Simpson's diversity index, Shannon's diversity index, and diversity profile for q=0, q=2, and q=5), if a Level 1 trigger is reached for any one of the diversity metrics, a detailed investigation of the vegetation dataset would be carried out to understand the change in the metric in question, and why related diversity metrics may not have reached the Level 1 trigger value. Furthermore, the nature of the effect will be considered. An increase in a diversity metric above the Level 1 trigger value may be associated with an influx of invasive or atypical fen species, while a decrease in a diversity metric below the Level 1 trigger value may be associated with loss of species documented in the MLWC pre-mining baseline dataset. The nature of the effect would inform the potential management response. | | Most of this text was removed because diversity was removed as a primary effects indicator. |
| 45 | 7.3.6 Environmental, Social, Cultural and Traditional Economic Values and Land Use 7-28 | The first sentence of Section 7.3.6 states "The work on developing the approach and methodologies for monitoring of the ESCT indicators continues to progress at the SC" Please reference to the Draft Framework for Community participation that will be added to Objective 5.<br><br>Review the process for responding to ESCT trigger exceedances with the SC. It is not clear what will occur after "SC discussions" occur, how this information will feed into project planning and management responses, or who will determine when response frameworks are "appropriate". | **Co-chairs** | We look forward to continued development of the ESCT program with the SC. We do not feel it is appropriate to include a draft work in progress into the Operational Plan at this time. We are committed to working with the SC on this, and can include complete work products in annual submissions to the regulator at a later date. |
| **7.4 Reporting** | | | | |
| 46 | 7-28 | Section 7.4 only discusses reporting for integrated indicators. How will reporting on other indicators in other programs inform management response frameworks. | **Co-chairs** | Section 7.4 discusses more than just the integrated indicators: "Fort Hills proposes that a comprehensive report describing monitoring activities and outcomes for both the integrated monitoring and the ESCT program, as well as updates on other activities occurring under the Operational Plan" |
| 47 | **7-28 to 7-29** | Annual reports that will start in 2025 should be informed by the SC not shared with the SC.<br><br>There should be an intensive monitoring during the construction of the wall and it should not be assumed that the wall (mitigation) is going to generally work. Please discuss. | **FMCA/ FMMN** | Work and activities completed with the SC will be included in the annual submissions. Elements of the submissions can be reviewed with the SC in advance of submission, particularly related to ITK or work products of the SC. The current timing of annual submissions (January) does not allow for a complete review by the SC.<br>Quality Assurance and Quality control plans would be developed as part of specifications for construction of the cut-off wall which would dictate how quality must be monitored and controlled. Such plans would likely consist of the testing requirements and standards that must be met to provide a predictable outcome with respect to the quality of the overall wall design and construction. These plans would likely include material tests required for the soils and bentonite that form the wall, standards for achieving the required mixing and testing of final mixes. On site Quality Control personnel are also anticipated to be present during construction to ensure construction practices and placement follow required standards of practice.<br>Subsequent to construction it is anticipated that performance monitoring of the wall will be carried out. This will likely be achieved by pairing piezometers upstream and downstream of the wall such that piezometric elevations on both sides of the "barrier" can be monitored for signs of change. |
| **MCFN comments** | | | | |
| 48 | General | TAG and others have mentioned that the triggers don't seem sufficiently sensitive due to the 'and' clauses. It would be a high bar to reach those triggers. | **MCFN** | See response to item #38 |
| 49 | General | I couldn't search the document for this. Are there location-based triggers (i.e. triggers closer to the cut off wall) that would provide some indication that MLWC is changing? It might be good to have more sensitive triggers near the cut off wall so that further investigation can be done if trends are changing. | **MCFN** | There is an extensive early warning network of monitoring locations described in the Objective 5 document. This includes locations near the cutoff wall. Triggers are values based on data and are not location-based. |
| 58 | 7.2.1 | Can there be a time limit associated with confirmation and investigation of cause? If this part drags on too long, the impacts could be irreversible. | **MCFN** | The Level 1 triggers are meant to be an early warning that things are changing and are set quite low. If change continued to occur, Level 2 would be triggered and then a management response would also be triggered so impacts would not be so great as to be irreversible. |
| 59 | | Is it possible to identify which ESCT indicators will have triggers? We discussed a few workshops ago that there wouldn't be triggers for all indicators.<br>Ideally, the ESCT indicators would be paired with similar integrated indicators to ensure that both western science and Indigenous knowledge are being used to monitor MLWC's condition. For example, the trigger for vegetation could be Shannon's diversity index or if a community member notices that the plant assemblages have changed greatly. | **MCFN** | At this point, only the primary effects indicators (including vegetation metrics) will have triggers associated with them. This can be reassessed once the ESCT indicator metrics and methods are established and will depend on how the metrics will detect early change directly related to Fort Hills operations in the watershed. |

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| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| **FMFN comments** | | | | |
| 50 | 7-1 to 7-3 | Figure 7.2-1 is a good overview diagram that does acknowledge that Site-wide EPEA monitoring, complementary data and ESCT monitoring factor into the response system. However, it is not clear in the text of the document, how and when these information sources will be used in the response framework<br><br>***Recommendation***<br>1)Clarify in the text how and when site-wide EPEA monitoring monitoring will influence the monitoring program and interpretation of trigger exceedances and management/mitigation responses. This is particularly important for wildlife (numerous species) and for air emission deposition because neither of these are built into the framework as Integrated Indicators<br>2)Describe somewhere in the operational plan (e.g., objective 1- baseline) when complementary data will be collected and specifically how these data will be used in the trigger system and response. For example, will PAHs, metal, naphthenic acid data be collected at least periodically as part of water quality monitoring. If these types of data are planned to be used as complementary they should be collected at least periodically. Under what circumstances or situations would these data be collected?<br>3) The main figure indicates that ESCT indicators will be used in a similar way to complementary data to feed into the monitoring under the surveillance tier. ESCT indicators are currently in development but once developed these should factor into the response framework in a more integrated way rather than being supplementary information that feeds into it. | **FMFN** | 1) See revisions to page 7-2 to add additional clarity on how site-wide data may be examined if a trigger is exceeded in the OP monitoring.<br>2) Complimentary data will be collected at the same time as the integrated indicator data. Additional language has been added to Objectives 2 and 5 for clarity.<br>3) The ESCT program is still in development and it is now stated in Objective 5 that FHEC is committed to working the ESCT program with the SC with a commitment to finalizing by the end of 2022. Until that is completed it isn't clear how that part of the framework will be developed however the figure may be revised if necessary once the ESCT program is complete. |
| 51 | 7-3 | ***Recommendation***<br>Generally concerned about the timeliness for response and mitigation. Figure 7.2-1 and accompanying text indicate that if a Trigger 1 exceedance occurs that only continued monitoring and investigations occur and mitigation only occurs potentially after Trigger 2 exceedance and additional monitoring after that. The response framework does not seem to be very responsive in a timely way (especially since the way the Triggers are currently stated (e.g. groundwater levels) it would take several years to document even a Trigger 1 exceedance. The overall framework needs to build in mitigation at an early timestep and Trigger level and/or change the Triggers to be more temporally responsive. | **FMFN** | Level 1 is intended to provide an early warning of potential effects, and implementation of investigation of cause occurs right away so that we can understand the nature of the effect (or whether it may have been a measurement error). Please see updates to text in Management Response and Trigger Assessment Frequency sections. To clarify, the additional 3 to 5 years of data for groundwater levels is in reference to baseline data requirements, see response to item #55. |
| 52 | 7-5 | ***Recommendation***<br>The groundwater limit proposed by FHEC is "groundwater levels (outside of fen) or gradients (within fen) occur outside the outer bound of recorded data AND surface water levels are outside of acceptable limits". What is the rationale for including the surface water level changes as a requirement within this limit? A more precautionary approach would be to identify triggers for groundwater only rather that requiring there to also be a change in surface water levels (which have their own triggers anyway) | **FMFN** | Changes in groundwater levels are considered in relation to surface water levels because changes in surface water levels would ultimately drive the response in the biological system.<br>Please also see response to item #30 above. |
| 53 | 7-7 to 7-8 | The proposed monitoring frequency for vegetation at permanent wetland sites is "once per year for a minimum of 3 years at MLWC, ALWC and GGWC and once every four years thereafter. Similarly, annual monitoring is proposed for wetland grid sites to develop baseline with less frequent monitoring thereafter (every two years). FHEC does not provide a rationale for the lesser frequency after baseline is established. A more precautionary approach may be to assume annual monitoring unless the baseline data collection indicates that variability in vegetation parameters is very tight and that less frequent monitoring would still identify changes in sufficient time to investigate and to responds with appropriate mitigation.<br><br>**Recommendation**<br>For vegetation monitoring, provide a clear rationale (e.g. statistical information on vegetation parameters) for less frequent monitoring after baseline established, or alternatively monitor permanent vegetation plots and grid plots annually until such time as data indicates that monitoring frequency could be less often and still allow timely mitigation responses. | **FMFN** | Vegetation monitoring during the baseline tier is proposed to occur every year for three years to maximize pre-mining baseline data collection during the remaining years before ditching and draining activities begin within the MLWC watershed. Surveillance tier monitoring for water levels will be continuous during the open water period, and surveillance tier monitoring for water quality will occur three times per year. Because plant communities are expected to respond to potential changes in water level and water quality, vegetation plots are monitored less frequently during the surveillance tier because effects are expected to be documented in the water level/water quality datasets first. If a Level 1 (early warning) trigger is reached for water levels/water quality, part of the response may be increased vegetation monitoring frequency. If a Level 1 trigger is reached based on the vegetation dataset, monitoring frequency and/or spatial coverage will increase. |
| 54 | 7-11 to 7-14 | What is the rationale for all the groundwater triggers also being dependent on surface water level changes? Please clarify regarding 3 to 5 years data for groundwater and surface water levels – is this referring to the amount of baseline data needed for comparison – or is it really saying that 3 to 5 years of data that is outside 2 standard deviations is needed for a Level 1 trigger to be met? Based on FHEC's proposed monitoring response framework, exceedance of a Level 1 trigger lead would leave to an investigation of cause, prior to any development of mitigation, which is only at Trigger level 2. A change that results in Trigger level 1 may need mitigation and this should be built into the response framework. The framework does not seem to be "early warning". 3 to 5 years of documented change in groundwater and surface water could lead to changes in vegetation, wildlife, and other resources important for exercise of Treaty and Aboriginal (s.35) rights. The framework should be designed to be responsive temporally and spatially with mitigation to prevent changes from increasing. | **FMFN** | Please see responses to items #30 and #52 regarding linkages between groundwater and surface water triggers.<br><br>Trend assessment based on the previous 3 to 5 years of data is separate from the assessment of standard deviations - please see updated triggers for surface water levels and groundwater levels. Data from the preceding 3 to 5 years will be used to assess trends, thus, assessment of potential trends will be updated each year.<br><br>A Level 1 trigger is considered an early warning - please see updated text in Section 7.2.4. |

Table 5 - Round 1 Sustainability Committee (SC) Comments

| SC Recommendations for the MLWC Operational Plan (OP) – Objective 6 | | | | |
|---|---|---|---|---|
| **#** | **Page #** | **Recommendation/Request** | **SC or TAG Member** | **Fort Hills Response** |
| 55 | 7.3.2 | Recommendation Similar to above regarding hydrogeology, what is the rationale for 3 to 5 years temporal trend being required for Level 1, 2, and 3 surface water hydrology triggers? If the 3 to 5 years is for baseline data, then this should be clearly noted. How will this work as an early warning, responsive monitoring framework? | **FMFN** | A minimum of 3 to 5 years of data is required to identify either an upward or downward trend compared to inter annual fluctuations that are part of hydrology cycles. Trend assessment will use data from the preceding 3 to 5 years, thus, it changes every year and reflects current conditions in the system. |
| 56 | 7.3.3<br>7-19-7-22 | Unlike hydrogeology and hydrology, FHEC is not basing triggers on 3 to 5 year trends, but rather on annual water quality data, compared to normal ranges and to BACI comparisons with regional reference areas. If a Trigger 1 is exceeded then there will be an investigation of cause. Basing triggers, especially level 1 on annual data seems more likely to be responsive and protective of the MLWC than waiting for 3 to 5 years to respond (as is proposed for hydrogeology and hydrology). However, since water quality is collected 3 times a year – spring, summer and fall, data should at least be scanned at this frequency (i.e. After each data set is received from the lab) for any measurable changes.<br><br>***Recommendation***<br>Consider what is the appropriate frequency for assessing hydrogeological and surface water quality triggers – is annual appropriate? Or 3 times per year after each data set collected? At minimum, data should be analyzed after each data collection period and checked to see if it is outside the range of natural variation. | **FMFN** | Please see Section 7.2.3 (Trigger Assessment Frequency) in updated draft - this section was added to address concerns around frequency of trigger assessment. |
| 57 | 7-28 | The AAG and FHEC may want to consider Indigenous Water & Sediment Quality Guidelines (IQWSQ), currently in development, to inform both the Integrated and ESCT indicators, and the Tiiggers and Limits. | **FMFN** | FHEC welcomes this input at the SC for additional discussion. |

FORT HILLS ENERGY CORPORATION

# McClelland Lake Wetland Complex Operational Plan Regional Reference Sites

December 2021

Operated by SUNCOR ENERGY

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# 1. INTRODUCTION

The Audet Lake Wetland Complex (ALWC), which is approximately 30 kilometres (km) northeast of the McClelland Lake Wetland Complex (MLWC), and the Gipsy Gordon Wetland Complex (GGWC), which is approximately 140 kilometres (km) southeast of the MLWC (Figure 2.1-1), were identified as potential reference sites to characterize regional trends and support a before-after-control-impact (BACI) experimental design.

The ALWC and GGWC were chosen based on four criteria:

- physical, chemical, and biological similarity to the MLWC
- proximity to the MLWC
- accessibility
- protection through time

The similarities of these reference sites to the MLWC are discussed in Section 2, and recommendations about the comparability of the reference sites to the MLWC are provided in Section 3.

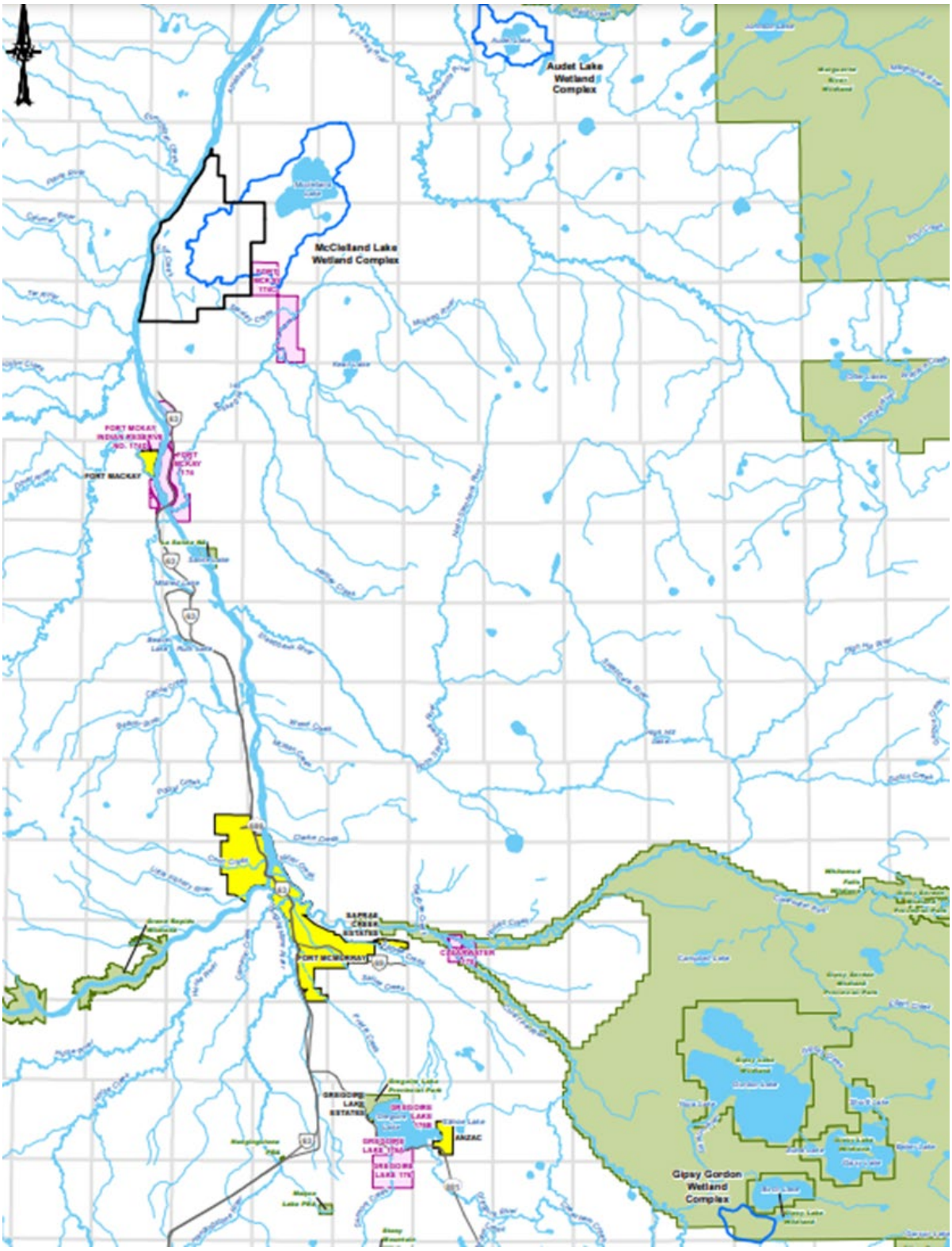



***Figure 2.1-1: McClelland Lake Wetland Complex, Audet Lake Wetland Complex, and Gipsy Gordon Wetland Complex***

# 2. REGIONAL REFERENCE SITE SELECTION CRITERIA

## 2.1. Physical, Chemical, and Biological Similarity to the MLWC

From a physical perspective, there are a number of similarities between MLWC and the reference sites:

- All three sites include a lake near a patterned fen - McClelland Lake (approximately 3,020 hectares [ha]) is the largest of the three lakes, followed by Birch Lake (associated with the GGWC and approximately 1,750 ha) and Audet Lake (approximately 700 ha).
- The patterned fen at all three sites sits in a groundwater discharge zone, at the base of an upland feature with no obvious evidence of regional groundwater inputs.
- Both reference sites appear to rely on precipitation, as does the MLWC, likely making these sites sensitive to climate change, and thus, suitable as reference sites for the MLWC.

Unique flow patterns characterize the MLWC and the reference sites. At the MLWC, there are five surface water input areas, including from the north, the west, the south, the southeast, and the non-patterned wetness gradient from south to north. Reticulate patterns have developed in areas with multi-directional water flow. The different flow directions have resulted in six unique ecohydrology zones (EHZ) (Figure 2.1-1), each of which contain different string and flark orientations, outlets, dominant vegetation, and water chemistry.

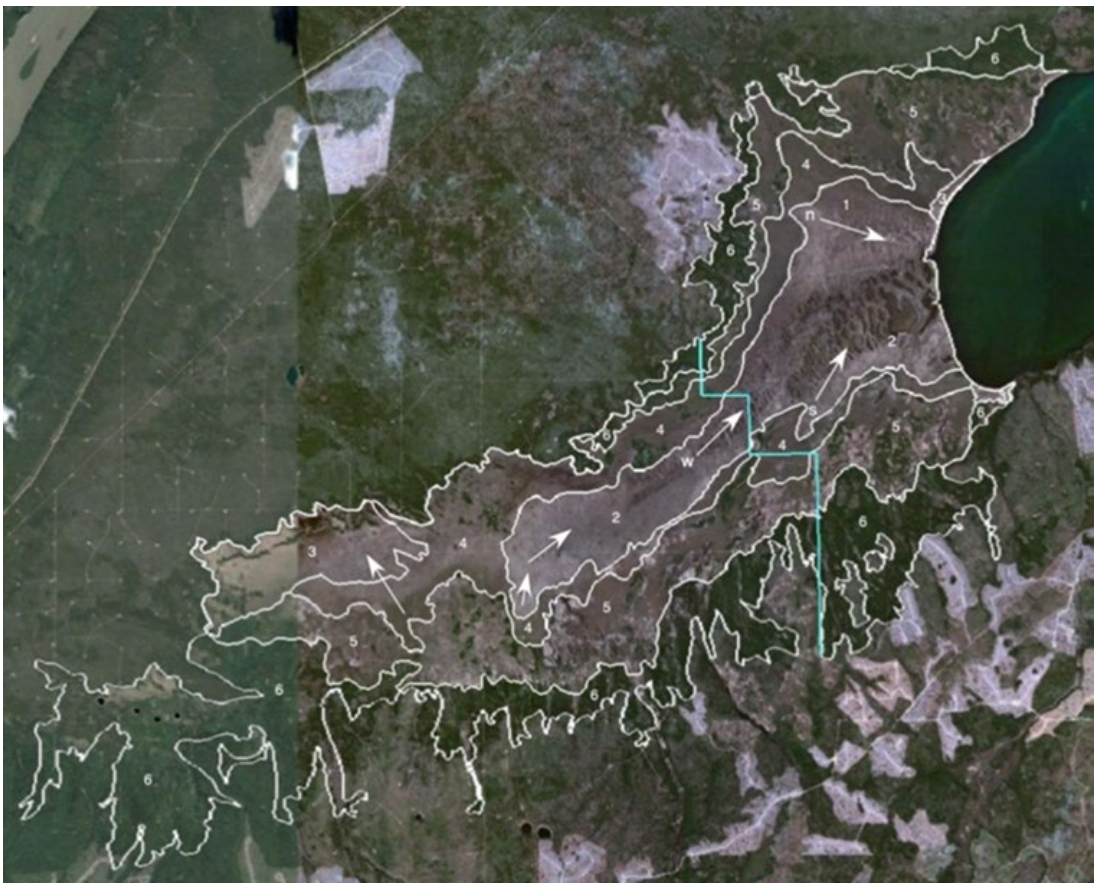
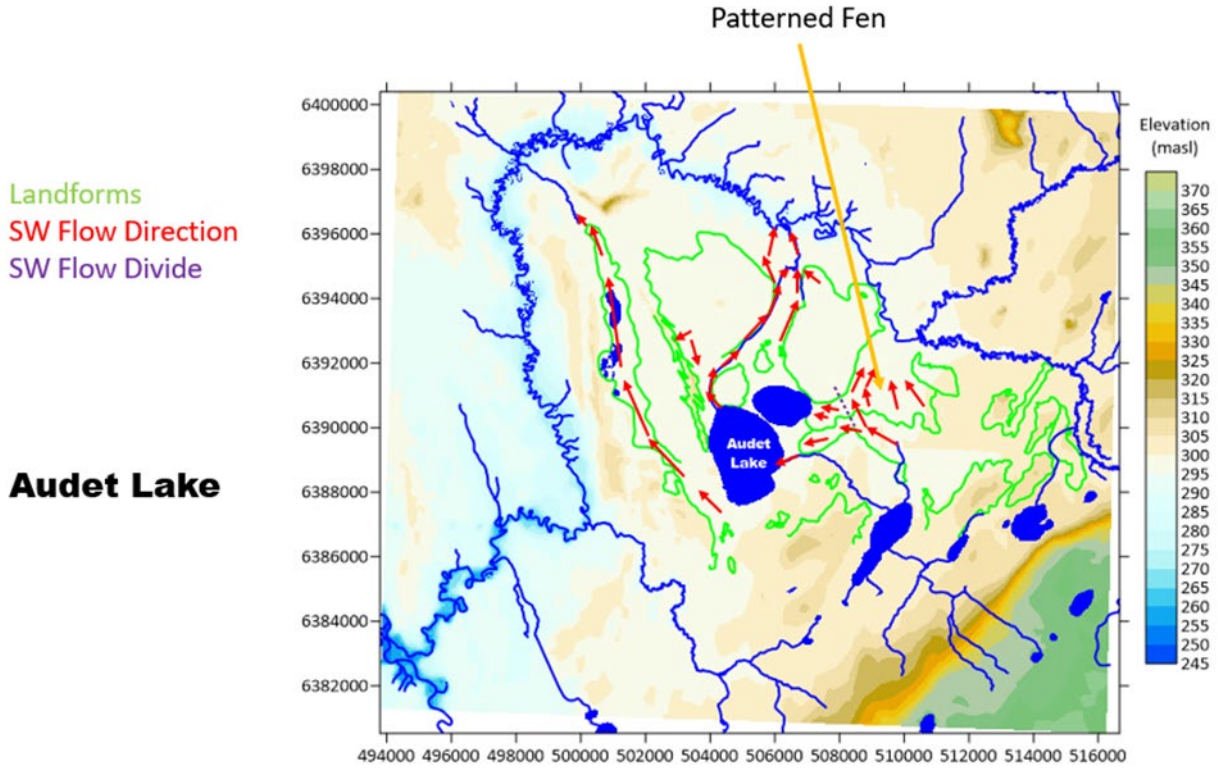


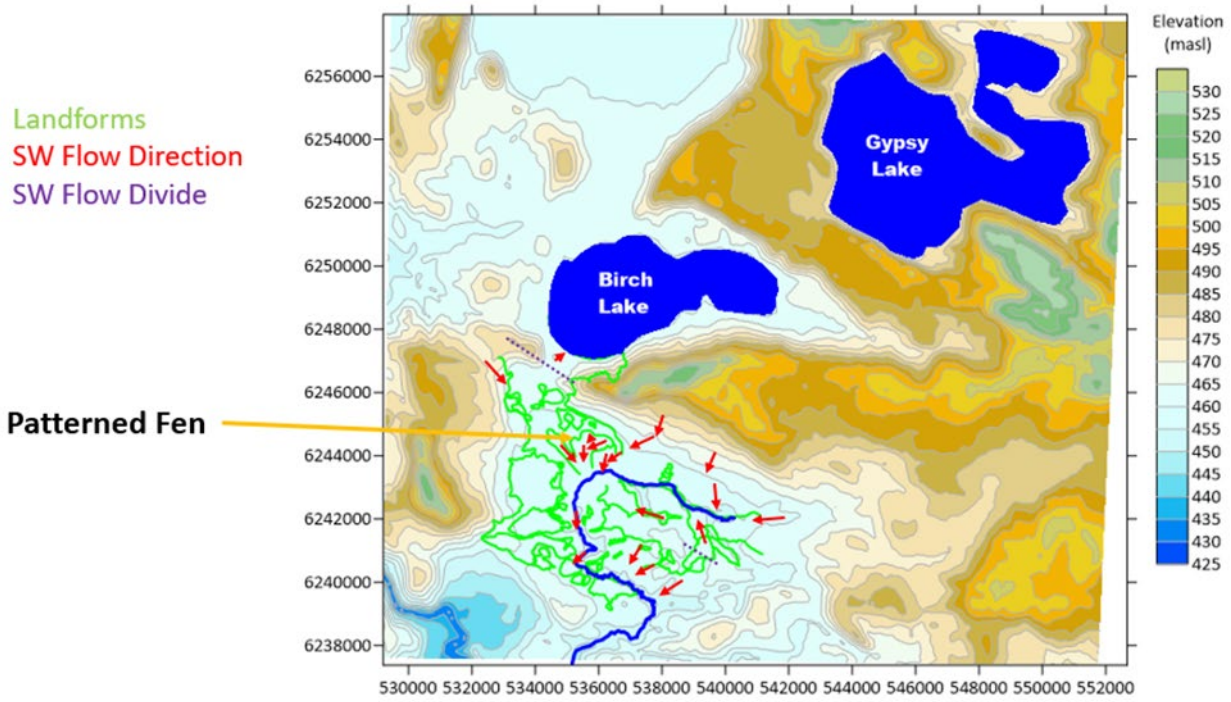
***Figure 2.1-1: Location of the Six Ecohydrology Zones at the McClelland Lake Wetland Complex***

Preliminary analysis of coarse-scale topographical and hydrological data shows that at both MLWC and ALWC, water flows from the patterned fen into the lake. However, while all the water within the MLWC patterned fen appears to drain into McClelland Lake, at the ALWC, a drainage divide appears to occur within the patterned fen, and a portion of the patterned fen appears to drain away from Audet Lake towards the Marguerite River to the north (Figure 2.1-2). Similarly, at GGWC, a hydrological divide separates the patterned fen from nearby Birch Lake, and water flows away from the lake and drains into a watercourse to the south (Figure 2.1-3); thus, the GGWC and Birch Lake are not hydrologically connected.




masl = metres above sea level; SW = surface water

***Figure 2.1-2: Flow Directions at the Audet Lake Wetland Complex***

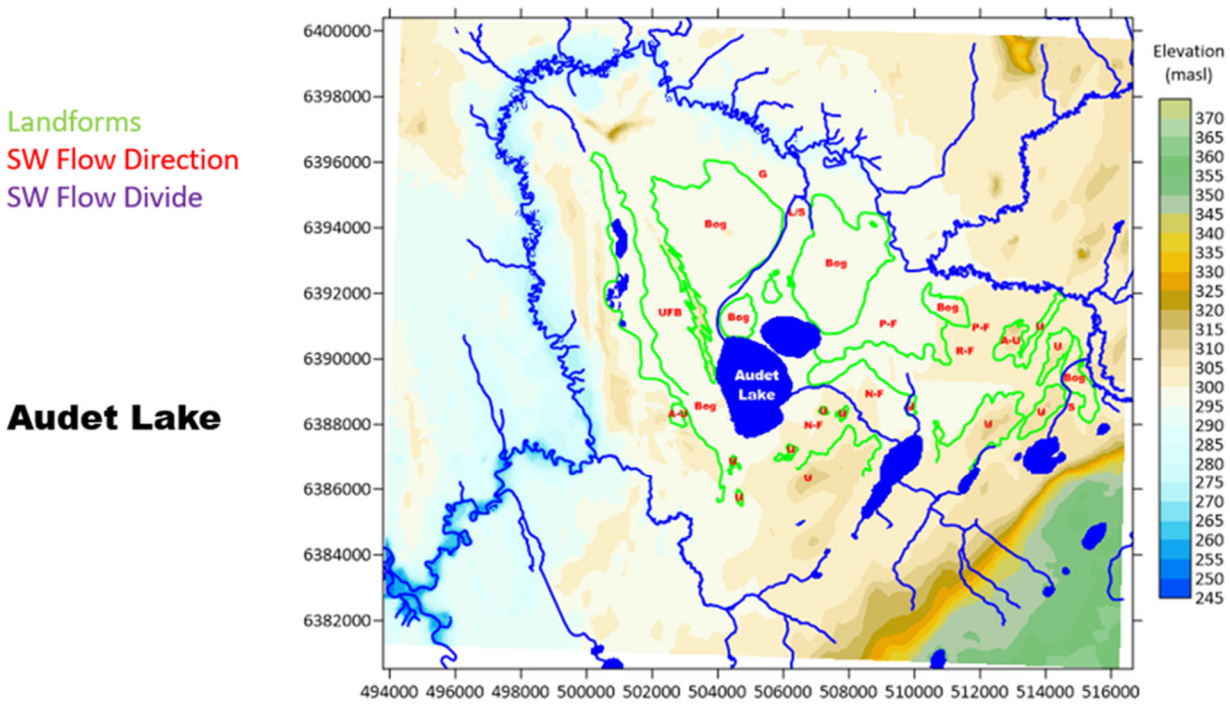



masl = metres above sea level; SW = surface water

***Figure 2.1-3: Flow Directions at the Gipsy Gordon Wetland Complex***

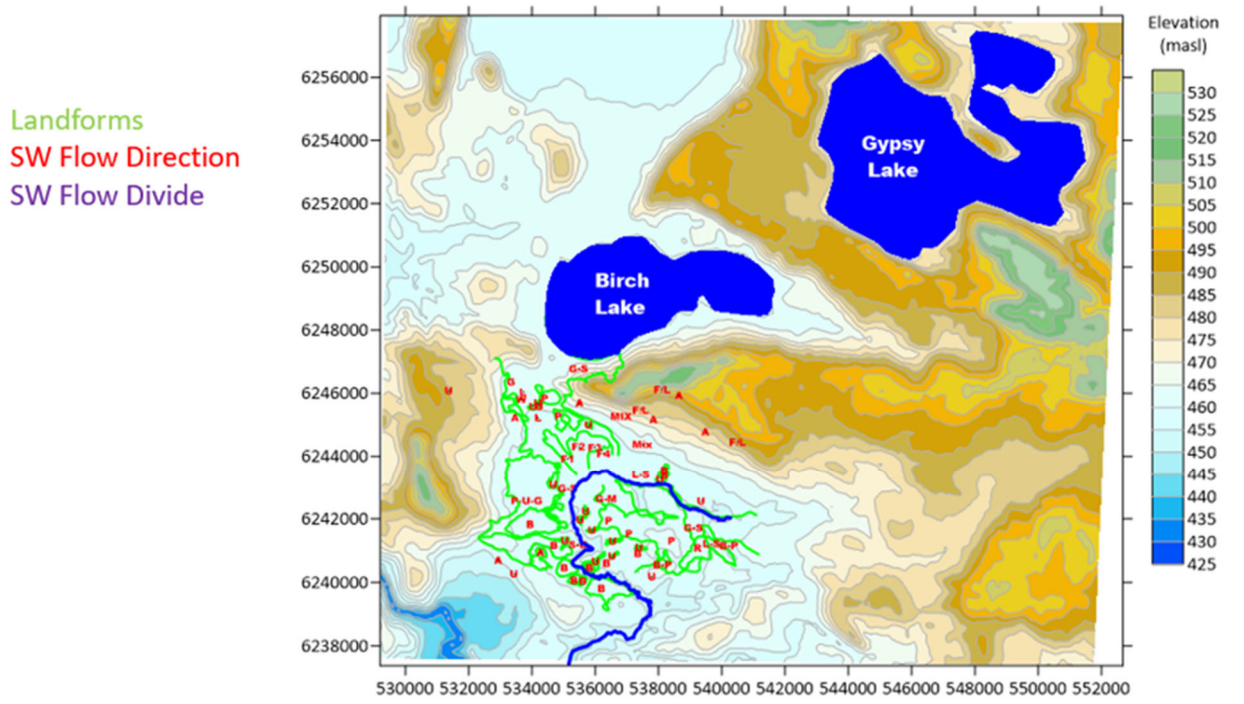
At the ALWC, a bog complex borders Audet Lake to the north, with a large, patterned fen extending to the southeast (Figure 2.1-4). Additionally, there is an elevational high and low water divide resulting in discharge of water into a stream which encircles the fen to the east, north, and west. Water originates from three sources within the wetland and flows north towards the Firebag and Athabasca rivers (Figure 2.1-2). A large fen with diverse patterning and orientations occurs south of Audet Lake. A bog island forms a dam for the water flow that occurs in the east/west string and flark orientation; flow is directed around the island to the west into Audet Lake and to the east to a small wetland and stream that are present east of the bog island. Water flow into Audet Lake occurs from the west-flowing patterned fen and southward from fen waters draining from the bog and upland areas (Figure 2.1-2).

At the GGWC, the patterned fen can be divided into four “sub-fens”. The wettest is the western fen (F-1), which is oriented to the southeast. Fens F-2 and F-3 flow southward, joining F-1 before flowing into a stream that empties into the Christina River to the south (Figure 2.1-5). Fen F-4 is located east of F-2 and F-3, but also flows southward (Figure 2.1-3). A complex of bogs is located to the west and south of the patterned fen, and the bogs border on a non-patterned shrubby area along the stream (Figure 2.1-5). A reticulate fen occurs on a low drainage divide, near the bog complex. These flow patterns result in water flow to the northwest and southwest, away from the patterned fen.




A = aspen upland; LS = larch and/or shrub-dominated wetland; U = mixedwood, aspen, and/or conifer-dominated upland; B/F = bog and fen intermixed; P = bog with permafrost thaw; B = bog, mostly without permafrost; R = reticulate fen; NF = non-patterned, mostly treed or shrub-dominated fen with small bog/permafrost islands; G = open graminoid moss-dominant wetland; F = fen; B? = perhaps bog with upland ridges? UFB = upland-wetland complex.
masl = metres above sea level; SW = surface water.

***Figure 2.1-4: Landforms at the Audet Lake Wetland Complex***




A = aspen upland; Mix = mixedwood upland; L = larch-dominated wetland; LS = larch and/or shrub-dominated wetland; U = mixedwood, aspen, and/or conifer-dominated upland; B = bog (either with or without permafrost thaw); P-U-G = peatland with permafrost bogs mixed with open graminoid fen and upland islands; B = bog with permafrost thaw; R = reticulate fen; GM = open graminoid moss-dominated fen (non-patterned); F (with number 1-4) = patterned fen; F/L = fire and/or logging after 1985.
masl = metres above sea level; SW = surface water.

***Figure 2.1-5: Landforms at the Gipsy Gordon Wetland Complex***

String and flark patterning is apparent at all three sites, although the prominence of the strings and flarks is more pronounced at the MLWC than at the ALWC or the GGWC. Areas with closely spaced, narrow, linear strings and flarks interspersed with areas with more rounded, lenticular patterning at both reference sites suggest that each site is influenced by unique, site-specific hydrogeological and hydrological processes. Evidence for the drainage divide within the ALWC is apparent in the orientation of the string and flark patterning. Similar to the MLWC, pattern orientations change at the ALWC; string and flark patterns extend from the southeast at ALWC, and change to an east/west orientation.

Patterns of water level fluctuations at Audet Lake are similar to those observed at McClelland Lake and the MLWC based on water level data from 2017 to 2020. Climate data analysis shows similarities between the ALWC and the MLWC, whereas a high-level analysis of climate data from the Gordon Lake Lookout climate station (near the GGWC) suggests wetter climate conditions at the GGWC than at the ALWC or MLWC. The reticulate fen at the GGWC may be the most sensitive indicator area and thus, may be a suitable area to monitor for changes at the GGWC, while the water divide south of the large bog at the ALWC may be the most appropriate place to monitor water quantity changes at the ALWC.

Water quality and vegetation data from the MLWC were stratified into EHZ for comparison with the ALWC and the GGWC. In general, EHZ 1 had lower concentrations for key water quality indicators (e.g., pH, electrical conductivity, total dissolved solids, calcium, magnesium, potassium, and sodium) than EHZ 2 (Vitt and House 2020). Water quality characteristics of the GGWC were closest to those of MLWC EHZ 1, and water quality characteristics of the ALWC were closest to those of MLWC EHZ 2. Plant communities in MLWC EHZs 1 and 2 reflect these differences in water quality (Vitt and House 2020). Plant communities in EHZ 1 were similar to GGWC plant communities for both strings and flarks, and plant communities in EHZ 2 were similar to ALWC string plant communities, which is consistent with water quality results. Overall, water quality and vegetation results show that the ALWC and GGWC together represent the full range of conditions documented at the MLWC; neither reference site alone encompasses the full measured range of variation that characterizes the MLWC. Water quality and vegetation may differ among the four fens at the GGWC as these fens have different water sources. Similarly, water quality and vegetation may differ among the three directional patterned areas, and between the reticulate patterned and directional patterned areas of fen at the ALWC. Further examination of EHZ at the reference sites may help refine suitability for comparisons between EHZ at GGWC and ALWC compared to those at the MLWC.

## 2.2. Proximity to the McClelland Lake Wetland Complex

Regional effects such as meteorological patterns, particulate deposition, and climate change vary spatially; therefore, it would be ideal to select reference sites in close spatial proximity to the MLWC. The ALWC is approximately 30 km northeast of the MLWC, while the GGWC is approximately 140 km southeast of the MLWC (Figure 2.1-1). Therefore, the ALWC has an advantage over the GGWC in terms of spatial proximity to the MLWC.

## 2.3. Accessibility

Similar to the MLWC, access to both the ALWC and the GGWC requires a helicopter, because surface access routes have not been developed within these wetlands. Therefore, differences in accessibility do not favour one reference site over the other.

## 2.4. Protection Through Time

The southern portion of Audet Lake and the ALWC is within the Northern Lights lease (Figure 2.4-1), which is held by Total and SinoCanada Petroleum Corporation, with Total as the operating partner. The lease area overlaps with approximately 40% of the Audet Lake watershed; thus, development within the Northern Lights lease could affect Audet Lake and the ALWC and diminish its value as a reference site. In contrast, Birch Lake and the GGWC occur within the Gipsy Gordon Wildland Provincial Park. Surface impacts are not expected to occur within this protected area; thus, the GGWC is expected to persist as a viable reference monitoring location throughout the operational and closure stages of the Fort Hills Project.

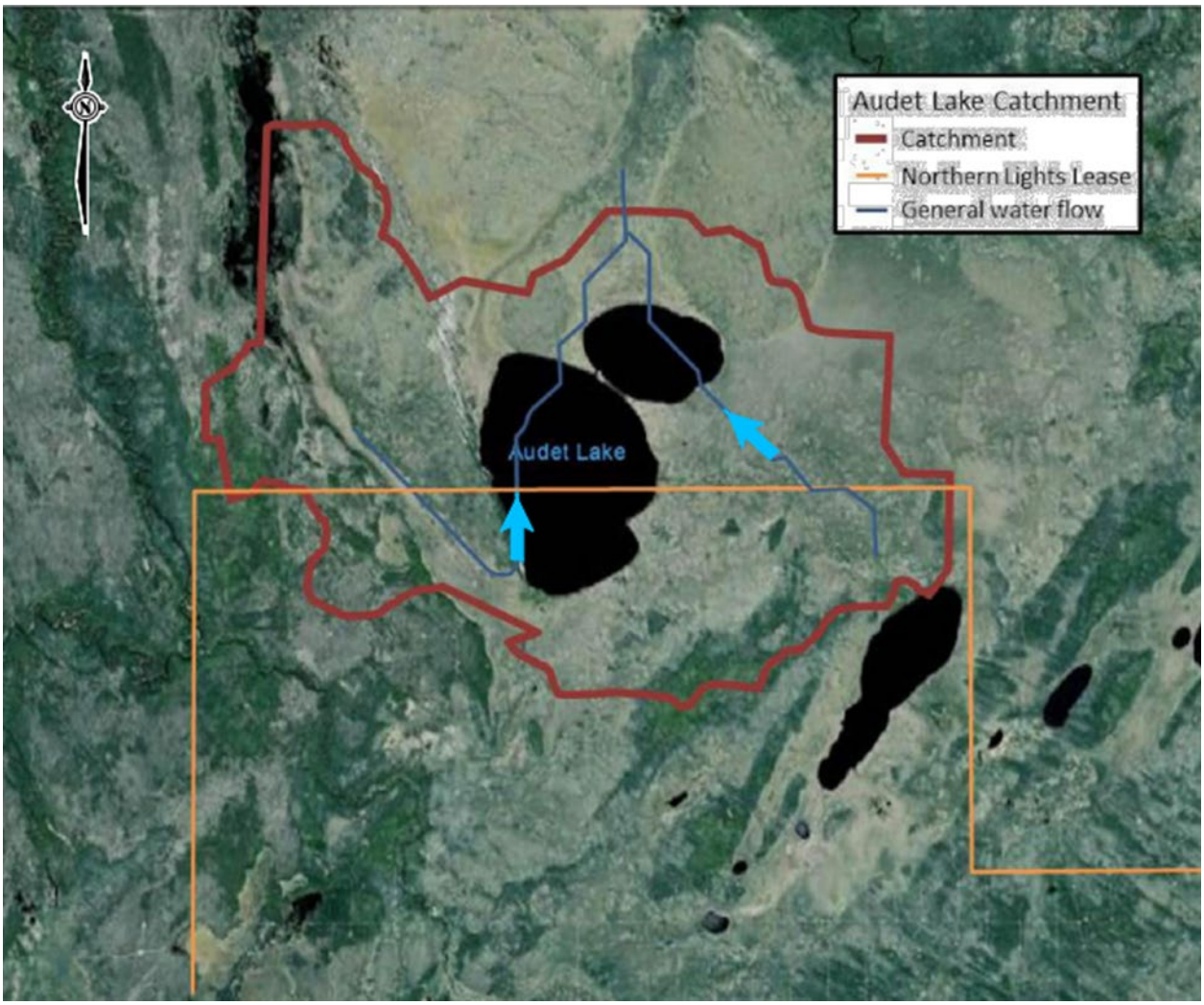



***Figure 2.4-1: Northern Lights Lease Boundary Within the Audet Lake Watershed***

# 3. SUMMARY OF REFERENCE SITE MONITORING RECOMMENDATIONS

Some physical differences in watershed size, lake size, string and flark patterning, and proportion (if any) of the patterned fen that drains into the associated lake are apparent in the imagery, topography and hydrology datasets. Therefore, neither reference site is a perfect fit with MLWC from a landscape or hydrology perspective. However, Vitt and House (2020) suggest that, from a vegetation and water quality perspective, coupling MLWC with reference sites associated with lakes is unnecessary. Instead, the emphasis should be on moderate-rich (i.e., similar to EHZ 1) and extreme-rich (i.e., similar to EHZ 2) fens that complement the range of conditions documented at MLWC (Vitt and House 2020). To this end, FHEC has recently done work to define EHZs at the reference sites, which has shown that the reference sites are suitable for vegetation and chemistry, but not ideal for hydrology and hydrogeology. FHEC has been unable to date to find a reference site in the area more similar to MLWC. While confirmation is required, it seems that regional groundwater inputs are not as influential at these sites as climate, and therefore, this may not be of concern in the use of GLWC or ALWC as reference sites. FHEC is committed to examining the option of adding groundwater monitoring at ALWC starting in 2022.

When water quality and vegetation data are considered, they suggest that both reference sites together best complement the MLWC. Specifically, for both water quality and vegetation parameters, the GGWC is closer to EHZ 1 of the MLWC and the ALWC is closer to EHZ 2 of the MLWC. Thus, inclusion of both reference sites would better complement the MLWC than either reference site alone from a water quality and vegetation perspective and would be useful for detecting natural impacts from climate change via vegetation response. The main disadvantage of relying on the ALWC alone as a reference site is the possibility of development in its watershed. Conversely, the main advantage of continuing with the GGWC as a reference site is its protected status and high probability it will remain a viable reference site throughout the operational life of the Fort Hills Project.

Only two years of water quality data and three complete years of vegetation data have been collected from the GGWC; thus, results should be considered preliminary. Ongoing data collection from both reference sites and an approach in which data are regularly reviewed and compared with data from the MLWC is recommended. In particular, additional subsurface hydrological data are needed to finish conceptualizing the hydrological functioning of the reference sites. Data collected thus far indicate that the reference sites are more hydrologically similar to the MLWC than may have been thought previously.

# 4. REFERENCES

Vitt, D.H. and M. House. 2020. *The Historical Ecology and Current Vegetation and Chemical Patterns Present at McClelland Wetlands.* Included in 'Phase 2: Developing an Improved Understanding of Past and Present Hydrology and Ecosystem Processes in the McClelland Lake Wetlands Complex: A Multidisciplinary Study'. Final Report – December 2020. Submitted to Suncor Energy, Inc. School of Biological Sciences, Southern Illinois University, Carbondale, IL, USA.

# 5. ABBREVIATIONS AND ACRONYMS

| Abbreviation / Acronym | Definition |
|---|---|
| ALWC | Audet Lake Wetland Complex |
| BACI | before-after-control-impact |
| EHZ | ecohydrology zone |
| e.g., | for example |
| FHEC | Fort Hills Energy Corporation |
| Fort Hills Project | Fort Hills Oil Sands Project |
| GGWC | Gipsy Gordon Wetland Complex |
| ha | hectare |
| i.e. | that is |
| km | kilometre |
| masl | metres above sea level |
| MLWC | McClelland Lake Wetland Complex |
| SW | surface water |
| % | percent |