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August 7, 2024

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Dear Minister Guilbeault,

Re: Request for Designation of the Vista Coal Mine Phase II Expansion Project and Vista Underground Mine Project

1. INTRODUCTION

We write on behalf of Keepers of the Water Society and the West Athabasca Watershed Bioregional Society (together "**Keepers**") regarding two related expansions to the Vista Coal Mine near Hinton, Alberta: the Vista Coal Mine Phase II Expansion Project ("**Phase II**") and the Vista Underground Mine Project (the "**Underground Mine**", and together, the "**Expansions**")

Keepers submits that the Expansions should be designated under s. 9(1) of the *Impact Assessment Act*, SC 2019, c 28, s 1 (the "**IAA**").[1]

The Vista Coal Mine, once expanded, will be the largest thermal coal mine in Canada. No part of the Vista Coal Mine has ever been federally assessed. The Vista Expansions not only have the potential for serious impacts on areas of federal jurisdiction, they are almost certain to cause significant and widespread adverse effects within federal jurisdiction.

These adverse effects within federal jurisdiction include:

- **Fish and Fish Habitat and Species at Risk**: the Expansions are expected to have harmful impacts on several species protected under the federal *Species at Risk Act* including endangered Athabasca Rainbow Trout (whose newly-protected critical habitat lies within the footprint of both Phase II and the Underground Mine) and threatened Bull Trout. The recently drafted report of professional biologist Lorne Fitch (attached to this designation request as **Appendix "A"**) provides new insights into the Expansions' potential for devastating impacts on these and other fish species;

[1] *Impact Assessment Act*, SC 2019, c 28, s 1 [***IAA***].

- **Deposit of Deleterious Substances**: the Expansions are expected to result in the deposit of deleterious substances, including selenium, into water frequented by fish;
- **Impacts to Indigenous Peoples**: the Expansions will adversely affect the rights and lands of several Indigenous groups who have never been consulted through the provincial permitting processes, and an impact assessment would provide the first process, and most robust process, for consultation with all impacted Indigenous nations;
- **Impacts on Migratory Birds**: the Expansions will result in habitat alteration, increased mortality, effects to health through exposure to deleterious substances, sensory disturbance, habitat fragmentation, and movement obstruction;
- **Proximity to the Thresholds in the Regulations**: the Expansions are several times greater that the production threshold determining whether a new coal mine is a "major project" and automatically assessed. The Expansions were not automatically designated solely as a result of their unique characteristics including the large existing mine and proposed underground operations but neither of these factors negate the Expansions' potential for impacts inherent to major projects; and
- **Exceptional Nature of the Project and Operator Regulatory Issues**: Coalspur has obfuscated key details of its expansion plans from federal regulators and demonstrated an ongoing inability to manage the environmental impacts from its existing mine, specifically in relation to wastewater management, highlighting the risk of further potential impacts on federally-protected fish species.

On the basis of these and other impacts on areas of federal jurisdiction, the Minister has twice previously designated the Expansions. In both previous decisions, the Minister and the Agency identified a plethora of potential adverse effects within federal jurisdiction. There is no factual or legal basis to stray from this previous conclusion. While both designations were rescinded for other reasons, those developments to not alter the conclusion that the Expansions will cause adverse impacts, or the Minister's legal authority to designate the Expansions on that basis. Instead, with the addition of new evidence outlining the severity of the potential adverse effects within federal jurisdiction set out in this designation request, and in particular in the attached Fitch Report, there is now even more overwhelming evidence for the Minister to designate the Expansions for assessment.

A federal impact assessment under the IAA is essential to understand the numerous potential serious impacts on areas of federal jurisdiction, to ensure a robust process for consultation with Indigenous nations, and to retain public trust in the federal impact assessment process.

Keepers therefore requests that you designate the Expansions under s. 9(1) of the IAA.

In the alternative, if the Underground Mine is determined to have substantially begun,[2] Keepers requests that you designate Phase II for an impact assessment under s. 9(1).

[2] *IAA, supra* note 1 at s 9(7)(a).

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2. BACKGROUND

a. Keepers of the Water and the West Athabasca Watershed Bioregional Society

Keepers of the Water Society is comprised of First Nations, Métis, and Inuit peoples; environmental groups; concerned citizens; and communities working together to protect air, water, land, and all living things in the Arctic Drainage Basin and Athabasca River Watershed.

The West Athabasca Watershed Bioregional Society is a group of concerned citizens from Edson, Jasper, Hinton, Brule, and surrounding areas who work to protect, preserve and restore the Athabasca Watershed through advocacy, education and community projects.

b. Coal Mine Expansions under the IAA

The *Physical Activities Regulations* (the "**Regulations**") set out a list of projects that are automatically designated and presumptively require an impact assessment. This list of projects is intended to identify major projects "with the greatest potential for adverse effects on areas of federal jurisdiction related to the environment".[3]

As set out in the Schedule to the Regulations, mining expansions are automatically designated based on physical impact – in the case of new mines, their production capacity, and in the case of mining expansions, both production capacity and surface area of active operations. New coal mines are automatically designated under the Regulations if they will produce 5,000 t/day or more (the "**Production Threshold**"). Coal mine expansions are designated if the total production capacity of the mine after expansion will exceed 5,000 t/day and the expansion will increase area of mining operations by 50% or more (the "**Area Threshold**"). "Area of mining operations" is a defined term: "the area at ground level occupied by any open pit or underground workings, mill complex or storage area for overburden, waste rock, tailings or ore."[4]

Coal mine expansions that are not automatically designated under the Regulations may be designated under section 9(1) of the IAA:[5]

> 9(1) The Minister may, on request or on the Minister's own initiative, by order, designate a physical activity that is not prescribed by regulations made under paragraph 109(b) if, in the Minister's opinion, the carrying out of that physical activity may cause adverse effects within federal jurisdiction or direct or incidental adverse effects.

Under section 9(2), the Minister may also consider the following factors for a designation decision:

(a) public concerns related to the adverse effects within federal jurisdiction — or the direct or incidental adverse effects — that may be caused by the carrying out of the physical activity;

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[3] *Reference re Impact Assessment Act,* 2023 SCC 23 at para 35 ***[IAA Reference]***.
[4] *Physical Activities Regulations*, SOR/2019-285, s 1(1).
[5] Bill C-69, *An Act to implement certain provisions of the budget tabled in Parliament on April 16, 2024*, 1st Sess, 44th Parl, 2024, cl 275 (assented to 20 June 2024) [**Bill C-69**].

(b) the adverse impacts that the physical activity may have on the rights of the Indigenous peoples of Canada — including Indigenous women — recognized and affirmed by section 35 of the *Constitution Act, 1982*;
(c) any relevant assessment referred to in section 92, 93 or 95;
(d) whether a means other than an impact assessment exists that would permit a jurisdiction to address the adverse effects within federal jurisdiction — and the direct or incidental adverse effects — that may be caused by the carrying out of the physical activity; and
(e) any other factor that the Minister considers relevant.

The only two limitations on this discretion to designate in the IAA are in s. 9(7). The Minister must not designate if (a) "the carrying out of the physical activity has substantially begun"; or (b) if a federal authority has exercised a power, duty, or function under another federal law that could permit it to be carried out, either in whole or in part.

c. The Vista Coal Mine

Coalspur is the owner and operator of the Vista Coal Mine, located 10 km east of Hinton, Alberta. The Vista Coal Mine has three components:

(1) Phase I, an open-pit mine operating since 2018;
(2) Phase II, a proposed second open pit directly west of Phase I; and
(3) the Underground Mine, a proposed underground expansion within the existing permit boundaries of Phase I.

The following map, prepared by the Impact Assessment Agency (the "**Agency**") in 2021, illustrates these three components:[6]

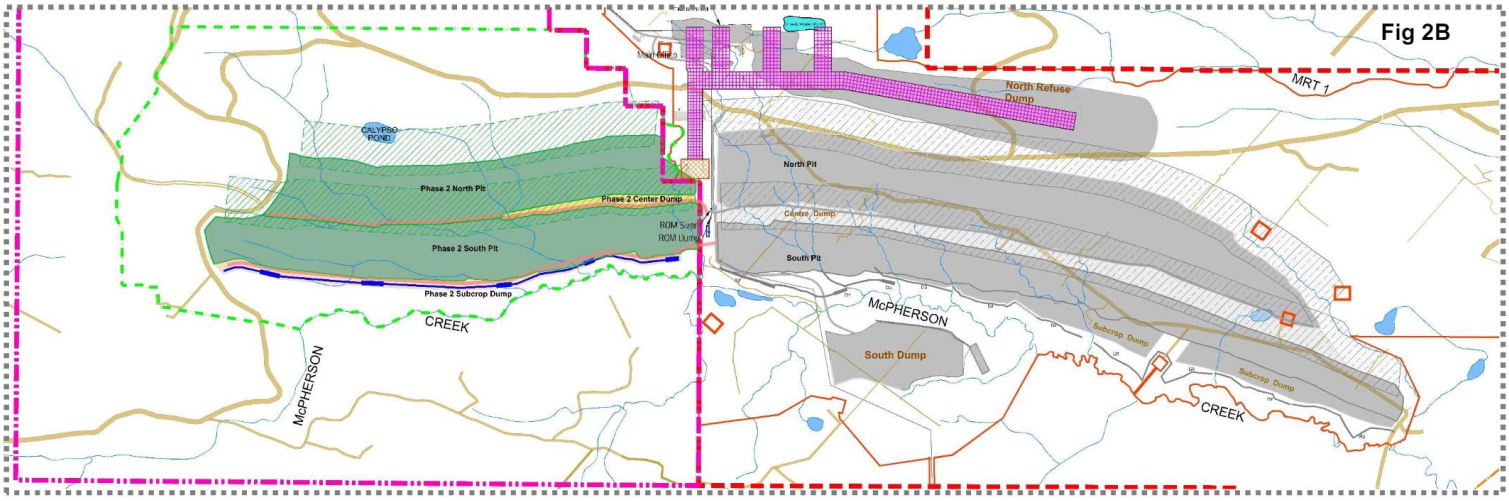

Figure 2B inset. Intersection of Phase I and Phase II activities with critical habitat identified in tributaries of McPherson Creek. Located within the Upper McLeod River Hydrologic Unit Code.

[6] Impact Assessment Agency of Canada, "Analysis Report: Whether to Designate the Vista Coal Underground Mine and Vista Mine Phase II Expansion Physical Activities in Alberta pursuant to the Impact Assessment Act" (September 2021), online: https://iaac-aeic.gc.ca/050/documents/p80731/141463E.pdf [**2021 Analysis Report**] at page 6.

The existing Phase I open-pit is shown in grey on the right. The proposed Phase II is in green on the left. The Underground Mine is in pink, directly above Phase I and within the same permit boundary. Tributaries of McPherson Creek, which are now identified and legally protected as critical habitat for the *Species at Risk Act* ("**SARA**")-listed Athabasca Rainbow Trout, run through the proposed sites of both proposed Expansions.

Phase I currently produces 6 million tonnes ("**MT**") of thermal coal each year. The coal produced at the mine is exported outside of Canada.

It is unclear whether and to what extent Coalspur will need to upgrade its processing infrastructure to account for the huge increase in coal production from the Expansions. While Coalspur had previously stated that any expansion to the existing mine would necessitate an expansion of processing,[7] it now claims that it could rely on the existing transportation and processing infrastructure from Phase I, despite evidence that Phase I operations have overwhelmed said processing capacity as discussed further below.

Coalspur first applied to the Alberta Energy Regulator (the "**AER**") for a provincial environmental assessment of Phase I in 2011.[8] The AER conducted the assessment and approved Phase I in 2014.[9]

Phase I was never subject to a federal environmental assessment. In May 2012, the Canadian Environmental Assessment Agency (the predecessor to the current Agency) decided Phase I did not need to be assessed under the former *Canadian Environmental Assessment Act*, SC 1992, c 37, as no federal authority had identified the need to exercise a power, duty or function to allow Phase I to proceed – the test at that time.

Both Expansions have previously been designated under section 9 of the IAA, but no assessment of effects has occurred. In total, there have been three decisions under section 9 related to the two Expansions:

- **The Phase II Decision** (December 20, 2019): The Minister declined to designate Phase II when it was first proposed. That decision, which was based on the evidentiary record before him in this preliminary designation request, was primarily justified on the belief that other legislative mechanisms could address the potential effects that had been identified at the time, and that consultation with Indigenous groups could be completed through other provincial and federal processes. Despite several opportunities to advise the Minister of its impending Underground Mine expansion, Coalspur failed to advise the

[7] Coalspur Mines (Operations) Ltd., "Section C – Project Description" (April 2012), online: https://open.alberta.ca/dataset/2a9db6ed-4149-4b01-9fa1-676f1e78ea53/resource/c6cd820c-673b-4483-901d-b55072ede37f/download/section-c-projectdescription.pdf at page C-28: "The infrastructure and processing capability would also need to be expanded to handle the increased coal tonnage."
[8] Alberta Government, "Environmental Assessment - Coalspur Mines Ltd. Vista Coal Mine Project - EIA Report and application for approval" (last modified 9 April 2013), online: https://open.alberta.ca/publications/5582113.
[9] Alberta Energy Regulator, "Coalspur Mines (Operations) Ltd.: Applications for Coal Mine Permit Amendment, Coal Processing Plant Approval Amendment, Coal Mine Pit License, and Coal Mine Dump Licenses" (27 February 2014), online: https://static.aer.ca/prd/documents/decisions/2014/2014-ABAER-004.pdf.

Minister of its plans at this time. The Minister was also unaware of deficiencies with the provincial consultation process, as explained further below.

- **The First Designation Decision** (July 30, 2020): Based on additional designation requests informing the Minister of the second expansion, specific concerns from two First Nations regarding the province's failure to require consultation, and additional information regarding the potential for adverse impacts on areas of federal jurisdiction, the Minister designated both Expansions. This decision was later quashed by the Federal Court due to the Minister's failure to consult the Ermineskin Cree Nation ("**Ermineskin**") before designating the Expansions. The Court sent the matter back to the Minister for consultation and reconsideration.

- **The Second Designation Decision** (September 29, 2021): Following further consultation with potentially impacted Indigenous groups, the Minister again designated the Expansions. The Minister also considered new information from the Agency, including (but not limited to) effects on newly protected critical habitat for a federally protected fish species downstream from the Expansions and within the Phase II footprint. This decision was set aside as a result of the Supreme Court of Canada's decision in *Reference re Impact Assessment Act*, 2023 SCC 23 (the "***IAA Reference***"), as the Court had found the certain sections of the IAA to be unconstitutional.

The events leading up to and following each decision are described in greater detail below.

i. *The Phase II Decision*

Coalspur proposed Phase II of the Vista Coal Mine in 2018, which would be a second open pit adjacent to and west of Phase I. The current proposal for Phase II entails a maximum production of 5.8 million tonnes per year with a ten-year lifespan, with a surface disturbance estimate of 586.2 ha.

Phase II, as an open-pit operation, will require clearing vegetation and destruction of streams and tributaries containing federally-protected fish habitat. Phase II will share existing infrastructure with Phase I, including transportation and processing facilities. Components of the expansion include construction and operation of roads, additional plant modules, tailings facilities an end pit lake, the mine pit itself and dump development, and mining via truck and shovel and continuous miner.[10]

Coalspur first sought provincial approval for Phase II in 2018. The provincial approval process for Phase II is ongoing, as Coalspur has yet to submit its formal application or its environmental impact assessment report to the AER as of the date of this letter.[11]

[10] 2021 Analysis Report, *supra* note 6 at 3.
[11] Alberta Government, "Environmental Assessment - Coalspur Mine (Operations) Ltd. Vista Coal Mine Phase II Project" (last modified 11 July 2019), online: https://open.alberta.ca/publications/environmental-assessment-coalspur-mine-operations-ltd-vista-coal-mine-phase-ii-project. This webpage indicates that no steps have been taken since July 11, 2019.

In May 2019, Keepers, the Alberta Wilderness Association, and three members of the public asked the Minister to designate Phase II for assessment under the former *Canadian Environmental Assessment Act, 2012* ("**CEAA 2012**"). This designation request included evidence that Coalspur had communicated to provincial regulators that its Phase II expansion would result in an area of mining operations above the prescribed threshold. This information was not shared with the CEA Agency prior to this May 2019 letter.

The CEA Agency then requested information from Coalspur to inform the Minister's designation decision, including specifically whether Phase II exceeded the thresholds under the Regulations.[12] In response, Coalspur then notified the Agency for the first time that it would be reducing the area of Phase II to the current area of 586.2 ha. The Agency determined in July 2019 that Phase II did not exceed the Area Threshold and was therefore not automatically designated, and started preparing a report to support the Minister's decision to exercise his discretion to designate or not.

The CEA Agency told Coalspur it should be notified of any project changes to confirm the application of CEAA 2012, and should be provided with updated information to inform its recommendation to the Minister about designation. Despite this request from the Agency, Coalspur failed to inform the Agency and Minister about its plans for the Underground Mine.

The IAA came into force on August 28, 2019. The CEA Agency was renamed the Impact Assessment Agency and the Minister considered the designation request under the IAA.

The Agency produced a public-facing report[13] and internal memorandum to inform the Minister's decision. The Agency found that Phase II would result in adverse effects in areas of federal jurisdiction, including to fish and fish habitat, migratory birds, and Indigenous peoples.

The Agency also found that Phase II fell narrowly below the Area Threshold: "[Phase II] would result in an increase in the area of mining operations between 42.7 to 49.4 percent, depending on how future anticipated changes to the Phase I footprint are considered in calculations."[14] The Agency also found that the total expanded production was nearly eight times the Production Threshold at 36,723 t/day.[15] The Agency's opinion on the basis of the evidence before it at the time was that Phase II did not warrant designation, as it believed existing federal and provincial mechanisms could assist in mitigating potential effects, and other processes existed for consulting Indigenous peoples.

On this basis, the Minister decided not to designate Phase II on December 20, 2019.[16] The Minister believed that the adverse effects that had been identified could be appropriately managed by existing legislative mechanisms such as the *Fisheries Act*, the *Migratory Birds*

[12] The correspondence described in this and the following paragraph between the CEA Agency and Coalspur from May-July 2019 is attached to this designation request as **Appendix "B"**.
[13] Impact Assessment Agency of Canada, "Analysis Report: Whether to Designate the Coalspur Mine Ltd. Vista Coal Mine Phase II Project in Alberta" (December 2019), online: https://iaac-aeic.gc.ca/050/documents/p80341/133221E.pdf [**Phase II Analysis Report**].
[14] Phase II Analysis Report, *supra* note 13 at 6.
[15] Phase II Analysis Report, *supra* note 13 at 6.
[16] "Minister's Response: Coalspur Vista Coal Mine Phase II Expansion Project" (20 September 2019), online: https://iaac-aeic.gc.ca/050/evaluations/document/133222.

Convention Act, and the provincial environmental assessment and regulatory processes. Additionally, the Minister noted that these processes would provide mechanisms for consultation with Indigenous peoples. Notably, critical habitat for Athabasca Rainbow Trout had not yet been finalized under SARA at this time.

ii. *The Underground Mine and the First Designation Decision*

As early as January 2019, Coalspur began seeking provincial approval for a second expansion, the Underground Mine. Coalspur failed to notify the Agency of this proposed second expansion throughout the entirety of its correspondences with the Agency before the December 2019 Phase II Decision, despite being under an ongoing obligation to provide updated information on the Vista Coal Mine.

The Underground Mine would produce an additional 1.8 million tonnes of coal over three years, be located within the Phase I permit boundary (northwest of the open pit), and share processing and transportation infrastructure with Phases I and II. Its proposed area is 126.9 ha, primarily underground, with estimated surface disturbance of 10 ha. Components of the Underground Mine include entries, the mine yard, water management structures, ventilation and electrical components, mining via room and pillar methods, and belt conveying of coal for processing and handling.[17]

Following a submission by Coalspur, the Alberta Aboriginal Consultation Office ("**ACO**") concluded on January 10, 2019 that the province would not require any consultation with Indigenous nations for the Underground Mine. In April 2019, Coalspur submitted an application to the AER to amend existing provincial permits to support the Underground Mine.

In May and June 2020, the Minister received three requests to designate the Expansions from Keepers, Louis Bull Tribe ("**Louis Bull**"), and the Stoney Nakoda Nations ("**Stoney Nakoda**").

The requesters notified the Minister about the previously undisclosed Underground Mine and expressed concern about cumulative impacts from both Expansions on the environment, Indigenous peoples, and Indigenous rights. Louis Bull and Stoney Nakoda raised concerns about inadequacies in the provincial consultation process – including that neither First Nation had been or would be consulted for Phase I, Phase II, or the Underground Mine.

Throughout July 2020, the Minister received emails and letters in support of designation from the public and environmental organizations, including a petition signed by 31,928 Canadians specifically about the expected adverse impacts of the Expansions on areas of federal jurisdiction.

The Agency produced a second public-facing analysis report[18] and internal memorandum, specifically about the Underground Mine, on July 30, 2020. The Agency identified likely adverse effects from the Underground Mine alone, including impacts on fish and fish habitat and aquatic species at risk, migratory birds, and Indigenous rights. While the Agency's opinion was that the

[17] 2021 Analysis Report, *supra* note 6 at 3.
[18] Impact Assessment Agency, "Analysis Report: Whether to Designate the Coalspur Mine Ltd. Vista Coal Underground Mine and Expansion Activities Project in Alberta Pursuant to the *Impact Assessment Act*" (30 July 2020), online: https://iaac-aeic.gc.ca/050/documents/p80731/135628E.pdf [**VUM Analysis Report**].

Underground Mine "does not, on its own, warrant designation", it provided the Minister with two options: (1) either decline to designate the Underground Mine (its recommended option), or (2) designate both Phase II and the Underground Mine together.

The Minister decided to designate both Expansions together on July 30, 2020.[19] The Minister's reasons included the fact that the Expansions far exceeded the Production Threshold while falling barely below the Area Threshold; the fact that they may cause unmitigable impacts to fish and fish habitat, species at risk, and to Indigenous peoples and their rights; and concerns about effects raised by the requesters, Indigenous groups, federal authorities and members of the public.

Coalspur and the Ermineskin Cree Nation ("**Ermineskin**") filed separate applications for judicial review of the First Designation Decision in August 2020.

While those judicial review applications were proceeding, Coalspur filed an Initial Project Description for the Expansions under s. 10 of the IAA in April 2021. This commenced the planning phase for an impact assessment. The Agency released a Summary of Issues on June 4, 2021, describing concerns about the Expansions' effects gathered through a comment period.

On July 19, 2021, the Federal Court granted Ermineskin's application for judicial review, quashing the First Designation Decision due to the Minister's failure to consult Ermineskin, and remitting the matter for reconsideration by the Minister. The Court declined to decide Coalspur's application concerning the reasonableness of the decision, finding the Coalspur judicial review moot.

iii. *Consultation and the Second Designation Decision*

Following further consultation with Indigenous groups, in September 2021 the Agency produced another analysis report[20] and internal memorandum,[21] this time for both Expansions, to guide the Minister's decision.

The Agency incorporated findings from its previous analyses while also listing new evidence of effects and concern it had gathered through the previous impact assessment planning phase, the consultation process, and from federal agencies. This time, the Agency recommended that the Minister designate both Expansions.[22]

On September 29, 2021, in the Second Designation Decision, the Minister designated the Expansions for an impact assessment based on the following considerations:[23]

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[19] "Minister's Response: Vista Coal Underground Mine Project and Vista Mine Phase II Expansion Project" (30 July 2020), online: https://iaac-aeic.gc.ca/050/evaluations/document/140819.
[20] VUM Analysis Report, *supra* note 18.
[21] Impact Assessment Agency, "Memorandum to Minister: Vista Coal Underground Mine and Vista Mine Phase II Expansion Projects – Recommendation on Whether to Designate" (29 September 2021) [**2021 Agency Memorandum**], not accessible online but attached as **Appendix "C"** to this designation request.
[22] 2021 Agency Memorandum, *supra* note 21 at page 10.
[23] "Minister's Response: Vista Coal Underground Mine Project and Vista Mine Phase II Expansion Project" (29 September 2021), online: https://iaac-aeic.gc.ca/050/evaluations/document/141492 [**2021 Designation Decision**].

- the fact that Expansions would far exceed the Production Threshold at over 50,000 t/day, and fall just below the 50 percent Area Threshold;
- the potential for the Expansions to cause direct and cumulative effects to areas of federal jurisdiction, including to fish and fish habitat, to newly-identified critical habitat for federally-protected Athabasca Rainbow Trout and Bull Trout, and through the deposit of deleterious substances into fish habitat (including selenium and calcite);
- the potential for the Expansions to adversely impact Indigenous peoples and their health and social well-being through direct and cumulative loss of land as well as air, water, plant, and animal contamination, and may adversely impact the exercise of the rights of some Indigenous groups through limitations on use of traditional lands; and
- concerns from requesters, Indigenous groups, federal authorities, and members of the public that the Expansions may cause adverse effects within federal jurisdiction.

In October 2021, Coalspur, Ermineskin, and Whitefish (Goodfish) Lake First Nation #128 filed applications for judicial review of the Second Designation Decision.

On May 30, 2022, the AER issued provincial approvals for the Underground Mine.

In October 2023, the Supreme Court of Canada issued its decision in the *IAA Reference*.[24] The Court found that the federal impact assessment scheme was unconstitutional in part, and in particular the "designated projects" portion of the legislative scheme. However the Court affirmed Canada's ability to conduct federal environmental assessments: "Environmental protection remains one of today's most pressing challenges. To meet this challenge, Parliament has the power to enact a scheme of environmental assessment."[25]

As a result of the *IAA Reference*, the Federal Court set aside the Second Designation Decision on December 18, 2023. The Government of Canada also issued interim guidance in October 2023, indicating that the s. 9(1) discretionary designation power "will be paused" until the Act is amended to align with the *IAA Reference*.[26]

The IAA was amended on June 20, 2024, correcting the unconstitutional sections of the IAA and ending the government's administrative pause on the use of the s. 9(1) designation power.

d. State of the Expansions

Phase II has not yet received the provincial approvals it requires to proceed. The provincial assessment has been stalled since the AER posted the final terms of reference for the

[24] *IAA Reference*, *supra* note 3.
[25] *IAA Reference*, *supra* note 3 at para 7.
[26] Impact Assessment Agency of Canada, "Government of Canada Releases Interim Guidance on the Impact Assessment Act" (26 October 2023), online: https://www.canada.ca/en/impact-assessment-agency/news/2023/10/government-of-canada-releases-interim-guidance-on-the-impact-assessment-act.html.

environmental impact assessment report in July 2019.[27] Next, Coalspur must prepare and submit an environmental impact assessment report for the AER to assess.

While the Underground Mine has all provincial permits as of May 2022, federal permits under the *Fisheries Act* and SARA – which DFO has repeatedly emphasized are required – remain outstanding.[28]

Despite lacking federal authorization, Coalspur began construction on the Underground Mine sometime in early 2024.[29] The extent of construction is not publicly known.

[27] Alberta Energy Regulator, "Final Terms of Reference: Environmental Impact Assessment Report for Coalspur Mine (Operations) Ltd. Proposed Vista Coal Mine – Phase II" (18 June 2019), online: https://open.alberta.ca/dataset/ab136e20-299b-4bc0-ac76-0c6f946b0eb4/resource/8c8c777f-01e8-4929-b121-dff5957af6ba/download/ftor-coalspur-vista-project-phase-ii.pdf.

[28] 2021 Analysis Report, *supra* note 6 at 13; Keepers reviewed the online SARA registry and the Common Project Search and did not find any SARA or *Fisheries Act* permits for the underground mine: see Government of Canada, "Species at Risk Public Registry" (last modified 12 December 2023), online: https://species-registry.canada.ca/index-en.html#/documents?sortBy=documentTypeSort&sortDirection=asc&pageSize=10; Government of Canada, "Common Project Search" (last modified 23 May 2024), online: https://common-project-search.canada.ca/.

[29] CBC, "Alberta coal mine moves ahead without permits federal officials say are needed" (7 March 2024), online: https://www.cbc.ca/news/canada/edmonton/alberta-coal-mine-moves-ahead-without-permits-federal-officials-say-are-needed-1.7137121.

3. GUIDANCE FROM THE SUPREME COURT'S *IAA REFERENCE* DECISION

As previously noted, the Second Designation Decision was rescinded as a result of the Supreme Court of Canada's decision in the *IAA Reference*, which found the IAA, as it was then drafted, to be unconstitutional. The Court also provided clarity on what may be considered under the IAA, which remains relevant post-amendments.

At the outset, the Court noted that the IAA "establishes an information-gathering process in the service of an ultimate decision-making function."[30] The Court also noted that in part the legislative intent was to restore public trust in federal environmental decision making.[31]

The Court noted that the structure of the s. 9(1) designation mechanism, which does not require definitive proof of effects within areas of federal jurisdiction, is "both practically necessary and constitutionally sound"[32] and in line with the precautionary principle.[33] As stated by the Court, "Projects ought to be designated based on their *potential* effects on areas of federal jurisdiction because…requiring definitive proof of such effects would put the cart before the horse. At the assessment stage, it would be both artificial and uncertain to limit the factors that can be considered to those that are federal."[34]

The Court did, however, clarify that the designation and decision to order an assessment must be driven by adverse effects within federal jurisdiction, a distinction which has been clarified under the revised definition section of the IAA. The Court also clarified that projects are not to be designated, assessments are not to be ordered, and public interest determinations are not to be made *solely* on the basis that a project emits greenhouse gases that cross provincial and national borders.[35]

Instead, decisions designating a project must be grounded on clear areas of federal jurisdiction: including fish and fish habitat, aquatic species at risk, migratory birds, and effects on Indigenous peoples and their rights. While the previous designations of the Vista Expansions alluded to greenhouse gas emissions, to suggest that such designations were done "solely" on the basis of such impacts is totally baseless. The Minister's previous determinations were based heavily on the clear evidence of significant adverse effects on areas of federal jurisdiction.

The Minister must respond to a designation request, with reasons, and within 90 days of the request. The response to this designation request should provide detailed consideration of the evidence of the adverse effects on areas of federal jurisdiction anticipated from the two Vista Expansions. Given the seriousness and potentially irreversible nature of these impacts, we believe designation of the Expansions is warranted to assess the magnitude of these expected impacts and whether mitigation is possible.

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[30] *IAA Reference*, *supra* note 3 at para 81.
[31] *IAA Reference*, *supra* note 3 at para 83.
[32] *IAA Reference*, *supra* note 3 at para 146.
[33] *IAA Reference*, *supra* note 3 at para 145.
[34] *IAA Reference*, *supra* note 3 at para 206.
[35] *IAA Reference*, *supra* note 3 at paras184 & 186.

4. GROUNDS FOR DESIGNATION

No part of the Vista Coal Mine has previously been subject to federal assessment. Phase II narrowly avoided automatic designation, falling narrowly below the Area Threshold after Coalspur reduced its proposed footprint. Production of the entire Vista Coal Mine would be nearly eight times the threshold at which new coal mines which are presumed to have major impacts and require automatic assessment. An increase in the size of coal mining operations as proposed by the Expansions on top of a mining operations never previously assessed will presumptively lead to potential adverse effects.

This presumption is more than borne out by the facts which demonstrate that specific ways the Expansions will have major impacts on areas within federal jurisdiction. This includes impacts on fish and fish habitat (including on federally-protected aquatic species at risk and through the deposit of deleterious substances), on Indigenous peoples and their rights, and on migratory birds. Each of these impacts is discussed in detail throughout this section.

a. Factors to be Considered

The primary consideration on a designation request is the evidence of potential adverse effects within federal jurisdiction. Public concern about these adverse effects remains a relevant consideration. Here there is ample evidence about the significant effects of these Expansions, and relevant factors under section 9(2) including public concern about these effects, as discussed in detail throughout this section.

Under the amended IAA, the definition of adverse effects within federal jurisdiction is as follows:[36]

> ***adverse effects within federal jurisdiction*** means, with respect to a physical activity or a designated project,
>
> (a) a non-negligible adverse change to the following components of the environment that are within the legislative authority of Parliament:
>
> (i) fish and fish habitat, as defined in subsection 2(1) of the *Fisheries Act*,
>
> (ii) aquatic species, as defined in subsection 2(1) of SARA,
>
> (iii) migratory birds, as defined in subsection 2(1) of the *Migratory Birds Convention Act*, and
>
> (iv) any other component of the environment that is set out in Schedule 3;
>
> (b) a non-negligible adverse change to the environment that would occur on federal lands;
>
> (c) a non-negligible adverse change to the marine environment that is caused by pollution and that would occur outside Canada;

[36] Bill C-69, *supra* note 5 at section 271(3).

> (d) a non-negligible adverse change — that is caused by pollution — to boundary waters or international waters, as those terms are defined in subsection 2(1) of the Canada Water Act, or to interprovincial waters;
>
> (e) with respect to the Indigenous peoples of Canada, a non-negligible adverse impact — occurring in Canada and resulting from any change to the environment — on
>
> (i) physical and cultural heritage,
>
> (ii) the current use of lands and resources for traditional purposes, or
>
> (iii) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance;
>
> (f) a non-negligible adverse change occurring in Canada to the health, social or economic conditions of the Indigenous peoples of Canada; and
>
> (g) a non-negligible adverse change to a health, social or economic matter that is within the legislative authority of Parliament that is set out in Schedule 3.

The Agency's "Operational Guide: Designating a Project under the Impact Assessment Act"[37] provides additional guidance on relevant information to be considered on a designation request, including whether or not:

- the project or its expansion(s) is near a threshold set in the Project List;
- standard design features and mitigation would address the anticipated adverse effects;
- the project involves new technology or is a new type of activity;
- the potential adverse effects can be adequately managed through other existing legislative or regulatory mechanisms;
- an assessment of environmental effects would be carried out by another jurisdiction;
- the potential adverse effects would be localized to previously developed lands;
- the project contributes to existing cumulative effects within federal jurisdiction; and
- the overall context of whether the project is of an exceptional nature.

The purpose of the amended *Impact Assessment Act* is also a relevant consideration:

> 6 (1) The purpose of this Act is to prevent or mitigate significant adverse effects within federal jurisdiction — and significant direct or incidental adverse effects — that may be caused by the carrying out of designated projects, as well as significant adverse environmental effects, as defined in section 81, that may be caused by the carrying out of projects, as defined in that section, by establishing processes to anticipate, identify and assess the potential effects of those projects in order to inform decision making under this or any other Act of Parliament in respect of those effects.

[37] Impact Assessment Agency of Canada, "Operational Guide: Designating a Project under the Impact Assessment Act" (last modified 19 May 2022), online: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/designating-project-impact-assessment-act.html.

The s. 9(1) designation provision and procedure provides exactly this type of process, one designed "to anticipate, identify and assess the potential effects" of projects to inform subsequent decision-making under this Act and other federal laws. The Vista Expansions have repeatedly escaped federal review of their likely effects. Designation provides a path for these Expansions to be considered and assessed for the first time, so that the federal government and the public can understand their likely effects before work can begin.

b. Effects on Fish and Fish Habitat

i. *Athabasca Rainbow Trout and Bull Trout*

The Vista Expansions will have serious impacts on two federally-protected fish species: (1) the Athabasca River population of Rainbow Trout, listed as endangered under SARA, and (2) the Saskatchewan–Nelson Rivers population of Bull Trout, listed as threatened.[38]

The purposes of SARA are to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened.[39] A species listed as endangered is at greater risk than those listed as threatened or of special concern. Endangered species are those facing imminent extinction or extirpation, whereas a threatened species is at risk of becoming endangered.

SARA prohibits the killing and harming of endangered, threatened and extirpated species listed in Schedule 1 of the Act (s. 32(1)). SARA also provides that no person shall destroy critical habitat of any listed endangered or threatened species (s. 58(1)), defined as habitat "necessary for the survival or recovery of a listed wildlife species" (s. 2(1)). Critical habitat must first be identified in a species' recovery strategy or action plan, prepared under SARA, in order to be legally protected from destruction through an order made under SARA.

In September 2020, between the First Designation Decision and the Second Designation Decision, DFO produced a final Recovery Strategy for Athabasca Rainbow Trout in which it identified critical habitat, including within the Phase II footprint, above the Underground Mine, and downstream from both Expansions.[40] On March 9, 2021, Minister of Fisheries and Oceans issued the accompanying *Critical Habitat of the Rainbow Trout (Oncorhynchus mykiss) Athabasca River Populations Order* SOR/2021-32, which legally protected the identified critical habitat from destruction.[41]

On behalf of Keepers, in June 2024 Ecojustice retained the services of Lorne Fitch, P. Biol., to review the application materials for the Vista Expansions and provide an opinion on the likely impacts on the relevant populations of Athabasca Rainbow Trout and Bull Trout. Mr. Fitch is a professional biologist, retired provincial fish and wildlife biologist and former adjunct professor with the University of Calgary, with over 50 years of experience in fisheries research,

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[38] 2021 Analysis Report, *supra* note 6 at 8.
[39] *Species at Risk Act*, SC 2002, c 29 [***Species at Risk Act***] at section 6.
[40] 2021 Analysis Report, *supra* note 6 at page 8; Fisheries and Oceans Canada, "Recovery Strategy for the Rainbow Trout (Oncorhynchus mykiss) in Canada (Athabasca River populations)" (2020), online: https://publications.gc.ca/collections/collection_2020/mpo-dfo/En3-4-328-2020-eng.pdf.
[41] *Critical Habitat of the Rainbow Trout (Oncorhynchus mykiss) Athabasca River Populations Order*, SOR/2021-32.

management, habitat protection, habitat recovery, pollution/habitat investigations and environmental outreach and education. His report (the "**Fitch Report**") is attached as **Appendix "A"** to this designation request. This designation request should be read alongside the report of Mr. Fitch, and the response to this request should consider and respond to the expert analysis provided within the report.

Mr. Fitch describes the uniqueness and importance of the Athabasca population of Rainbow Trout as follows:[42]

> Athabasca rainbow trout are the only rainbow trout native to Alberta, all others are introduced. The uniqueness of the species is exhibited in genetic divergence, habitat occupancy and small size at maturity, and this dictates unique physical criteria (water velocity, depth and substrate) at spawning. The species is adapted to cold, unproductive headwater environments (COSEWIC, 2014) …
>
> The most significant natural limiting factor for Athabasca rainbow trout is its habitat specificity, particularly water temperature and spawning and rearing habitat requirements (Sawatzky, 2018). These habitat requirements strongly influence the distribution of Athabasca Rainbow trout, making it vulnerable to unpredictable processes, especially ones outside natural regimes, like mining and logging.

Mr. Fitch also described the Bull Trout population that would be affected by the Expansions:[43]

> Bull trout are late maturing, and rear in small streams for several years before moving downstream to exploit greater food resources in larger streams and rivers. Young fish utilize aquatic invertebrates, but as they grow in size, fish make up a large part of their diet. Adult bull trout are best served by intact watersheds where habitat diversity creates niches for many other fish species.

80 per cent of streams used by Athabasca Rainbow Trout are at high risk due to human activity.[44] Both Vista Expansions overlap with the identified critical habitat for Athabasca Rainbow Trout, including Trail Creek, McPherson Creek, and the tributaries of McPherson Creek that run through the proposed footprints.[45] The Underground Mine involves mining underneath these tributaries, and the Phase II open pit will require physical removal of critical habitat.[46]

In 2021, the Agency noted in particular that the "two sub-watersheds in which the [Vista Expansions] occur have some of the larger estimated populations of Rainbow Trout (Athabasca River populations) in the region", meaning that this location is important for the species and its recovery.[47]

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[42] Lorne Fitch, P. Biol., "A Review of the Probably Impacts of the Vista Coal Mines on Native Fish Species, with particular reference to Athabasca Rainbow Trout and Bull Trout" (June 2024) [**Fitch Report**], attached to this designation request as **Appendix "A"**, at pages 5 and 8.
[43] Fitch Report, *supra* note 42 at page 11.
[44] Fitch Report, *supra* note 42 at page 11.
[45] 2021 Analysis Report, *supra* note 6 at page 9.
[46] 2021 Analysis Report, *supra* note 6 at page 9.
[47] 2021 Analysis Report, *supra* note 6 at page 9.

Bull Trout also occur within the area of the Expansions, which will be located within the Bull Trout Recovery Area.[48] The Recovery Strategy for the Bull Trout (*Salvenlinus confluentus*), Saskatchewan-Nelson River populations was also finalized between the First and Second Designation Decisions in September 2020. As described by Mr. Fitch, Bull Trout habitat is increasingly at risk:

> "[Bull Trout] is a slow-growing and late-maturing species that thrives in cold, pristine waters and often requires long unimpeded migratory routes joining spawning to adult habitat. Historical range contractions now limit the populations to the foothills and east slopes of the Rocky Mountains, likely in response to habitat deterioration and reduced habitat connectivity through damming of the larger rivers. No populations are abundant and more than half show evidence of decline. [49]

ii. *Adverse effects on Fish and Fish Habitat*

In its 2021 analysis report, the Agency summarized a series of potential effects on fish and fish habitat, including the following:[50]

- changes to stream flow through physical activities related to water withdrawal and discharge, including dewatering of the underground mine;
- changes to surface water quality, such as increased contaminants or sediments from physical activities, including increased mining and associated activities and groundwater-surface water interactions during underground mining;
- the deposition of deleterious substances, such as selenium, into water frequented by fish; and
- for the Phase II Expansion but potentially not for the VUM, the physical removal of fish and fish habitat, including designated critical habitat for fish species at risk (Athabasca Rainbow Trout).

Based on these anticipated impacts and others, DFO concluded that there is "significant uncertainty regarding effects from the physical activities to aquatic species at risk, including their habitat, survival, and recovery".[51] The Agency also expressed uncertainty about "whether additional effects to water quality and fish and fish habitat could be limited through the physical activities design, the application of standard mitigation measures, or managed through existing legislative mechanisms."[52]

The Fitch Report explains the effects of mining on trout in more detail.[53] As it explains, the potential effects identified by the Agency would harm key features of the habitat of Athabasca Rainbow Trout and Bull Trout and directly harm individuals of the species, including by interfering with spawning, and causing mortality. For example:

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[48] 2021 Analysis Report, *supra* note 6 at page 8.
[49] Fitch Report, *supra* note 42 at page 12.
[50] 2021 Analysis Report, *supra* note 6 at pages 8-9.
[51] 2021 Analysis Report, *supra* note 6 at page 9.
[52] 2021 Analysis Report, *supra* note 6 at page 10.
[53] Fitch Report, *supra* note 42 at pages 18-26.

- Groundwater-surface water interactions can negatively affect delivery of groundwater to streams, and groundwater upwelling is necessary for Athabasca Rainbow Trout and bull Trout spawning.[54] Successful incubation of eggs depends on appropriate surface flow.[55] Stream flow during trout egg incubation "may be the single most important factor limiting rainbow trout fry survival in streams of west-central Alberta."[56] Changes to groundwater amounts and timing due to hydrological changes from land use are a potential cause of past disappearance of Bull Trout near the relevant area.[57]
- Sediment is inconsistent with habitat requirements for Athabasca Rainbow Trout and Bull Trout and can lead to direct or delayed mortality and population decline in trout.[58] Low sediment is a requirement for successful egg incubation.[59] Sediment also reduces embryo survival and can make it impossible for females to prepare redds for spawning.[60]
- Selenium is toxic to fish and aquatic invertebrates and leads to genetic issues and fish population declines.[61] Selenium impacts from coal mining on native trout are well-documented, including in the same McLeod River area as the Expansions and in native rainbow trout.[62] Selenium is toxic at elevated concentrations and has been documented as causing embryonic deformities and deformities in early life stages of Athabasca Rainbow Trout, which impair survival, and has been associated with reduced muscle tissue in adult Athabasca Rainbow Trout.[63] Further, because native rainbow trout are more sensitive to it than stocked trout, it may also give an advantage to non-native trout over native trout.[64] Selenium from coal mining has been found to have population-level effects on native trout.[65]
- Habitat includes not only stream beds but also riparian vegetation buffers. Removal of habitat that is riparian vegetation contributes to sedimentation and degradation of surface water quality.[66]

These effects are incompatible with the "clean, cold, complex and connected waters" that these species require.[67] Overall, Mr. Fitch's opinion is that "[t]he cumulative effect of human activities is now beyond the range of natural variation under which most native fish species evolved", and the status quo of increasing human impacts is incompatible with the recovery of these species.[68]

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[54] Fitch Report, *supra* note 42 at page 25.
[55] Fitch Report, *supra* note 42 at page 10.
[56] Fitch Report, *supra* note 42 at page 8.
[57] Fitch Report, *supra* note 42 at page 25.
[58] Fitch Report, *supra* note 42 at pages 8 & 14-18.
[59] Fitch Report, *supra* note 42 at page 10.
[60] Fitch Report, *supra* note 42 at page 8.
[61] Fitch Report, *supra* note 42 at page 47.
[62] Fitch Report, *supra* note 42 at pages 21-24 & 47.
[63] Fitch Report, *supra* note 42 at pages 21-22.
[64] Fitch Report, *supra* note 42 at page 21.
[65] Fitch Report, *supra* note 42 at page 22.
[66] Fitch Report, *supra* note 42 at page 14.
[67] Fitch Report, *supra* note 42 at page 13.
[68] Fitch Report, *supra* note 42 at pages 13 & 26.

In addition to the effects previously identified by the Agency, the Fitch Report highlights the risk of operational and structural failures with impacts on fish and fish habitat, based on the history of such failures at other Alberta coal mines.[69] The examples include the catastrophic failure of sediment ponds at the Obed Coal mine in 2013, which released massive amounts of sediment into the Athabasca River and tributaries, and releases of deleterious effluent from wastewater ponds at the Coal Valley Mine into tributaries of the McLeod River in 2011; both of these impacted habitat for Athabasca Rainbow Trout.[70]

In Mr. Fitch's opinion, "[c]oal mining operations in mountain and foothill settings, with steep terrain features are (and will be) subject to repetitive slope, road and settling pond failures, despite the application of engineering solutions", especially in light of increasing extreme weather events due to climate change.[71] The consequences for Athabasca Rainbow Trout and Bull Trout are that "[e]ven just one operational or structural engineering failure will result in an irrevocable loss of species at risk trout, as has been the case in many other surface coal mines."[72]

The Fitch Report explains that the Expansions' cumulative effects may be incompatible with recovery of native trout and maintaining critical trout habitat. Mr. Fitch's opinion is that "[t]here is a high probability that expansion of the Vista mine, coupled with the existing mine footprint will have adverse impacts on Athabasca rainbow trout and bull trout and critical habitats", including from sediment; selenium; hydrologic shifts, including impacts on groundwater flows from underground mining.[73] In his opinion, "[w]atershed instability created by coal mining in McPherson Creek and other streams produces a high level of risk to population viability and persistence of Athabasca rainbow trout and bull trout."[74] Cumulative impacts of Phase I and the Expansions "will make it problematic, even prohibitive to maintain critical habitats for Athabasca rainbow trout and bull trout in MacPherson Creek, a tributary (MCT2) and other affected streams", and "trout and coal mines cannot coexist without losses in trout populations."[75]

Mr. Fitch also underscores the importance of cumulative effects assessments, noting that they "are not undertaken for coal mining on a regional or watershed scale" in Alberta and that "[t]he McLeod watershed displays the effects of a failure to consider cumulative effects and this is manifested by the species at risk nature of watershed populations of Athabasca rainbow trout and bull trout."[76] Land use impacts are cumulative, or even synergistic.[77]

The Fitch Report outlines the limitations of mitigation for addressing the above effects, and specific shortcomings of mitigation proposed by Coalspur. Mr. Fitch explains why mitigation for effects on fish and fish habitat might not be effective, and highlights research documenting failures of mitigation for effects of development on fish and fish habitat, which failures call into

[69] Fitch Report, *supra* note 42 at page 37-45.
[70] Fitch Report, *supra* note 42 at pages 39 & 42.
[71] Fitch Report, *supra* note 42 at page 45.
[72] Fitch Report, *supra* note 42 at page 46.
[73] Fitch Report, *supra* note 42 at pages 27-28.
[74] Fitch Report, *supra* note 42 at page 46.
[75] Fitch Report, *supra* note 42 at page 28.
[76] Fitch Report, *supra* note 42 at page 28.
[77] Fitch Report, *supra* note 42 at page 48.

question the ability of mitigation to effectively address effects on at-risk fish species and their habitat.[78] He explains the shortcomings of specific mitigation measures proposed by Coalspur, including the insufficiency of the proposed buffer from McPherson Creek, streamflow augmentation, and surface water management.[79] He also highlights concerns about "proper assessment of ecological thresholds (like population carrying capacity) for each ecosystem, which can limit the overall effect of mitigation".[80] He concludes that "[t]here is no suitable mitigation or offsetting that would be effective, especially when dealing with species at risk trout where significant habitat issues and loss of habitat have already occurred on a local and regional watershed scale."[81]

The potential impacts for fish and fish habitat of the Expansions in critical habitat of Athabasca Rainbow Trout and Bull Trout habitat are severe. The Fitch Report concludes that:

> No streams and no trout populations are surplus— all are required for recovery efforts for both populations of species at risk trout. No measures will protect these populations from harm if mining continues and is expanded to include both surface and subsurface mining. … With continuation of coal mining, including expansion of the surface mine footprint and underground mining it is highly likely that a combination of acute and chronic issues, including changes in hydrology, water quality and aquatic habitat will result in population declines and possibly loss of Athabasca rainbow trout. These negative changes in the watershed will preclude any recovery options for both Athabasca rainbow trout and bull trout populations.[82]

Impact assessment is therefore critical for understanding the complete picture of the severe potential effects on these federally-protected fish populations, and whether they can be mitigated.

iii. *Deposit of Deleterious Substances*

Coal mining effluent contains toxic substances, which, as described above, have harmful impacts on native trout and are not addressed by existing mechanisms.

The *Coal Mining Effluent Regulations* (proposed under the Fisheries Act) are currently being developed by Environment and Climate Change Canada ("**ECCC**") and will apply to coal mines in Canada. These regulations will set national standards for toxic substances including selenium, nitrate and suspended solids, as well as setting requirements related to pH and toxicity. They will also set requirements for monitoring, reporting and record keeping, including environmental effects monitoring. Notably, these regulations would prescribe selenium as a deleterious substance and set maximum thresholds. However, these regulations are not yet in force, and it is uncertain when they will be in place.

[78] Fitch Report, *supra* note 42 at pages 29-34.
[79] Fitch Report, *supra* note 42 at page 35-37.
[80] Fitch Report, *supra* note 42 at page 30.
[81] Fitch Report, *supra* note 42 at page 37.
[82] Fitch Report, *supra* note 42 at page 48.

In 2021, selenium was also added to Schedule I of the *Canadian Environmental Protection Act, 1999*, the Toxic Substances List.[83] When listing selenium, ECCC noted that its most severe impacts are on aquatic species, though birds, reptiles and amphibians are also affected:

> The most severe effect resulting from long-term exposure to elevated concentrations of selenium in the food web is reproductive failure in egg-laying vertebrates (fish, water birds and amphibians). Selenium may accumulate in fish eggs and affect developing embryos and larvae, while adults appear to be less affected. Reduced egg hatchability and increased embryonic deformities are the main selenium toxicity endpoints observed in birds, although causal evidence is sparse for oviparous reptiles and amphibians.

Both the *Coal Mining Effluent Regulations* (once in force) and the *Canadian Environmental Protection Act, 1999* depend on federal authorities to either act preventatively to set requirements for projects depositing selenium, or to enforce prohibitions if exceeded. A federal impact assessment provides a preventative pathway to understand the extent of selenium pollution and propose mitigation measures before work and further pollution can begin.

Selenium and other contaminants would also meet the statutory test for a deleterious substance under the *Fisheries Act*: essentially, any substance that could cause lethal or sublethal effects to fish when added to water. However, while deposition of deleterious substances is an offence under the *Fisheries Act*, the potential for after-the-fact prosecutions does not effectively prevent pollution.

The failure of existing mechanisms to address selenium and other deleterious substances is illustrated by problems resulting from other coal mines.

Selenium is a notorious by-product of open-pit coal mining. A study between 1998 and 1999 on selenium concentrations specifically within the McLeod River, which is downstream of McPherson Creek and the Vista coal mine, found baseline concentrations of 0.5-1.3 micrograms per litre (µg/L), but concentrations as high as 36.3 µg/L directly downstream from other regional mines.[84] These concentrations far exceed the Canadian Council of Ministers of the Environment (CCME) water quality guideline for selenium required to protect aquatic life: 1 µg/L.

Selenium from open-pit coal mining is also notoriously difficult to mitigate. As the Fitch Report explains, there is a lack of proven technologies for reducing selenium to safe levels of aquatic life.[85] In British Columbia's Elk Valley region, the Kootenay River watershed which crosses over into the United States, selenium pollution from extensive coal mining has had devastating impacts on the watershed and aquatic species that live within it. Coal mining has been ongoing in the Elk Valley for over a century.[86] Selenium is bioaccumulative, meaning that it can build up in

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[83] *Order Adding Toxic Substances to Schedule 1 to the Canadian Environmental Protection Act, 1999*: SOR/2021-89.
[84] 2021 Analysis Report, *supra* note 6 at page 10.
[85] Fitch Report, *supra* note 42 at pages 34 & 47.
[86] Impact Assessment Agency of Canada, "Analysis Report: Whether to Designate the Castle Project in British Columbia Pursuant to the *Impact Assessment Act*" (19 August 2020), online: https://iaac-aeic.gc.ca/050/documents/p80702/135794E.pdf at page 20.

certain species and move up the food chain.[87] Selenium is also persistent; it can remain in waterways for decades even after the sources of pollution are addressed.

After significant pressure from groups on both sides of the border, Canada and the United States agreed to conduct a joint commission to investigate reduce and mitigate the impacts of selenium pollution in the transboundary watershed.[88] However, a recent report revealed that it will cost at least $6.4 billion to reverse the rising selenium concentrations from these mines.[89]

The province of British Columbia and the primary proponent in the Elk Valley, Teck Resources Ltd, have to-date been unable to mitigate selenium pollution from open-pit mining operations. Attempts at mitigation such as Saturated Rock Fill (SRF) technology and water treatment facilities have not had meaningful impacts on selenium concentrations. As noted by Mr. Fitch, "[c]urrent treatment methods are at best, experimental concepts."[90]

As the Fitch Report concludes, "[e]xperience strongly suggests regulatory standards, oversight, monitoring and enforcement are insufficient to validate the promises made prior to mine development by governments and mine proponents for effective, "stringent" environmental protection during and after mine development."[91] Further, "[o]nce a coal mine is approved, monitoring, environmental problems, regulatory oversight and enforcement are inconsistently applied. The evidence suggests this comes at the expense of water quality, biodiversity maintenance and watershed integrity."[92]

Selenium concentrations in the McLeod watershed will significantly increase as a result of the two Vista expansions, intensifying impacts on Athabasca Rainbow Trout and Bull Trout along with other aquatic species. Designation is the best mechanism to assess the intensity of these impacts, including cumulative effects, and to determine whether mitigation is possible.

iv. *Coalspur's failure to mitigate impacts on fish and fish habitat*

Coalspur's past conduct raises additional concerns about likely adverse impacts on fish and fish habitat:

- Coalspur failed to seek federal approval before starting work on the Underground Mine, despite being told permits under the *Fisheries Act* and SARA were required to understand mitigate impacts on protected fish; and

[87] Impact Assessment Agency of Canada, "Analysis Report: Whether to Designate the Castle Project in British Columbia Pursuant to the *Impact Assessment Act*" (19 August 2020), online: https://iaac-aeic.gc.ca/050/documents/p80702/135794E.pdf at page 20.
[88] Government of Canada, "Joint Statement from the Ambassador of Canada to the United States, Kirsten Hillman, and the Ambassador of the United States to Canada, David L. Cohen, on the Elk-Kootenay watershed" (11 March 2024), online: https://www.international.gc.ca/country_news-pays_nouvelles/2024-03-11-us-eu.aspx?lang=eng.
[89] Gordon Johnson, Burgess Environmental, "Review of Reclamation Security Addressing Selenium Contamination – Teck Coal" (18 March 2024) via letter [communicated to Casey Brennan and Simon Wiebe] [**Review of Reclamation Security**].
[90] Fitch Report, *supra* note 42 at page 47.
[91] Fitch Report, *supra* note 42 at page 45.
[92] Fitch Report, *supra* note 42 at page 45.

- Wastewater from the existing Phase I far exceeded what was originally permitted, requiring Coalspur to seek an emergency expansion of its tailings facilities. This application was partially denied due to Coalspur's proposed dilution strategy, which the AER characterized as a "dilute and pollute-up to strategy … inconsistent with the principle of effective pollution prevention and control".

Each of these two concerns is detailed in this section.

1. Unauthorized start of the Underground Mine

Coalspur has started work on the Underground Mine without seeking necessary federal authorizations. As a result, the extent of the impacts on fish and fish habitat is unknown, mitigation may not be in place in the absence of any permit conditions, and mitigation may soon be impossible. Assuming that construction has not substantially begun, designation of this expansion is warranted to ensure these likely impacts are understood and addressed before work can continue.

The Agency's 2021 analysis report indicates that DFO expressed significant uncertainty about the impacts of the Expansions to protected fish species and their habitat, survival and recovery and whether they would or could be mitigated. DFO noted that an authorization under the *Fisheries Act* was required for both Expansions which could include conditions to avoid, mitigate, and offset these impacts.[93] Requirements for authorizations under SARA include that "all feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat" and that "the activity will not jeopardize the survival or recovery of the species".[94]

Coalspur disagreed about the requirement to seek permits before starting work on the Underground Mine, stating in April 2021: "[t]he activities associated with the [Underground Mine] have no anticipated effects on fish and fish habitat as they reside within the existing operating footprint of Phase I."[95] At the time of writing, DFO has not issued permits for either of the Expansions under the *Fisheries Act* and SARA.

Once the Second Designation Order was set aside by the Federal Court in December 2023, Coalspur immediately started work on the Underground Mine.[96] The extent of construction is unknown. According to the Alberta Energy Regulator in March 2024: "The company started construction work, but it's limited to the underground portion of the mine … Coalspur has not

[93] 2021 Analysis Report, *supra* note 6 at page 13.
[94] *Species at Risk Act*, *supra* note 39 at sections 73(3)(c) & 73(3)(b).
[95] Coalspur Mines (Operations) Ltd., "Vista Mine Initial Project Description Summary" (April 2021), online: https://iaac-aeic.gc.ca/050/documents/p80731/138950E.pdf [**Initial Project Description**].
[96] CBC, "Alberta coal mine moves ahead without permits federal officials say are needed" (7 March 2024), online: https://www.cbc.ca/news/canada/edmonton/alberta-coal-mine-moves-ahead-without-permits-federal-officials-say-are-needed-1.7137121.

commenced mining activities at Vista Test Underground Mine. As of Dec. 31, 2023, no coal has been mined at the underground mine and the portal has not been constructed."[97]

Coalspur's decision to begin work without required permits is concerning. At-risk fish and their habitat, including critical habitat, may already be impacted. Designation is required immediately to understand and mitigate these likely impacts.

2. Wastewater Management Issues

Coalspur has been unable to manage wastewater for the existing Phase I.

Immediately after the mine became operational, it became clear in 2019 that the permitted Processing Plant for Phase I could not handle the volume of waste material generated. Coalspur began applying to the AER for tailings cells to hold this unexpected waste. As described by Michael Beyer, CEO of Vista Energy Holdings LLC (the parent corporation of Coalspur) in an affidavit supporting a 2021 creditor protection application: "Shortly after mine start-up in 2019, Coalspur determined that the composition of raw coal feed exceeded the design capacity of the Project's filter process plant and, as a result, an alternate means of processing slurry was required."[98]

The AER approved an initial tailings cell in February 2020, repurposing a mined-out pit within the Phase I boundary.

In June 2020, Coalspur submitted an application to the AER for approval of eight additional tailings cells.[99] It described the purpose of the application as follows:[100]

> The Mine has experienced an increased volume in the material being generated from the underflow of the Processing Plant's thickener cells. This increase has caused the mine to fully utilize the capabilities of the Filter Press Plant and therefore do [sic] not have the capacity to process the excess underflow being generated.

Each tailings cell would have a storage capacity of between 2,600,000 to 5,600,000 cubic meters, or nearly 30 billion litres total.[101] These proposed tailings cells would run directly north of the SARA-listed trout habitat in McPherson Creek.

While the AER was still considering Coalspur's application, Coalspur had already filled the first tailings cell. Coalspur was forced to cease all mining operations at the mine site as it was unable to manage the additional wastewater from continued operation.[102]

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[97] CBC, "Alberta coal mine moves ahead without permits federal officials say are needed" (7 March 2024), online: https://www.cbc.ca/news/canada/edmonton/alberta-coal-mine-moves-ahead-without-permits-federal-officials-say-are-needed-1.7137121.
[98] Affidavit of Michael Beyer, Chief Executive Officer of Vista Energy Holdings LLC, sworn April 19, 2021, online: https://minedocs.com/22/Coalspur-Affidavit-04192021.pdf [**Beyer Affidavit**] at para 7.
[99] See Appendix "C".
[100] Brian Gregg, Bighorn Mining Ltd., "Re: Coalspur Mines (Operations) McPherson Pit Tailings Cells" (14 August 2020) [**Vista Tailings Application**], of which excerpts are attached **Appendix "D"**, at page 5. The full application can be requested from the Alberta Energy Regulator as Application Nos. 1929395, 1929396, and 1929397.
[101] Vista Tailings Application, *supra* note 100 at page 11.
[102] Beyer Affidavit, *supra* note 98 at para 9.

In April 2021, the AER partially granted Coalspur's application for further tailings cells. Only two of the tailings cells were granted, on the basis of environmental concerns. Coalspur had been required to assess and validate certain geotechnical, geochemical and environmental reclamation criteria for the first tailings cell, but according to the AER "The data submissions lacked the field verification and evidence necessary to enable a fulsome consideration of the additional tailings cells".[103]

Additionally, while Coalspur had provided supplemental information and lab data to support its claim that the barrier it was using to minimize seepage from the cells was sufficient, the AER found there was insufficient verification to support Coalspur's claim that "long-term seepage into McPherson Creek, and surrounding tributaries, will be effectively minimized as to have no adverse effect on the aquatic life."[104]

Coalspur also expressed a desire to dilute tailings with water, groundwater, and fresh water, to meet regulatory limits – allowing Coalspur to discharge runoff into local streams. The AER rejected this approach: "Coalspur's proposed approach is equivalent to a dilute and pollute-up to strategy. This is inconsistent with the principle of effective pollution prevention and control."[105]

The Vista Expansions intend to rely on the same processing infrastructure as Phase I. Coalspur has already demonstrated an inability to deal with existing wastewater, and its proposed "dilute and pollute-up" strategy has been rejected by the AER, as described above. Before further expansion can occur, a federal impact assessment will allow for a robust process to have Coalspur's plans for further expansion and associated wastewater and processing plans to be considered in full.

c. Impacts on Indigenous Peoples and their Rights

When declining to designate Phase II in 2019, the Minister believed that the provincial consultation process could be an adequate forum for addressing impacts on Indigenous peoples. The 2020 designation requests from Louis Bull (on May 1, 2020) and Stoney Nakoda (on June 30 and July 8, 2020) raised serious concerns with this process.

Louis Bull and Stoney Nakoda were clear in their designation requests that they had never been consulted for any part of the Vista Coal Mine – not for Phase I, Phase II, or the Underground Mine. This was a significant change since the Phase II Decision, as at that time the Minister and Agency believed that consultation could be done through existing provincial processes.

Louis Bull specifically notified the Minister of two material developments since the Phase II Decision: that (1) the ACO had rejected Louis Bull's request to be involved with Phase II

[103] Alberta Energy Regulator, "Re McPherson Tailings Cell Amendment Application Nos. 1929395, 1929396, and 1929397 under the *Coal Conservation Act* (CCA); *Environmental Protection Enhancement Act* (EPEA) Application No. 010-00301345; *Water Act* (WA) Application Nos. 007-00311969 and 006-00311965" (8 April 2021) [**AER Tailings Decision**], attached to this request as **Appendix "E"**, at page 2.
[104] AER Tailings Decision, *supra* note 103 at page 2.
[105] AER Tailings Decision, *supra* note 103 at page 3.

consultations in January 2020,[106] and (2) the ACO had found no consultation was required with any Indigenous communities for the Underground Mine in February 2020.[107] Louis Bull further expressed concern about effects on its members ability to access traditional foods, the loss of medicinal plants, decreases in culturally significant species; the significance and impacts to Louis Bull's Aboriginal and Treaty Rights; and the significance of the mine area to Louis Bull citizens.

Through two letters to the Minister, Stoney Nakoda also detailed their concern about potential impacts from Phase II and the Underground Mine.[108] Stoney Nakoda reiterated Louis Bull's concerns about the ACO's failure to include them in the consultation process for Phase II, and failure to require any consultation for the Underground Mine: "The existing [consultation] processes in no way address the identified potential adverse impacts of [Phase II and the Underground Mine] on Stoney Nakoda's rights." Stoney Nakoda submitted that it was unclear how adverse effects to their health, social and economic conditions and section 35 rights could be appropriately managed by the provincial regulatory process.

As recognized by the Federal Court, there was no consultation with other impacted Indigenous nations before the First Designation Decision in July 2020, which led to the Federal Court sending that decision back to the Minister in July 2021 to be newly decided.

Consultation occurred throughout 2021 during both the planning phase for the assessment and then after the Federal Court's July 2021 decision requiring reconsideration.[109] Through this process, the Agency gathered information about potential impacts on Indigenous peoples and their rights. The Agency noted that while some Indigenous groups supported the Expansions and prior consultation efforts from the province and Coalspur, others raised concerns about the absence of traditional land use studies, impacts on species of Indigenous importance, impacts to water quality and significant lands and rivers, impacts to the ability to maintain the relationships that Indigenous peoples have with the land, the risk of contamination from accidents; impacts to health through consumption of water, foods, and medicinal plants; impacts to mental and physical health due to dramatic environmental change; and impacts to physical and cultural

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[106] The ACO later appeared to change its mind on June 2, 2020: Letter from Vince Biamonte, Indigenous Relations, ACO, to Melanie Daniels, Louis Bull Tribe, "Re: Your request for consultation on the Coalspur Vista Phase II Project" (2 June 2020), online: https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-80731/comment-47499/ACO%20consultation%20decision%20letter%20to%20LBT.pdf.

[107] Louis Bull Tribe, "Request for Designation under the *Impact Assessment Act* of Coalspur Mine (Operations) Ltd.'s Vista Coal Mine Expansion" (1 May 2020). This request does not appear to be available online, but is already within the Agency's possession from the 2020 and 2021 decision-making processes for the Vista Expansions.

[108] Sara Louden, Rae and Company, "Re: Letter in Support of Requests for Designation under the Impact Assessment Act of Coalspur Mine (Operations) Ltd.'s Vista Coal Mine Expansion" (30 June 2020); Sara Louden, Rae and Company, "Re: Stoney Nakoda Nations' Request for Designation under the Impact Assessment Act of Coalspur Mine (Operations) Ltd.'s Vista Coal Mine Expansion" (8 July 2020).

[109] Impact Assessment Agency, "Coalspur Mines Phase I Vista Test Underground Mine and Vista Mine Phase II Expansion Projects - Summary of Issues" (4 June 2021), online: https://iaac-aeic.gc.ca/050/documents/p80731/139378E.pdf [**Summary of Issues**]; Impact Assessment Agency, "Reconsideration Process: Phase I Vista Test Underground Mine and Vista Mine Phase II Expansion Projects: Summary of Indigenous Engagement and Consultation" (24 September 2021) [**Summary of Indigenous Consultation**]. The Summary of Indigenous Consultation does not appear to be available online but is already within the Agency's possession from the 2021 decision-making process for the Vista Expansions.

heritage sites. Several nations also made specific submissions to the Agency about impacts to their communities and their rights.[110]

This further consultation allowed the Agency to identify specific culturally-significant environmental impacts: including effects on fish species harvested by Indigenous peoples, effects on medicinal plants and trees, and effects to health and to species of cultural significance (including bighorn sheep) through accumulation of selenium and other pollutants.[111] The Agency was of the view that the physical activities may cause adverse impacts on the rights of the Indigenous peoples of Canada, in particular through loss of access to culturally significant sites and traditional lands.

The full extent of impacts from the Vista Expansions to Indigenous peoples and their rights is unknown. The process that began with the impact assessment planning phase unfortunately ended in 2021. To our knowledge, no consultation has occurred since that time. Despite this, Coalspur has started work on one of the Expansions and some impacts may have already occurred. Designating the Expansions will ensure that impacts are fully understood, robust consultation takes place, and mitigation measures can be proposed before work can continue.

It is the federal government's constitutional duty to ensure the honour of the Crown and the duty to consult and accommodate is upheld.[112] The federal government cannot rely on a materially flawed process by the province to fulfill these duties.

d. Migratory Birds

According to Coalspur, there are 134 migratory bird species potentially within the area of the Expansions.[113] The Agency has identified many potential impacts to these species including "habitat alteration, increased mortality, effects to health through exposure to deleterious substances, sensory disturbance, habitat fragmentation, and movement obstruction."[114] When they were consulted prior to the Second Designation Decision, Indigenous nations also raised concerns about potential effects to species of cultural significance, including waterfowl and eagles.[115]

ECCC noted specific impacts from birds landing on wastewater.[116] Given Coalspur's existing issues with wastewater management, this factor is of particular concern. And as noted previously

[110] See e.g. LBT's May 2021 submission on "key issues": Letter from Melanie Daniels, Lands & Consultation Manager, to Shelley Boss, Impact Assessment Agency of Canada (20 May 2021), online: https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-80731/comment-54555/Coalpsur%20Mine%20key%20issues%20Louis%20Bull%20Tribe%20May%202021_Final_Redacted.pdf; see also Louis Bull Tribe, "Traditional Land Use Assessment (Public Summary Report)" (27 November 2020), online: https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-80731/comment-54555/FINAL%20Coalspur%20TLU%20Report%2027Nov20.pdf.
[111] Summary of Issues, *supra* note 109 at page 3.
[112] *Coastal First Nations v. British Columbia (Environment)*, 2016 BCSC 34 at para 196.
[113] Initial Project Description, *supra* note 95 at page 31.
[114] 2021 Analysis Report, *supra* note 6 at page 24.
[115] 2021 Analysis Report, *supra* note 6 at page 25.
[116] 2021 Analysis Report, *supra* note 6 at page 25.

in the section on deleterious substances, selenium is known to have specific impacts on egg hatchability and increased embryonic deformities for birds.

e. Proximity to Thresholds

The Agency's Operational Guide notes that the question of whether a "project or its expansion(s) is near a threshold set in the Project List" is a relevant consideration for whether designation is appropriate. The thresholds are designed to capture major projects presumed to cause adverse impacts, whereas the designation provision is used for activities that fall outside of the automatic thresholds but nonetheless have serious adverse impacts.

In deciding whether to designate, it is also worth noting the regulatory history of the Area Threshold. Coal mine expansions were originally designated on the basis of production capacity alone under the original project list for CEAA 2012. This second threshold, exempting coal mine expansions below 50% of the area of mining operations, was subsequently added to narrow the list of automatically designated projects. However, the Regulatory Impact Analysis Statement which accompanied this amendment made clear that the Minster retains broad discretion to consider the individual circumstances of a given case that falls below this type of threshold in justifying the functionality of this regime.[117]

In other words, the Minister's powers under s. 9(1) have always been intended to act as a safeguard for excluding otherwise potentially harmful projects that slip through the formal prescribed thresholds. The Vista Expansions are precisely this type of project.

If Phase I alone was proposed today, it would be automatically designated under the project list. At around 20,000 tonnes per day, it is nearly four times the Production Threshold of 5,000 t/day.

Phase II will produce an additional 18,000 t/day of "clean" coal processed for market, again far exceeding this threshold.[118] Phase II only escapes automatic designation as it is an expansion to an already massive mine. While the Underground Mine's production is limited relative to these two phases, it itself has a significant daily production of 1,740 t/day of "clean" coal, alone accounting for over one third of the Production Threshold.[119]

As noted by the Minister in 2021, once expanded the Vista Coal Mine will produce over 50,000 tonnes per day of raw coal, "well above the total coal production capacity of 5,000 tonnes per day" described in the Regulations.[120]

It is only because the Underground Mine's footprint is primarily underground that the two Expansions were not automatically subject to impact assessment. "Area of mining operations" has been interpreted by the Agency as disturbed area at ground level.

In 2019, the Agency found that Phase II fell narrowly below the Area Threshold: "[Phase II] would result in an increase in the area of mining operations between 42.7 to 49.4 percent,

[117] Regulatory Impact Analysis Statement SOR 2013-186, (2023) C Gaz II, 2357-2358.
[118] 2021 Agency Memorandum, *supra* note 21 at page 2.
[119] 2021 Agency Memorandum, *supra* note 21 at page 2.
[120] 2021 Designation Decision, *supra* note 23.

depending on how future anticipated changes to the Phase I footprint are considered in calculations."[121] The surface disturbance of Phase II is estimated to be 586.2 ha.

The Underground Mine will increase the total disturbed area by 126.9 ha – but due to being underground, its estimated surface disturbance is only 10 ha. If the underground area of the Underground Mine was included in the calculation of "area of mining operations", the Expansions would amount to a 60% total increase in area and presumptively require assessment.

The Agency recently published a discussion paper as part of the 5-year review of the Regulations. In the discussion paper, the Agency confirmed that each physical activity in the Project List, and each corresponding threshold, is intended to serve "as a representation of the scale or size of a project at which it is most likely to result in adverse effects in federal areas."[122]

The Agency also noted that the thresholds for coal mines, and expansions to coal mines, are currently too high: "no coal mine project has met the Project List thresholds since they were increased in 2019".[123] Due to this, coal mines expected to have non-negligible impacts on areas of federal jurisdiction, in particular through impacts on water and fish, required designation by the Minister. The Agency announced an intention to "lower thresholds, including expansions, for coal projects to return to thresholds applied under CEAA 2012 (3000 t/day) and to capture large expansion of existing coal mines."[124]

These proposed changes further support the use of the designation power until the Project List is amended. The scale of the Vista Expansions is even more significant when compared to the previous production threshold of 3000 t/day, and the Agency has noted the need to capture large expansions of existing coal mines. At a 43-49.4 percent increase in area, and several times the production threshold, Phase II of the Vista mine can only be considered a large expansion.

f. Exceptional Nature of the Project

Once expanded, the Vista coal mine will be the largest thermal coal mine in Canada. Despite being proposed relatively recently, the mine's adverse impacts on areas of federal jurisdiction have escaped any scrutiny, assessment, and potential mitigation.

Additionally, the past actions of the proponent Coalspur require greater scrutiny. As discussed in previous sections, Coalspur failed to inform the Agency about the Underground Mine when the Minister was contemplating Phase II, undermining his ability to understand the full extent of potential impacts from the expanded mine. Coalspur has also now started work on the Underground Mine without applying for or receiving required permits from DFO. Coalspur has also demonstrated an inability to manage the existing wastewater from Phase I, as demonstrated through the AER's rejection of Coalspur's proposal to massively expand tailings capacity for wastewater as its existing processing facilities could not handle the waste from Phase I.

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[121] Phase II Analysis Report, *supra* note 13 at page 6.
[122] Impact Assessment Agency of Canada, "Discussion Paper on the Project List Review" (31 July 2024), online: https://letstalkimpactassessment.ca/discussion-paper-on-the-review-of-the-physical-activities-regulations [**Project List Discussion Paper**] at page 6.
[123] Project List Discussion Paper, *supra* note 122 at page 15.
[124] Project List Discussion Paper, *supra* note 122 at page 16.

Coalspur has also demonstrated an inability to contain mine wastewater as intended within its mitigation and operational plans. In 2023, two separate incidents were reported to the AER where Coalspur had released mine wastewater into fish-bearing streams.[125] In one instance the AER reported that Coalspur was unable to ascertain the volume of this wastewater spill.

Another relevant consideration is reclamation, and the potential burden on the taxpayer and environment if Coalspur is unable to afford the costs of remediation. The Expansions are expected to result in the deposit of deleterious substances, including the persistent and bioaccumulative selenium, into sensitive waterways for decades to come. Comparable mines in the Elk Valley have resulted in much higher reclamation costs than originally anticipated. As described in a previous section, a recent report revealed that it will cost at least $6.4 billion to reverse the rising selenium concentrations from the Elk Valley coal mines, far exceeding original estimates and reclamation bonds.[126]

Coalspur has struggled with insolvency, entering into creditor protection proceedings under the federal *Companies' Creditors Arrangement Act* in 2021.[127] Coalspur faced a series of operating losses, entered into a temporary shutdown, and lost interest from investors during this time.[128] Michael Beyer, the head of the parent corporation of Coalspur, stated at the time that "Coalspur is currently insolvent and urgently requires protection under the CCAA to give it a reasonable time to advance its restructuring efforts."[129]

As reported by The Narwhal, in 2022 Coalspur owed approximately $504 million to at least five secured creditors and investors, and $53.5 million to 286 unsecured creditors – 60 of which were located in Hinton, the community adjacent to the mine.[130] According to The Narwhal, most of these local businesses were unable to recover the debts owed to them from Coalspur as a result of the creditor protection proceedings, despite Coalspur surviving near-financial disaster and maintaining operations in recent years.

These circumstances raise serious questions about Coalspur's ability to ensure proper remediation of the mine once operations have ended and cashflows from the sale of coal have ceased. There has been considerable public concern about Coalspur's underestimate of reclamation costs, particularly considering its financial status.[131] Adverse impacts on areas of federal jurisdiction, in particular on fish and fish habitat through continued deposit of selenium, will persist beyond the operational lifecycle of the Vista Coal Mine. A federal assessment will

[125] Alberta Energy Regulator, "Compliance Dashboard" (data last updated 2 August 2024), online: https://www1.aer.ca/compliancedashboard/incidents.html. Recoverable by searching for "Coalspur" on the AER Compliance Dashboard; the incident reference numbers are #20231552 and #20231007.
[126] Review of Reclamation Security, *supra* note 89.
[127] Beyer Affidavit, *supra* note 98 at para 15.
[128] The Narwhal, "The inside story of an Alberta coal mine devastated by a financial crisis" (24 June 2021), online: https://thenarwhal.ca/alberta-coal-mine-vista-coalspur-finances/.
[129] Beyer Affidavit, *supra* note 98 at para 15.
[130] The Narwhal, "This Alberta coal mine is back from the brink of financial ruin – but it comes at a cost" (12 February 2022), online: https://thenarwhal.ca/alberta-vista-coal-mine-turnaround/.
[131] The Narwhal, "The inside story of an Alberta coal mine devastated by a financial crisis" (24 June 2021), online: https://thenarwhal.ca/alberta-coal-mine-vista-coalspur-finances/.

provide a better understanding of these potential effects and the actual costs of remediation, to ensure funds for reclamation are set aside before work can begin.

5. DESIGNATION OF PHASE II ALONE

a. Whether the Underground Mine has "Substantially Begun"

Subsection 9(7)(a) of the IAA provides that the Minister may not designate a project if "the carrying out of the physical activity has substantially begun."

As discussed above, some amount of work on the Underground Mine has apparently started. Keepers does not have the necessary information to know the extent of the work started on the Underground Mine, or whether it is "substantially begun". However, it is likely that this expansion can still be designated under the IAA.

According to Agency guidance, the focus of the inquiry into whether an activity has substantially begun is focused on "material progress", informed by the extent to which physical undertakings have been carried out.[132] The same guidance document sets out a set of relevant considerations:

- Direct linkage to the physical activity: the physical undertakings that took place, or that are taking place, are directly linked to the physical activity and would not have occurred without the physical activity (e.g., site clearing or remediation that may be linked to other potential projects would not meet this consideration);
- Permanence: the physical undertakings that took place, or that are taking place, amount to an essential part of the physical activity that is long-lasting (e.g., present throughout the operation phase), as opposed to temporary;
- Substantive landscape alteration: the physical undertakings have physically affected the landscape at the project site in a substantive manner (e.g., extensive clearing of vegetation, land graded for construction of project components); and,
- Duration: the physical undertakings that took place, or that are taking place, occurred over an extended period of time (e.g., several weeks of construction days).

This guidance was recently considered and applied to consideration of a 2022 designation request about the Summit Mine 14 Project in Alberta, a proposed underground coal mine. There, the proponent took the position that the project had substantially begun because "most required regulatory approvals have been attained and permanent physical undertakings have been carried out, including drilling of wells, construction of access routes, and construction of entrances to the underground mine." Applying the above guidance, the Agency determined that the project had not substantially begun as the activities to date "appear to be related to preliminary investigation or exploration activities and are not physical activities that constitute the potentially 'designated project' that could be subject to the IAA (i.e., construction, operation, decommissioning and abandonment)."

[132] Impact Assessment Agency of Canada, "Guidance for interpreting "substantially begun" under subsection 9(7) and "substantially begin" under subsections 70(1) and 70(3) of the Impact Assessment Act" (last modified 21 June 2024), online: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/guidance-interpreting-substantially-begun-subsection-9-7-and-substantially-begin-subsections-70-1-70-3.html.

While Canadian courts have not yet interpreted "substantially begun" within the meaning of the *IAA*; British Columbia case law concerning similar language further suggests the phrase should be interpreted to focus on physical activities undertaken beyond the mere start of a project. In *Glacier Resorts Ltd v British Columbia (Minister of Environment)*,[133] the British Columbia Court of Appeal confirmed the reasonableness of a Minister's interpretation of "substantially started" within provincial environmental assessment legislation that focused on physical activities suggesting more than a project's "mere start." The Minister's reasons explained that the *EAA*'s use of the word "substantially" indicated that "the project must obviously be more than merely started", an interpretation that was upheld by the Court of Appeal.[134] It further held that a project's "substantial start" is distinguishable from whether the proponent made reasonable efforts to advance the project.[135]

b. Designating Phase II Alone

In the alternative, if work on the Underground Mine has indeed "substantially begun", Keepers request that the Minister designate Phase II alone for impact assessment under s. 9(1) of the IAA.

While the Underground Mine is a substantial project on its own with a projected extractive capacity of nearly one million tonnes per year, the Phase II project is much larger, with a maximum production capacity of 5.8 million tonnes per year. If built, Phase II has the potential to raise Canada's thermal coal exports by this amount, meaning that they will have more than quintupled since 2015. The Phase II expansion will also have disproportionate effects as a result of its open-pit operation and increased production capacity as compared to the Underground Mine.

In particular, Phase II is expected to have potentially irreversible effects on fish and fish habitat – an area of clear federal jurisdiction – including on fish protected under SARA and their critical habitat. This critical habitat was only identified in 2021 and is relevant new information for designation. As noted by the Agency in 2021, Phase II was expected to require "the physical removal of fish and fish habitat, including designated critical habitat for fish species at risk (Athabasca Rainbow Trout)."[136] Due to the nature of open-pit mining, tributaries running through the footprint of Phase II, and their surrounding riparian areas, which are also critical habitat, will inevitably be taken up and destroyed in full.

The information gathered by the Agency, DFO, and ECCC, and provided by Indigenous groups in 2020 and 2021, indicates that even the impacts of Phase II alone will be severe and potentially irreversible, and will undermine the continued survival of these two protected fish species.

[133] *Glacier Resorts Ltd. v. British Columbia (Minister of Environment)*, 2019 BCCA 289 ***[Glacier Resorts]***.
[134] *Glacier Resorts*, *supra* note 133 at para 25.
[135] *Glacier Resorts*, *supra* note 133 at para 55.
[136] 2021 Analysis Report, *supra* note 6 at 9.

6. CONCLUSION

For the reasons set out in this request, the numerous potential adverse effects to areas of federal jurisdiction resulting from the Expansions warrant designation under s. 9(1) of the IAA.

On the basis of the above information, Keepers request that the Minister designate the two Vista Expansions for impact assessment under s. 9(1) of the IAA.

In the alternative, if the carrying out of the Underground Mine has substantially begun, Keepers request the Minister designate Phase II for impact assessment under s. 9(1) of the IAA.

Sincerely,

Dyna Tuytel
Barrister & Solicitor

Daniel Cheater
Barrister & Solicitor

Encls.

Appendix A: Lorne Fitch, P. Biol., "A Review of the Probably Impacts of the Vista Coal Mines on Native Fish Species, with particular reference to Athabasca Rainbow Trout and Bull Trout" (June 2024)

Appendix B: Correspondence between the Canadian Environmental Assessment Agency and Coalspur Mines (Operations) Ltd. (May-July 2019)

Appendix C: Impact Assessment Agency, "Memorandum to Minister: Vista Coal Underground Mine and Vista Mine Phase II Expansion Projects – Recommendation on Whether to Designate" (29 September 2021)

Appendix D: Excerpts from Brian Gregg, Bighorn Mining Ltd., "Re: Coalspur Mines (Operations) McPherson Pit Tailings Cells" (14 August 2020)

Appendix E: Alberta Energy Regulator, "Re McPherson Tailings Cell Amendment Application Nos. 1929395, 1929396, and 1929397 under the *Coal Conservation Act* (CCA); *Environmental Protection Enhancement Act* (EPEA) Application No. 010-00301345; *Water Act* (WA) Application Nos. 007-00311969 and 006-00311965" (8 April 2021)

cc. Keepers of the Water Society, West Athabasca Watershed Bioregional Society

A Review of the Probable Impacts of the Vista Coal Mines on Native Fish Species, with particular reference to Athabasca Rainbow Trout and Bull Trout

Lorne Fitch, P. Biol.

Prepared for Ecojustice Canada Society, June 2024

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Statement Of Issues

There are concerns raised by clients of Ecojustice that the Phase II expansion of the Coalspur Vista surface coal mine, including an underground portion will impact populations and habitat of *Endangered* Athabasca rainbow trout and *Threatened* bull trout. This mine expansion may also affect downstream populations of these two native fish species and negatively influence recovery efforts for both species.

A review of these concerns has been undertaken by Lorne Fitch, a professional biologist, retired provincial fish and wildlife biologist and former adjunct professor with the University of Calgary. Mr Fitch has over 50 years of experience in fisheries and aquatic system inventories, research, management, habitat protection, habitat recovery, pollution/habitat investigations and environmental outreach and education. His credentials to undertake this review and provide an opinion are further outlined in the Curriculum Vitae in the Appendix.

Project Context

There is a proposal by Coalspur Mine (Operations) Ltd. to expand the existing Vista Coal Mine Project, an open-pit surface coal mine for thermal coal and to include a new underground mine as part of the operation. The underground mine would be located within the Phase I mine permit area and is additional to the Phase II Expansion, which would extend surface mining westward from Phase I (Coalspur Mines (Operations) Ltd, 2012). These physical activities are located approximately ten kilometres east of Hinton, Alberta.

Watershed Context

Mining occurs and is proposed within tributaries of the Athabasca and McLeod rivers that contain several native fish species, including Athabasca rainbow trout and bull trout. Streams affected by mine development include McPherson Creek, a tributary to the McLeod River, an unnamed tributary to the McLeod River, Trail Creek, tributary to the Athabasca River and an unnamed Athabasca River tributary. The current mine influences most of the watershed of McPherson Creek,

five south bank tributaries of McPherson Creek and seven north bank tributaries of the stream. The main access road and coal conveyance system crosses Trail Creek, an unnamed tributary of Trail Creek and an unnamed tributary of the Athabasca River. Mine expansion would influence a further six tributaries of McPherson Creek and an additional unnamed tributary. There are an additional eight standing waterbodies influenced by mine development.

The topography of the area has been characterized by “undulating or strongly rolling dissected plateau to steep slopes.” The mine is situated in high foothills characterized by elongate ridges and valleys oriented northwest to southeast.

Fisheries Context

Streams affected by Coalspur Mine (Operations) Ltd. existing and proposed mine development contain (or contained) at least 12 species of fish based on fisheries inventories in 1981 and 2010-12.

This fish assemblage contained the following species:

Fish Species	**Species at Risk Status**
Athabasca rainbow trout (*Oncorhynchus mykiss)*	Endangered (SARA), Threatened (AB)
Bull trout (*Salvelinus confluentus*)	Special Concern (SARA), Threatened (AB)
Burbot (*Lota lota*)	Secure
Arctic grayling (*Thymallus arcticus*)	May be at risk
Lake Chub (*Couesius plumbeus*)	Secure
Longnose dace (*Rhinichthys cataractae*)	Secure
Longnose sucker (*Catostomus catostomus*)	Secure

Pearl dace (*Margariscus margarita*)	Undetermined
Spoonhead sculpin (*Cottus ricei*)	May be at risk
White sucker (*Catostomus commersoni*)	Secure
Finescale dace (*Phoxinus neogaeus*)	Undetermined
Brook trout (*Salvelinus fontinalis*)	Exotic/Alien

Information on the occupancy, distribution and size of fish populations in these watersheds can be biased by a number of factors. These include the timing of fisheries inventories, capture techniques, capture selectivity of certain species and sizes, amount of representative habitats sampled, amount of overall sampling effort, number of sampling efforts in all seasons, seasonal fish movements and water conditions and clarity. As well, limited systematic inventory data on many non-sport fish species and inadequate assessment of population risk means provincial status is, for most species, at best a guess.

Athabasca rainbow trout were found in McPherson Creek, a tributary (MCT2) immediately east of the mine, in a McLeod River tributary (MRT1) and in Trail Creek (Pisces, 2012). Earlier fisheries inventories found bull trout and Arctic grayling in McPherson Creek and one tributary (MCT4) (Techman, 1982). The McLeod River and the Athabasca River contain Athabasca rainbow trout, bull trout and Arctic grayling downstream of the existing mine and proposed expansions.

Recent work on mitochondrial DNA for Arctic grayling showed a divergence and geographic distribution of genetic diversity in Canada which merits consideration for separate designatable units for future species status assessment and management (Reilly and Miller, 2021). This could potentially mean the current status of Arctic grayling of *May be at* risk could be changed for the Alberta population to *Special Concern* or *Threatened.*

Athabasca Rainbow Trout Life History

Athabasca rainbow trout are the only rainbow trout native to Alberta, all others are introduced. The uniqueness of the species is exhibited in genetic divergence, habitat occupancy and small size at maturity, and this dictates unique physical

criteria (water velocity, depth and substrate) at spawning. The species is adapted to cold, unproductive headwater environments (COSEWIC, 2014).

The Athabasca rainbow trout is taxonomically unique (Nelson and Paetz, 1992) and represent a unique gene pool on the Eastern Slopes of the continental divide. Analysis suggested a greater variation between groups (Athabasca River vs. McLeod River vs. Wildhay/Berland), than among populations representing these groups (Taylor et al, 2007). Genetic studies show populations are often distinct from one another (Alberta Sustainable Resource Development and Alberta Conservation Association, 2009). This suggests evolution and development of unique features tailored to specific streams. Loss of those unique genetic features has implications for recovery efforts if those populations are lost, especially to land use.

Headwater streams are important to maintain genetic purity and could act as sources of fish that could assist in recovery of populations impacted by land use.

Pure populations of Athabasca rainbow trout have unique genotypes which provide the species a greater fitness to survive in headwater streams. These unique genotypes developed in place since the melting of montane and continental glaciers in response to conditions experienced at a watershed level.

The life history of Athabasca rainbow trout includes spawning in the spring (early June) based on water temperature (Sterling, 1992). Adult females excavate depressions in smaller gravel substrate, into which fertilized eggs are deposited. The depression, termed a “redd”, is then covered with gravel as a new depression is excavated upstream. Eggs incubate in the gravel substrate with fry emergence 59 days later. The young fish, with yolk sac still visible, may remain in the redd for an additional week before emergence.

Growth rates of this species are very slow and adult fish remain small in size. Miller and Macdonald (1950) observed that, “The low temperature and poor food supply have converted these Rainbow into a dwarf race of absolutely no sporting value…” This utilitarian sentiment persisted until there was recognition of the genetic uniqueness of the species and the remarkable adaptation to very rigorous conditions of existence.

Athabasca rainbow trout fry and older age classes have similar habitat preferences to other trout species. The preferred habitat of fry at this point in their life history

includes pools and other micro-habitats of relativity slow moving water, where the energy expenditure of swimming is minimized. Fry have limited swimming ability and minimal reserves of energy to constantly negotiate higher velocity water in the main current of a stream. Pools, with low, or areas of no current velocity, coupled with overhead cover in the form of large woody material and overhanging riparian vegetation, plus large, instream substrates of sediment-free cobbles and boulders provide excellent rearing and hiding cover (Rosenfeld et al, 2000; Rosenfeld and Boss, 2001).

By late summer/early fall, streams have lower flows, reduced current velocities and run clear, all of which facilitates optimal rearing of young Athabasca rainbow trout.

Older age classes of trout utilize more of the stream environment for resting, feeding, movement and hiding cover. Pools are still favoured habitat and deeper ones, where depth is sufficient to allow over-winter survival (generally > 1.0m), are essential for the long term persistence of the species. Athabasca rainbow trout overwinter in deeper pools. Sterling (1992) found overwintering pools in his study streams had a mean maximum depth of 0.63 metres.

There is consistent use of low velocity habitat at the micro-habitat and channel unit scale for both juvenile and adult trout (Al-Chokhachy and Budy, 2007).

Micro-habitats for trout include small areas of little or no current velocity behind and beneath cobbles, small boulders, roots and root wads and undercut streambanks. Channel habitats are the areas of larger scale that include pools, large boulders, bedrock outcrops, log jams and instream woody material that also have low current velocities.

Athabasca rainbow trout are represented by stream-resident and river-migrant populations. Stream-resident females exhibited little instream movement to spawn, while males moved short distances, less than one kilometre (Sterling, 1980). Trout that are stream-resident seem to have a high fidelity to specific stream sections and do not undertake extensive migratory movements, probably undergoing all of their life cycle within a few hundred meters of the site of spawning and overwintering pools.

Sterling (1992) in studying Athabasca rainbow trout life history in other McLeod River tributaries found spawning in substrate with less than 12.1 per cent fines

and that embryo survival to fry emergence was strongly influenced by intrusion of sediments. A doubling of sediment in spawning gravels reduced embryo survival more than seven times. A small substrate size is critical for fish that are of a small size at spawning to enable female trout to excavate a redd of suitable depth. Not only does sediment in amounts greater than the range of natural variability decrease fry survival, but sediment may also "cement" spawning gravels making it difficult if not impossible for female trout to excavate redds.

Results also indicated interstitial dissolved oxygen, required for successful trout egg incubation was significantly lower following sediment additions from timber harvest. Similar results might be expected from coal mining, where forest cover is completely removed. Related to any forest disturbance and hydrologic changes from land uses was the observation that "Streamflow during incubation may be the single most important factor limiting rainbow trout fry survival in streams of west-central Alberta."

Athabasca rainbow trout spawn every year, with their spawning period occurring later than in most non-native rainbow trout found in southern Alberta. Like other salmonids, female rainbow trout select spawning sites in areas with groundwater influenced flow through suitably sized substrate. The emerging fry feed on larvae and nymphs of various aquatic insects along the edges of natal streams

The most significant natural limiting factor for Athabasca rainbow trout is its habitat specificity, particularly water temperature and spawning and rearing habitat requirements (Sawatzky, 2018). These habitat requirements strongly influence the distribution of Athabasca Rainbow trout, making it vulnerable to unpredictable processes, especially ones outside natural regimes, like mining and logging.

Bull Trout Life History

Bull trout exhibit three life history strategies: stream resident, migratory or fluvial (riverine), and adfluvial (riverine-lake migrant) (COSEWIC, 2012) and these may overlap. Stream residents are non-migratory, and spend most of their lives in small streams and rivers. Fluvial bull trout occupy rivers and major tributaries and move into headwater streams to spawn. Migrations to spawning streams may be lengthy and demonstrate the scale, habitat diversity and connectivity required by fluvial populations to meet their life cycle requirements.

Fluvial populations occupy medium sized rivers and major tributaries, and move into higher gradient smaller rivers and streams to spawn. In addition to spawning habitat, these smaller systems provide rearing habitat for juvenile bull trout until approximately age two, when the fish migrate downstream to occupy large rivers. Bull trout return to natal streams to spawn after sexual maturity at age five, sometimes in alternate years (Fraley and Shepard, 1989; McPhail and Baxter, 1996; Warnock, 2008).

Stream-resident bull trout live permanently in small, cold tributary streams and often spawn and overwinter within a two kilometre section of these systems. These stream resident trout are strongly associated with pool habitat and instream and overhead cover. Small fish (< 200 mm) seek cover in coarse substrates and large woody debris. They may be connected to migrant populations or be fully or partially isolated from other populations by natural barriers.

Resident juveniles and adults overwinter in small pools with a depths from 0.4 to 1.5 metres. These pools can isolated from one another during winter ice conditions, but continue to receive flow from perennial groundwater springs. Seasonal groundwater upwellings provide residents with cold-water refugia in summer and perennial groundwater upwellings provide warmer water refugia in winter.

Bull trout natal streams tend to be shallow, structurally diverse headwater or tributary streams with stable, sediment-free channels found at higher elevations (COSEWIC, 2012). Their structural diversity not only meets habitat requirements of spawning adults but also provides for the changing habitat needs of rearing juveniles. These natal habitats occur as discrete patches of suitable habitat in a matrix of the larger stream network (Baxter, 1997; Dunham and Rieman, 1999; Decker and Hagen, 2008).

Bull trout adults spawn in the fall, often beginning upstream migratory movement as early as the spring freshet. These trout may undertake extensive seasonal migrations to spawning tributaries in May to August and downstream to overwintering areas by late September to early October.

There is a consistent fidelity to specific spawning sites, based on physical characteristics of overhead cover, gravel size, upwelling groundwater and uniform stream flows over the period of egg incubation. Spawning occurs from September

through October, based on water temperature. The adult bull trout female excavates a redd, deposits eggs fertilized by attendant males and then buries each excavation with subsequent, upstream redd construction. Eggs incubate over winter, with hatching occurring March to April and emergence of fry from the substrate in late April to mid-May.

Because bull trout spawn in flowing water and eggs incubate over the winter, incubation sites are particularly vulnerable to anchor ice accumulations, as well as scouring and low flows. Females, therefore, often select spawning sites associated with groundwater sources that stabilise temperatures through the winter (Baxter, 1997; Baxter and McPhail, 1999; Ripley et al, 2005). Within these areas of upwelling, they tend to select localized spots of strong down-welling and high inter-gravel flows (Baxter and Hauer 2000). These occur over coarse gravel/cobble substrates that have low levels of fine sediment, for example, the tail-outs of pools at the heads of riffles (Baxter and Hauer, 2000). The specific selection of these characteristics increases aeration of eggs. Successful incubation is dependent on several stream characteristics, including appropriate temperature, gravel composition, permeability, low amounts of sediment and surface flow.

The preference of young bull trout for coarser substrate than is used by spawning adults appears to be heavily influenced by avoidance of predation and competition. In the spring, newly emerged bull trout fry seek cover in shallow, slow-flowing stream margins with coarse cobble-boulder substrate (Pollard and Down, 2001; Spangler and Scarnecchia, 2001).

Bull trout fry have similar habitat requirements to Athabasca rainbow trout, requiring pools of low, or no current velocity and extensive overhead and instream cover. There is a disproportionate use of pools by juvenile bull trout. Bonneau and Scarnecchia (1998) found that while pools only constituted 15 per cent of available habitat, 44 per cent of bull trout were observed in pools. Any loss, impairment or diminishment of pool habitat will affect bull trout populations.

Juvenile bull trout have a limited home range extending up to 200 metres but display minimal displacement within the stream, showing fidelity to a particular instream feature (e.g. boulder, cobble, root wad) that defines cover and low current velocity (Mushens 2003). During summer, juvenile bull trout hold positions close to the stream bottom and within larger substrate materials.

Bull trout are late maturing, and rear in small streams for several years before moving downstream to exploit greater food resources in larger streams and rivers. Young fish utilize aquatic invertebrates, but as they grow in size, fish make up a large part of their diet. Adult bull trout are best served by intact watersheds where habitat diversity creates niches for many other fish species.

Athabasca Rainbow Trout and Bull Trout— Species At Risk

Athabasca rainbow trout

The recovery strategy for Athabasca rainbow trout (Fisheries and Oceans Canada, 2020) notes that mining, past, present and proposed represents about 38 per cent of Athabasca rainbow trout range in the combined Gregg, McLeod, Embarras and Erith watersheds. Populations with abundance levels less than 20 fish/0.1 hectare are at high risk and vulnerable to other impacts—80 per cent of streams are at high risk. It is recognized that "The two sub-watersheds in which the physical activities [i.e., coal mining] occur have some of the larger estimated populations of Rainbow trout (Athabasca River populations) in the region" (Impact Assessment Agency of Canada, 2021). Smaller tributaries such as McPherson Creek and the other affected streams are significant contributors to the overall watershed population.

Less than five per cent of mine surfaces have reestablished functioning forest ecosystems, even after decades, continuing to add risk to Athabasca rainbow trout populations.

Reason(s) for designation: This fish is an obligate resident of clear, cold flowing water in the upper Athabasca River drainage of Alberta. Quantitative sampling over the last two decades demonstrates that the majority of sites are declining in abundance with an estimate of >90 per cent decline over three generations (15 years). Threats are assessed as severe due to habitat degradation associated with resource extraction. Additionally, ongoing climatic change and associated altered thermal regimes and hydrology, habitat fragmentation, introgression from non-native rainbow trout, and fishing threaten the species. Potential impacts from invasive brook trout is also a concern (COSEWIC, 2014).

It is recognized that critical habit for Athabasca rainbow trout "is found within the Phase II Expansion footprint and downstream from both physical activities" (Impact Assessment Agency of Canada, 2021).

Bull trout

The distribution of bull trout in Alberta includes the Saskatchewan-Nelson Rivers populations and the Western Arctic populations in the Athabasca watershed. Historically, bull trout were more widely distributed in Alberta. Once occupying reaches further downstream, they are now restricted to upstream reaches with the exception of the northern Peace and Athabasca drainages where they occur in low abundance. In recent decades, the distribution of bull trout has also declined in eastern parts of its range in Alberta.

This species has been classified as *Threatened* by Alberta for both the Saskatchewan-Nelson Rivers populations and the Western Arctic populations. The recovery strategy recognizes the need to maintain or improve the condition of all populations.

Reason(s) for designation: This freshwater fish is broadly distributed east of the Rocky Mountains. It is a slow-growing and late-maturing species that thrives in cold, pristine waters and often requires long unimpeded migratory routes joining spawning to adult habitat. Historical range contractions now limit the populations to the foothills and east slopes of the Rocky Mountains, likely in response to habitat deterioration and reduced habitat connectivity through damming of the larger rivers. No populations are abundant and more than half show evidence of decline. The primary and persistent threats to these populations include competition and hybridization with introduced eastern brook trout and climate-induced increases in water temperature. Although legal harvest has been eliminated, this species is highly catchable and is therefore likely susceptible to catch-and-release mortality in many areas that are accessible to recreational anglers. Consequently, an aggregate decline in abundance of > 30 per cent over the next three generations is projected (Fisheries and Oceans Canada, 2020).

Summary

Native fish species have persisted in the waters of the Eastern Slopes of Alberta for approximately 12,000 years. Prior to that, in the glacial refugia where they moved from and since taking up residence in headwaters streams, these fish have

been subject to evolutionary pressures and disturbances. These include flood, drought, fire, landslides and predation. Disturbances appear extreme but happened, over time, within a range of natural variation. Over millennia, fish evolved to deal with this range of variation in their stream environments and that has been transferred into their genetic material as a way of coping, surviving and thriving in a rigorous system. Population failures at a stream reach level would have occurred due to some natural catastrophe. Because there was considerable connectivity within a larger watershed with other trout populations, fish movement ensured recovery was possible.

A variety of land uses in the Eastern Slopes in as little as five decades have profoundly changed the physical environment of native fish. The cumulative effect of human activities is now beyond the range of natural variation under which these species evolved. As an example the amount of erosion-generated sediment from human activity now exceeds the natural range of variability by several orders of magnitude (e.g., Southern Foothills Study, 2015).

The previous flexibility and options native trout had have been severely limited and, not surprisingly, both Athabasca rainbow trout and bull trout are categorized as species at risk, both federally and provincially. Population recovery implies the status quo, especially in land use decisions, will not allow populations of Athabasca rainbow trout and bull trout to regain stability in distribution, abundance and connectivity. Recovery actions, in addition to dealing with habitat restoration, requires a recognition and commitment to stop making things more perilous for these species with additive, cumulative land use decisions.

Habitat Requirements

The persistence of these native fish species requires several habitat parameters to be met. In general terms the criteria is an amalgam of clean, cold, complex and connected waters.

Critical habitat refers to the habitat elements necessary for the survival or recovery of a listed species. Those elements include spawning and rearing areas, overwinter sites, food supply, migration and any other areas at a watershed scale upon which the fish species depends, either directly or indirectly to successfully carry out their life processes and persist multiple generations forward.

Aquatic life forms have adapted to a natural range in variation of sediment regimes and can compensate for variation in sediment concentrations within the natural range, but fail to when the sediment regime is influenced by human land use factors.

Logging, roads and mining increase sediment rates, turbidity, nutrients and water temperatures, modify streamflow, allochthonous detritus and decrease gravel porosity, percolation rates and dissolved oxygen in streams.

Spawning substrates of suitable sized gravels free of sediment are required for various life cycle requirements. Appropriate stream flow, especially during the stage when eggs are incubating in the substrate is essential. Low velocity, micro-habitats to minimize energy expenditure are necessary for rearing habitat for juvenile fish. Overwintering pools of substantial depth allow fish to successfully survive winter conditions of reduced stream flow, ice cover and physical blockages to movement. These are "critical" habitats necessary for the survival or recovery of a listed species.

Water temperatures cannot exceed, for lengthy periods, the upper thermal thresholds for the species. Water temperatures are moderated by groundwater capture during spring snow melt and subsequent rainfall events. Water stored as shallow groundwater eventually reaches the stream, is cooler than stream water and reduces stream temperatures. Overhanging riparian vegetation shades the stream surface from direct sunlight and maintains stream temperatures.

Riparian vegetation is also a source of terrestrial food items for trout and tends to "glue" stream bank materials together, maintains cross sectional profiles of narrower, deeper stream channels and makes the system more resilient to erosion and mobilization of sediment. Riparian vegetation buffers and filters sediment from upland portions of the watershed but when upland portions of the watershed are disturbed by mining and/or logging the thin line of riparian vegetation is rendered ineffective at protecting water quality. Riparian areas also constitute critical habitat for trout species, within intact watershed conditions.

Summary of Habitat Requirements

The watershed of a stream completes the context of essential habitat elements that trout depend on for their life cycle requirements. Trout and the aquatic environment are inseparable from the watershed in which they exist. An intact

watershed, with a high degree of ecological integrity is what fish depend on, for stable stream flow, groundwater influence, structural elements like large woody debris, temperature moderation in the form of riparian vegetation and upland forests which also provide a buffering and filtering capacity, and a supply of substrate suitable for spawning and benthic insect production.

Notes on General Effects of Sediment

Sediment is categorized as sand, silt or clay of an organic or inorganic origin. Turbidity is the optical property of water which results from suspended and dissolved minerals in water. Measurements of turbidity estimate the amount of sediment in a sample of water and are usually described as Nephelometric Turbidity Units (NTU). Suspended sediment is the amount of mineral or organic particles transported in the water column and is described as milligrams/liter (mg/l). Deposited sediment refers to those intermediate particles that settle out of the water column on the stream bed under conditions of slower water velocity (Canadian Council of Ministers of the Environment, 2002).

Sediment, the product of both natural erosion and human sources, is a major limiting factor to native fish populations. Suttle et al (2004) showed increasing amounts of sediment decreased growth and survival of juvenile trout. The authors concluded that there is no threshold below which sediment levels are harmless to trout, but that any reduction provides benefits.

Much (2010) summarized the effects of sediment on trout. Sediment can be lethal, leading to direct mortality. It can have sublethal effects which are characterized as reductions in feeding and growth rates, decreases in habitat quality, reduced resistance to diseases, respiratory impairment and physiological stress. The result can be delayed mortality and population decline over time. Sediment can result in behavioural shifts, a change in activity patterns, altered types of activity or a change in habitats used. These behavioural shifts may also lead to delayed mortality and population decline over time.

The effects of deposited sediment on the physical habitat of trout include: the infilling of interstitial spaces between substrates of gravels, cobbles and larger materials, which reduces and/or eliminates the spaces essential for aquatic invertebrates (trout food) and for juvenile trout to rear and to find overwinter

cover; the cementing of larger substrate together which creates problems for spawning fish, eggs incubating when flows through the gravels are blocked and inability of fry to emerge; and, reductions in water depth in pools, including loss of pools and instream cover, which decreases the physical space available for juvenile and adult fish for critical rearing times and for successful overwinter conditions (Waters, 1995). Sediment accumulating on the surface of substrate materials has been shown to have a smothering effect on trout eggs and young fish as well as aquatic invertebrates.

The infilling of the interstitial spaces between larger substrate materials precludes use by aquatic invertebrates, the primary source of food for trout (Hynes, 1970; Lemly, 1982). This is especially so for species of mayflies (*Ephemeroptera sp.)* and stoneflies (*Plecoptera sp.)* which show declines in many streams as sediment increases over substrate materials.

An embedded substrate, "cemented" together with sediment particles can prevent trout from spawning, make spawning actions, such as the excavation of redds extremely difficult and interferes with the movement of water through the substrate, essential for maintaining an oxygen flow to the incubating eggs and removing metabolic by-products. Increased sediment export and calcite accumulation can have physical impacts on stream habitats through the process of sedimentation and cementation (Hartman et al, 2005). Observations from streams in the Oldman watershed impacted by logging and unregulated off-highway vehicle activity show failures by bull trout to successfully excavate redds where substrates are cemented.

Cederholm, et al (1980) noted a rapid decrease in survival to emergence for trout for each one per cent increase in sediment amounts over natural background levels. The authors found survival of trout eggs is inversely correlated with percentage sediment, when the percentage of sediment exceeds natural background levels by 10 per cent.

Weaver and Fraley (1991) showed there is a strong relationship between sediment in the trout egg incubation environment and ultimate fry emergence success. They noted, for both bull trout and westslope cutthroat trout, that sediment from road/ trail building and use reduced trout embryo survival to emergence and negatively impacted rearing, once trout have emerged.

A study on the effects of sediment addition to streams containing trout and salmon showed substantial decrease in fish densities (Klamt, 1976). Sediment additions to pools decreased pool volumes affecting available habitat and fish densities decreased. Similar results were found for riffle habitat. Sediment filled interstitial spaces, increasing the degree of embeddedness, forcing trout and salmon into less optimal habitats. In channels with natural background levels of sediment few territorial interactions were observed between fish. Trout and salmon densities decreased over winter with higher sediment loads; this was attributed to sediment decreasing optimal cover conditions (blanketing large substrate) and decreasing the ability of juvenile fish to burrow into substrate materials.

When deposited sediment amounts exceed 30 per cent juvenile bull trout densities decrease sharply and this affects recruitment to the population in a major way (Montana Bull Trout Scientific Group, 1998). If interstitial spaces among large substrate pieces are unavailable because of deposited sediment, trout have to seek other habitats not so affected (Bjornn, 1971). This creates competition for space and delayed mortality is a result of stress.

Stress is cumulative. Sigismondi and Weber (1988) found that fish subjected to two or more stresses had less tendency to respond to a stimulus and required longer recovery times than fish stressed only once. In the experiment, stressed fish took longer to reach cover, with the greatest delay in response occurring immediately after the stress. When stress reduces the ability of a fish to seek cover, this decreases chances of survival.

Exposure to suspended solids (sediment/turbidity) is an environmental stressor that elicits a physiological response. Redding et al (1987) found exposure of yearling trout and salmon to suspended sediment increased cortisol levels, an indicator of stress. The authors indicated trout and salmon underwent sublethal physiological stress that reduced performance capacity related to obtaining food and resisting disease. The effect of relatively low turbidity levels or suspended sediment amounts ranges from stressing fish, altering behavioral patterns to mortality (Lloyd, 1987).

Stress in fish results in extra energy costs and demands. Stressed fish have less energy available for necessary activities, such as swimming stamina and this would be particularly true for juvenile trout. Recovery from stress can take variable periods of time and, when exposed to multiple stresses (or repeat

stresses), require longer recovery periods (Sigismondi and Weber, 1988; Barton et al, 1986). This comes at the expense of body maintenance and growth, especially for juvenile trout (Frost and Brown, 1969). Diverting energy to deal with stress reduces fitness of individuals and this has severe implications for survival.

Mortality of trout as a consequence of stress is highly probable, although it is often very difficult to find moribund or dead fish without a concerted search effort, especially if mortality is delayed. The thing about fish mortality is it is not completely predictable and does not happen according to some recipe. All the fish usually don't die at once; instead they disappear as a consequence of reduced fitness and an inability to survive winter conditions.

What Do Coal Mines Do to Fish?

Adverse impacts on fish populations can be categorized as follows:

1. Loss of critical physical habitats from sediment, concretions, stream channel alterations (and infilling), loss of tributary streams and riparian buffer losses.
2. Water quality shifts from sediment loading above normal background levels and impacts from contaminants (e.g., selenium, calcite, pH).
3. Hydrologic shifts from land clearing, roading and drainage networks that increase the magnitude and frequency of flooding, impacts on physical habitats (i.e., additional erosion, sedimentation, channel instability) and alter natural stream/groundwater flows that impact spawning and overwinter survival.
4. Chronic and acute sediment additions that cause cementing of substrate, infilling that affects trout spawning, incubation and aquatic insect production and loss of deep-water survival habitats.
5. Physiological impacts to trout including noise, disturbance and sediment plumes that increase stress and mortality.

Habitat Effects

Coal mining impacts entire watersheds, inclusive of major streams and rivers. Small, often seasonal tributaries are used as dumps for overburden, or are mined through, drainage networks are disrupted and riparian areas which are important

buffers for water quality are truncated and lost. These actions fragment and minimize the essential watershed pieces that form critical habitat for trout.

A focus on protection for only the permanent, larger streams where trout exist misses the concept that an entire, intact watershed is what fish depend on, for stream flow, habitat elements like large woody debris, temperature moderation and a supply of substrate suitable for spawning and benthic insect production. Removal of tributary systems robs trout of those essential pieces of sustaining habitat.

Caskenette et al (2020) provide guidance on critical habitat that is relevant for all species at risk trout. The authors, based on extensive reviews, provide an inclusive definition of critical habitat. The authors point out, "Performance of the riparian zone is often dependent on the state and use of the upland areas. Although the science advice in this document pertains to *Critical Habitat* associated with the riparian zone, it is important to note that identifying riparian *Critical Habitat* will not mitigate threats from land use in upland areas. Some upland areas may also be disproportionately important in maintaining attributes of aquatic *Critical Habitat* features, and therefore warrant protection." This is essential advice that adhering to the provisions of the *Species at Risk Act* for coal mine development will require attention to more of the watershed than just the areas trout occupy.

Surface mining results in higher streamflow and storm-generated runoff (Sullivan, 1976; Collier et al, 1970; Touysinhthiphonexay and Gardner, 1984), primarily because of compaction of mine spoils. Bare soils (overburden) have lower hydraulic resistance than soils with dense sod cover and produce double the overland flow and 10 times more sediment than spoils covered by topsoil alone (U.S. Forest Service, 1980c).

Waters (1995) concluded "Strip mining for coal generates the most erodible spoils" and is the largest single contributor of surface-mined spoils. Glancy (1973) found annual sediment yields of 218-2,670 tonnes/km² from mined areas; undisturbed areas yielded only 21-326 tonnes/km². Musser (1963) found that sediment yields from forested areas increased 1000 times as a result of strip mining.

Part of this sediment export is from roads. Unpaved roads are a major sediment source, increasing landslide erosion rates 10-300 times and sediment production rates an order of magnitude or more (Donahue, 2013). Unpaved logging roads,

equivalent to mine roads, under heavy use (more than four trucks/day) generated 500 tonnes of sediment/road km/year, had a sediment production figure of 500,000 kg/ha and delivered 70,000 kg/ha of sediment/road (Cederholm et al, 1980).

In the analysis of extreme flow events and maximum probable floods the probability of multiple extreme rainstorm events, close together and possibly coupled with rain-on-snow events does not seem to have been taken seriously in mine designs. As a result, this influences the capacity and efficacy of sediment ponds and the impact of these flow events, coupled with substantial erosion from mine workings, on water quality in receiving streams.

Modelling results of the risk of failure of one, or multiple sediment controls and containment features, is deemed by coal mine proponents to be remote, yet failures continue to happen, with frequencies greater than predicted.

Multiple studies confirm the negative effects on trout of increased sediment loadings, the impacts on spawning and rearing and on aquatic insect production, the primary food sources for trout (Klamt, 1976; Cederholm et al, 1980; Lemly, 1982, 2019; Chapman and McLeod, 1987; Weaver and Fraley, 1991; Suttle et al, 2004; Much, 2010; Kuchapski, 2013).

Hydrologic Effects

Coal mines have high water demands and it is unclear how these demands can be accommodated and still ensure adequate instream flow needs for fish (and the aquatic environment) can be met. Since coal mine water demands are year-round and stream flows are minimal overwinter, there is no way to ensure the instream flow requirements overwinter can be met to allow trout survival. Since this would diminish habitat for many trout that are listed as *Endangered* or *Threatened*, coal mines would be in violation of the Federal *Fisheries Act,* Canada's *Species at Risk Act,* and Alberta's *Wildlife Act.* The effects of hydrologic shifts and groundwater alterations on trout populations are detailed in Brown and MacKay, 1995 and Power et al, 1999.

There are upstream and downstream trends in the amount of physical habitat in rivers. Rosenfeld et al (2007) have demonstrated that based on hydraulic geometry, optimal flows for habitat proportionally increase as streams become smaller and decrease downstream as stream size increases. From their work they

concluded these nonlinear downstream trends in habitat suggest that fixed flow percentage approaches may underestimate optimal flows for certain types and certain places along streams and rivers, for example, headwaters. This is an issue about effective instream flow need determination for headwater systems where coal mines are, or could be located.

Stream flow data is often only available for a single location far downstream on a larger stream or river, so assessing trends in headwaters stream flow, much like with the physical habitat, relies on extrapolation to conditions and characteristics of these smaller streams. Others have observed this trend and have suggested these streams should be classified according to size and that this classification should be related to critical ecological values (Jowett and Hayes, 2004).

Water Quality Effects

Coal mining liberates many toxic elements as the waste rock from overburden weathers. Genetic abnormalities and high mortality in trout populations from selenium contamination are significant problems for coal mines in the Eastern Slopes. The critical impacts of elements like selenium from overburden waste rock are dealt with in Kuchapski (2013), Kuchapski and Rasmussen (2015) and Lemly (2019).

Contaminant concerns at active mine sites include chronic effects of metals, bioaccumulation, sediment contamination and endocrine disruption. Abandoned or closed mine sites are also a source of contaminant input to local water systems. Coal mining within the range of Athabasca rainbow trout has caused widespread selenium loading to surface waters in the upper McLeod watershed (COSEWIC, 2014).

Selenium is an essential nutrient but is toxic at concentrations only slightly higher than the required amount. Embryonic deformities have been documented in Athabasca rainbow trout in the upper Athabasca River watershed. As native rainbow trout may be more sensitive to selenium than stocked cutthroat or brook trout (DFO, 2018), increased selenium levels may give an advantage to these introduced species.

Holm et al (2003) found increased incidences of edema and spinal deformities in rainbow trout fry and increased frequency of craniofacial deformities in brook trout fry from a selenium contaminated site in a coal mining area of the McLeod

River drainage. Holm et al (2005) found a significant relationship for rainbow trout larvae (but not brook trout larvae) between the amount of selenium in eggs and the incidence of developmental abnormalities, all which would impair survival. The comparisons were made between eggs collected below a coal mining site (i.e., Luscar Creek, McLeod River drainage) and from reference streams not associated with coal mining.

A 92 per cent decrease in native rainbow trout populations was observed in mine-affected streams in the Coal Branch and the decrease could only be explained by selenium exposure (Kuchapski and Rasmussen, 2015). Adverse effects on native trout at the population level—reproductive failures in exposed streams, lower trout population densities and a shift in populations to less sensitive non-native trout—have been documented in Coal Branch streams affected by coal mines (Klaverkemp et al, 2005). Many of these effects related to selenium contamination were evident in native trout in mine-affected streams in BC (Lemly, 2014).

High concentrations of selenium in the winter months can increase its toxicity to fish because in combination with low temperatures, elevated selenium can cause reduced activity and body lipid depletion (Lemly, 1993).

Kuchapski and Rasmussen (2015) measured bioaccumulation of selenium through the aquatic food chain in headwaters of the McLeod River drainage. They showed elevated concentrations in trout tissue from coal mine affected sites above that in reference sites that exceeded proposed individual toxic-level concentrations. Rainbow trout biomass at the reach scale was significantly negatively related to mean fish muscle tissue selenium concentrations, but not so for other species.

Selenium concentrations in trout tissue were at higher levels in streams exposed to mining and adverse effects were predicted for trout populations in these streams than in unimpacted reference streams (Casey, 2005). Palace et al (2004) found that most bull trout (>90 per cent) captured immediately downstream from coal mining activity in the McLeod River headwaters have concentrations of selenium that would be expected to impair recruitment.

Mackay (2006) studied fish tissue selenium data from near three coal mines in the upper McLeod and upper Smoky River drainages in west-central Alberta. He reported that selenium concentrations in rainbow and brook trout were usually greater than the thresholds for toxicity effects in mining-exposed streams

compared to reference streams, particularly in the tissues of fish collected from waters draining the Luscar and Gregg River mines.

Results for native rainbow trout and data from other Alberta studies (comparing selenium concentrations in fish tissues to toxicity effects thresholds) near coal mines in west-central Alberta indicate that adverse effects on various fish species are expected in exposed (i.e., coal mine influenced) streams compared to reference streams.

Selenium concentrations are also generally higher in aquatic insects at sites exposed to mining activity, in comparison to reference sites (Casey, 2005). Aquatic invertebrates are a dominant food source in the diet of trout species in streams of the McLeod River (Stantec, 2004). Evidence from studies of end pit lakes at coal mines show that invertebrates and fish bioaccumulated selenium to higher levels in pits with elevated selenium concentrations over time, compared to pits with lower levels (Miller et al, 2013).

In addition, analysis of an aquatic food web in the upper McLeod River showed selenium bioaccumulated to highest concentrations in trout ovary tissue at the Luscar Creek exposed site, compared to the reference site (Casey, 2005). However, multiple stressors in coal-mining regions can affect macroinvertebrate assemblages (Kuchapski & Rasmussen, 2015). Wayland et al (2006) determined levels of selenium in water samples, caddisfly larvae and eggs of American dippers nesting on the Gregg River downstream from coal mines, and on reference streams in the same general vicinity. Selenium levels in water samples and caddisflies collected from sites near dipper nests on the Gregg River were greater than those collected from sites near nests on reference rivers.

Wayland and Crosley (2006) reported “selenium levels were greater at coal mine–impacted sites than at reference sites in caddisflies but not in mayflies or stoneflies. Arsenic levels were greater at coal mine–impacted sites than at reference sites in caddisflies and stoneflies but not in mayflies. Zinc levels were higher at coal mine–impacted sites than at reference sites in mayflies, caddisflies, and stoneflies, but only selenium was sufficiently elevated in aquatic invertebrates to be of potential concern for consumers such as fish and aquatic birds.”

Casey (2005), studying coalmining and reference locations in the McLeod and upper Smoky river drainages, reported numerous observed and calculated effects of coal mines, and specifically selenium-rich drainage, on trout and aquatic food

webs. Guideline concentrations considered safe for aquatic life were often exceeded. “Food web data from the streams showed ... highest selenium concentrations were found in the food web components at the first [coal mine influenced] exposed sites compared to reference sites.”

More extensive spatial sampling of lower trophic levels in the food showed selenium concentrations in sediment and biofilm declined at sites further downstream of the mines, to levels that were similar to those at reference sites, but with substantial biomagnification of selenium from surface waters to the lower levels of the food web.

There is an assertion in Coalspur Mines (Operations) Ltd (2012) that selenium leaching will not be an environmental issue from the Vista coal mine, despite overburden material analysis showing concentrations of the element. In spite of the contention the baseline risk of downstream contamination by Vista mines is indeed lower than for the other mines in the McLeod River watershed, yet Coalspur proposed and the Alberta Energy Regulator required mitigation measures "similar to what other coal mining operations in the region have employed" (AER, 2014). The question that should be applied is "What risk does Vista Mine operations, including watershed disturbance and waste-rock accumulation and short- and long-term oxidation of it, pose to downstream aquatic ecosystems?" Overburden selenium concentrations are of no relevance to that question (William Donahue, Independent environmental scientist, pers. comm. 2024).

Impacts from coal mining also include downwind ecosystems impacted by contaminants from wind borne fugitive coal dust emitted during mining and carried atmospherically (Cooke and Drevnick, 2022). The authors found significant concentrations of selenium and 17 polycyclic aromatic hydrocarbons in sediments in a southwestern Alberta alpine lake downwind of Elk Valley, BC coal strip mines.

Effects of Underground mining

Coal mining exposes sulfide minerals that can become oxidized and release sulphate creating acid characteristics that may be neutralized by carbonate material (Griffith al, 2012). Redmond (2021) in assessing effects of coal mining on water quality in the McLeod watershed speculated that acid drainage from mining disturbance is “unlikely to be an issue due to the high buffering capacity of surface waters in the McLeod River.” However, water quality from legacy abandoned

underground mines was not sampled in this work to provide a definitive statement about the effects of subsurface mining.

This report on water quality in the McLeod River also indicated that natural groundwater could also be influencing changes in metals at upstream sites in the watershed, but provided no supportive data.

Underground mines change, divert and intercept groundwater (Hobba, 1993). Dewatering of underground mines adds complexity and risk to amounts of water to be disposed of and the quality of such water. Groundwater-surface water interactions during underground mining are complex, not well understood and the effects can persist during mining and following abandonment (Sgambat et al, 1980). This potentially can negatively affect the delivery of groundwater to receiving streams.

Upwelling of groundwater is a necessary part of spawning requirement for both Athabasca rainbow trout and bull trout, ensuring successful incubation of eggs. It is speculated the disappearance of a robust population of bull trout from Anderson Creek, upstream of McPherson Creek, was a function of a variety of factors, including hydrological changes from land use (likely timber harvest and roading) that changed groundwater amounts and timing (Mike Blackburn, Senior fisheries biologist, pers. comm. 2024).

The water quality of some coal mine effluents from legacy and operational underground mines in southwestern Alberta was investigated by Radford and Graveland (1973). The most critical ion was iron and other metals such as copper, manganese, lead and zinc occurred, with some constituents exceeding maximum recommended tolerable water quality standards. An iron precipitate blanketed stream beds in the affected streams. Turbidity varied from 3.0 to 165 Jackson Turbidity Units. At the higher end of turbidity findings, these readings exceed upper levels for trout survival and would provide levels of impairment to both adult trout and juveniles (Birtwell et al, 2008). Hobba (1993) noted increased total dissolved solids, from 20 to 100 times greater amounts, in streams receiving mine drainage.

Average standing crops of stream benthic invertebrates were reduced 50 per cent with the effluents having similar effects on species of *Ephemeroptera*, *Plecoptera* and *Trichoptera.* Bioassays showed the effluent discharges were not toxic to non-native rainbow trout although maximum concentrations of several metals (iron

and zinc) were both individually and collectively acutely lethal to test trout. Heavy metal contamination of trout in effluent affected streams showed higher concentrations of most metals than were found in trout collected from unaffected waters. Radford and Graveland (1973) did not speculate on the sublethal effects of mine effluents on trout growth, reproduction or long term survival.

In more recent studies (Cooke et al, 2024), the authors noted that episodic discharge of mine water from underground adits at the abandoned Grassy Mountain mine drive periodic (but short-term) increases in iron, various metals and suspended sediment. In one brief period in July 2022, total iron increased to 16.80 mg/l which exceeded the Federal water quality guideline for the protection of aquatic life by 30 times. Similar large increases were noted in other trace elements as well as total suspended sediment.

Cumulative Effects

A number of cumulative effects assessments and associated studies have been undertaken in the Eastern Slopes of Alberta's Rockies: Sawyer and Mayhood, 1998; Flathead Transboundary Network, 1999; Apps et al, 2007; Southern Alberta Land Trust, 2007; Silvatech Consulting, 2008; Holroyd, 2008; ALCES, 2009; Oldman Watershed Council, 2010; Antoniuk and Yarmoloy, 2011; Stelfox and Yarmoloy, 2012; Weaver, 2013; Fitch, 2015; Southern Foothills Study, 2015; Weaver, 2017; Alberta Biodiversity Monitoring Institute, 2017; Farr et al, 2017; Farr et al, 2018a; Farr et al, 2018b; ALCES, 2020; Apex Geoscience, et al 2021.

Every independent cumulative effects assessment and associated study indicates that maintaining the status quo in land use (i.e., increasing the industrial and recreational footprint) leads to, or has exceeded the thresholds for ecological integrity and resilience. The cumulative effect of human activities is now beyond the range of natural variation under which most native fish species evolved.

The zone of impact (i.e., protection of aquatic life (PAL) guideline exceedances) , especially for selenium extends downstream on the McLeod River however, the spatial resolution of the exposed sites on the McLeod River made it difficult to distinguish the exact distance of impact (Redmond, 2021). This indicates however that past, present and proposed coal mining have effects beyond the localized site and on native trout populations far downstream of these endeavours.

Summary of Probable Effects of Vista Mine Expansion

There is a high probability that expansion of the Vista mine, coupled with the existing mine footprint will have adverse impacts on Athabasca rainbow trout and bull trout and critical habitats in the following respects:

As the area of mining impact increases, the buffer zone (present and added to the expanded mining area) will prove to be inadequate to control acute and chronic sediment additions to McPherson Creek, a tributary (MCT2) and other affected streams. This will negatively affect spawning for Athabasca rainbow trout and bull trout, incubation and rearing of these trout species, loss of deep-water trout survival habitats and aquatic insect production. The cementing of substrate with additions of calcite will further aggravate the situation for species at risk trout and their food supply.

The leaching of selenium from mine spoil will be an additional concern for trout survival and may become a legacy issue persisting for decades, as it has been shown to be in the watershed of the McLeod River. This will further imperil both Athabasca rainbow trout and bull trout in McPherson Creek and other mine affected streams.

Hydrologic shifts from land clearing, roading plus loss and diversion of tributary streams to McPherson Creek will increase the magnitude and frequency of flooding, impacts on critical habitats (i.e., additional erosion, sedimentation, channel instability) and alter the natural timing and amount of stream/groundwater flows. The risk is high from operational and engineering failures of settling ponds, roads, conveyance systems or mine surfaces and could result in catastrophic spills of coal, sediment, tailings or flocculants into receiving streams, as other mines have experienced. Mortality of species at risk trout would be a certainty and population recovery uncertain.

Underground mining may add to the instability of ground water flows through capture, truncation and diversion. There is uncertainty about how underground mining might affect the timing, amount of ground water and its quality available to McPherson Creek and a tributary (MCT2). Without better information on the possible impacts the best course is the precautionary one of not proceeding with the underground portion.

Any hydrological shifts from either surface or underground mining will impact spawning and overwinter survival of native trout.

Additional concerns include physiological impacts to trout including noise, disturbance and sediment plumes that will increase stress and mortality.

The cumulative impact from the existing mine operations, coupled with surface mine expansion and the underground mine will make it problematic, even prohibitive to maintain critical habitats for Athabasca rainbow trout and bull trout in MacPherson Creek, a tributary (MCT2) and other affected streams.

Cumulative effects assessments are not undertaken for coal mining on a regional or watershed scale and when done are too narrow in scope to be effective predictors of issues and impacts. The McLeod watershed displays the effects of a failure to consider cumulative effects and this is manifested by the species at risk nature of watershed populations of Athabasca rainbow trout and bull trout.

The overriding conclusion from a large body of evidence and experience is that the aquatic environment is harmed by coal mining, and trout and coal mines cannot coexist without losses in trout populations.

There is an abundance of evidence that selenium from Alberta coal mines damages aquatic life. While monitoring is important and imperative, what is crucially needed is action to reduce contamination and prevent further pollution. Adding new coal mines or expanding existing ones simply adds to the cumulative effects of selenium in the watershed, for which there are no effective control or mitigative options.

Mitigation (Offsetting): Band Aid or Cure?

A variety of terms are used to describe how impacts of development can be ameliorated. Mitigation or offsetting refers to reducing impacts. Compensation recognizes a resultant loss and works to recreate lost habitats, often at other locations but with accountable, measurable outcomes. Off-setting, remediation, reclamation and restoration may be the mechanisms. These terms are often used interchangeably.

One of primary goals is to compensate for fish and wildlife population and habitat losses with a goal of no net loss of existing populations and a net gain through recovery actions (or off-setting) to ensure populations continue to persist into the future for multiple generations, with assurances of resilience to natural and anthropogenic disturbance. The literature is replete with instances of problems with mitigation, failures, lack of compliance, inability to replicate habitat structure and function, and monitoring gaps with mitigation plans.

Harper and Quigley (2005a, b) reviewed progress and made several observations and conclusions about mitigation effectiveness. They found uncertainty on fish-habitat linkages with the consequence being that the DFO goal of “no net loss” was largely not being met. Only 14 per cent of proponents complied with mitigation plans, there was inadequate record keeping, a lack of standardized approaches to measure mitigation effectiveness and a general lack of monitoring, or monitoring that was of too short an interval to effectively demonstrate trends towards meeting no net loss goals. Quigley and Harper (2006a, b) in a wider view of projects substantiated that compliance was poor, monitoring data was superficial and there was inadequate time allocated to conduct scientifically rigorous, quantitative assessments.

Zedler and Callaway (1999) and Tischew et al (2008) related that long-term success rates and efficacy of aquatic mitigation projects remained largely unevaluated, or were misjudged as to effectiveness making it difficult to further develop and adapt plans and projects for future mitigation needs. Horak and Olsen (1980) pointed out that the overall lack of standards, criteria and monitoring mean the metrics for fisheries mitigation effectiveness are unknown. Without such measures there is a tendency to continue to do the same things over and over, but not achieve equitable mitigation. The lack of long-term timelines to measure full functionality of mitigation projects was seen to be a flaw by Scrimgeour et al (2014).

Lievesley et al (2016, 2017) in evaluating mitigation success of wetland and riparian habitats found only one third of sites met both an ecological and a compliance metric. Designs often failed to mimic essential structure and function of natural habitats, constructed habitats did not have a consistent and increasing trajectory to success and measured extents of restored and constructed habitats were inconsistent from project to project. The authors also noted that lost

habitats are undervalued while habitats gained through mitigation are overvalued. Monitoring is not standardized so comparisons are difficult.

Most striking though, is the conclusion by the authors of the assumption by proponents that habitat structure and function can be recreated. This does not have general support in the scientific community and the empirical evidence is lacking.

Theis et al (2020) evaluated 577 mitigation projects, finding crucial problems persisted, and even high levels of compliance did not guarantee a high degree of function. Function often scored lower than compliance, a troubling finding if only compliance is used as a metric of mitigation success. Ecosystem function following mitigation was hard to assess and evaluate in projects because no clear guidelines existed. New ecosystem creation had more uncertainty than restoring existing systems. Concern was raised over proper assessment of ecological thresholds (like population carrying capacity) for each ecosystem, which can limit the overall effect of mitigation. This can lead to a situation of over-promising, but under-delivering on mitigation.

A review by Post (2020*)* of the proposed Grassy Mountain coal mine impact assessment found significant flaws with the mitigation suggested for *Threatened* westslope cutthroat trout. The conclusions were that: the mine project would negatively impact long-term population viability; critical habitat had been underrepresented; there was a failure to properly account for cumulative effects; and, none of the mitigation or offsetting methods had been proven effective and would be transferable to the streams affected by proposed mine development.

Habitat features define the survival, abundance and distribution of fish species, yet these critical features can be poorly understood, mapped imperfectly or missed from impact assessments. Population dynamics are not tracked, yet an understanding of this is key to appreciating (and responding to) the vulnerability of a population to coal development and fully assessing risks and impacts.

Many mitigation strategies represent an over-simplification of the complex inter-relationships between the physical environment and the biological organisms that inhabit that environment. Without a solid understanding of all the biological limiting factors, or a sound basis for predicting the outcomes of proposed habitat manipulation, the mitigation program may well produce no significant, positive impact on fish populations, let alone equitable compensation for habitat losses.

Summary

All of the above brings into question whether mitigation and compensation strategies exist that can be effectively employed to deal with impacts on species at risk fish and their habitats. This should form a cautionary note to any review and acceptance of proposed mitigation strategies for coal mine development. Mitigation employed to date has not generated anything close to an impressive record of success, let alone compensation for populations and habitats lost or impacted.

Mitigation can lead to the vain hope we can continue to do everything, everywhere, anytime and all the time, with our development footprint effectively erased behind us. At worst it creates the impression there is still room for expansion of development and biodiversity is protected.

Fisheries Mitigation Realities in Alberta

Fisheries mitigation solutions assume that:

- Habitats created or improved represent ones that form critical factors for all life cycle requirements and that these habitats are not already present.
- Streams are not at population carrying capacity and habitat enhancements will increase trout abundance and biomass.
- Stream productivity (benthic and terrestrial insect production) will not be a limiting factor beyond a certain trout population size.
- Habitats created or improved will persist over long periods of time to permanently benefit trout populations over multiple generations; and
- Trout abundance, distribution and biomass increase and not because of a shift in population usage of created habitats.

Quantitative monitoring has not confirmed these assumptions.

Pattenden et al (1998) summarized the results of five years (1991-1996) of research on instream habitat structures in southwestern Alberta, and provided information on the efficacy of these devices for mitigation. These are the type of physical habitat improvements proposed and used for mitigating the impacts of coal mine development on trout streams. The short-term performance of 351 instream structures on 26 streams, in place between two and seven years and

subject to less than a 1:6 flood flow was investigated. Under those initial conditions, 63 per cent of the structures were found to have maintained their physical stability or, had minor flaws. Sixty one percent of the structures provided the design and desired deep-water refuge fish habitat.

This information was re-analyzed to determine relationships between structure performance and fluvial and hydraulic characteristics using information in Fitch et al (1994). This investigation concluded that structures tended to perform better in stable channels with low rates of bedload transport.

Following a sizeable flood in June 1995 (≥100-year return period) a subset (149) of the original structures was re-evaluated (R. L. and L. and Miles, 1996). Eighty one percent of the sampled structures had been severely damaged or destroyed due to processes of general and local scour, sediment deposition and/or channel shifting. Of the structures that were still intact (43), only 31 per cent (13) provided the desired deep-water habitat of the original design. Overall, this represented a 91 per cent failure of constructed habitat features to provide effective trout habitat.

The results indicated that many instream habitat structures built in southwestern Alberta were subsequently degraded by small flood events, and most did not survive a sizeable flood. In several cases, normal bed load movement simply filled in the deep-water habitat. Streams with higher gradients and subject to flashier flow regimes due to proximity to mountain slopes had the highest structure failure rates. These are the streams most often impacted by coal mine development.

Instream habitat structures provided short-term benefits, but even with appropriate design and location require regular maintenance and rebuilding to be effective under conditions of minor flood events. This is evidence that coal proponent's claims of such structures being "self-sustaining" and not requiring any scheduled maintenance, have no credence.

There are physical limits to the amount of instream habitat a river or stream is capable of maintaining throughout a variety of fluvial processes. While deep-water habitat (i.e., overwintering pools) is viewed as a limiting factor to stream-dwelling trout and hence an increase in this habitat type is regarded as a way to bolster trout populations, there are limitations. In an alluvial system, pools occur with a size and frequency that is dependent on the meander wave-length, which in turn is a property of the hydraulic regime (Bray, 1982). These relationships

cannot be changed and attempts to manipulate this relationship, for example by attempting to increase the number of wintering pools, have a high probability of failure.

As a fundamental step in stream habitat mitigation planning, candidate reaches for habitat enhancement need to be evaluated for channel stability and classified, by stream type, to assess the suitability of proposed fish habitat structures for various channel types. Rosgen (1996) provides a stream reach classification system as well as a way to evaluate the suitability of habitat enhancement structures. There is no evidence that coal proponents undertake this fundamental step in mitigation/compensation planning.

While some research indicates that, in some circumstances, instream habitat enhancement can increase fish production (Ward and Slaney, 1981; Ward, 1993) there is increasing evidence that structural measures alone do not necessarily improve fish production. Monitoring of trout population responses to instream habitat structures to mitigate habitat losses from the Oldman River Dam have not demonstrated significant, increased trout production (O'Neil and Pattenden, 1994; Bryski, 2023).

Riley and Fausch (1995) documented an increase in fish numbers and biomass in enhanced sections of six northern Colorado streams. However, the authors suggested that the success was related more to the movement of fish into structures from adjacent areas, rather than an increase in fish production (i.e., growth or survival). Gowan and Fausch (1996) found when pool habitat was artificially added to streams, abundance and biomass of large trout increased, but, again, immigration from other stream segments was the primary reason for the increase.

Cunjak (1996) pointed out that stream habitat enhancements can have deleterious effects on salmonid populations if water conditions (i.e., stream flows and temperatures) are not considered. Simply increasing the number of chairs (wintering pools) increases the movement between chairs but does not increase the number of players (trout) or necessarily create the opportunity for enhanced trout populations.

A conclusion of the research and observation indicates that most fisheries mitigation including instream habitat structures, such as those often proposed for creating overwinter habitat, tend to be ephemeral and do not provide useful trout

habitat over the long-term. The value for long-term mitigation purposes (over the active life of a coal mine and beyond) is questionable.

Strip mine pits that are not reclaimed by infilling with overburden are allowed to fill with water as a reclamation option. These are often seen as an additional mitigation benefit to compensate for lost stream habitats. However, natural, unimpacted streams were found to be 10 times more productive for trout than mine pit lakes in the Coal Branch.

These mine pits tend to be deep, cold, with limited littoral area (the productive part of a lake). These pit lakes can be initially productive, because of nutrients available as the residue from blasting compounds (e.g., ammonium nitrate). These diminish over time and productivity becomes more and more restricted. No spawning areas are available, requiring regular stocking to support a fishery. These do not replace self-sustaining native trout populations or habitats in any reasonable way.

After studies of selenium bioaccumulation in mine pit lakes in west-central Alberta (the Coal Branch) it was concluded that, “high selenium exposure in metallurgical coal pits indicated that under the current mining and reclamation strategy, these lakes are not suitable for management as recreational ‘put and take’ fisheries” (Miller et al 2013). The authors also concluded mine pit lakes, “may pose a significant problem for managers because the selenium that accumulates in their [trout] tissue may exceed guidelines for human consumption and pose a hazard to wild vertebrate predators.”

Recommendations have been made not to stock these mine pit lakes with trout because of selenium bioaccumulation and the risk to human health through consumption of these fish. Use of mine pits for fisheries mitigation is untenable.

No operating coal mines have developed successful treatment methods and such mechanisms are at best concepts at this point, not proven technologies for reducing selenium concentrations to levels safe for aquatic organisms. Legacy coal mines and likely old coal processing facilities may continue to contribute selenium to surface waters (Cooke et al, 2024). Without long-term, proven results from selenium reduction technologies to levels below toxicity thresholds, the best option to ensure selenium pollution does not impact fish populations and downstream water quality is not to approve new coal mines or the expansion of existing ones.

Summary of Proposed Mitigative Strategies for the Vista Mine Expansion

A number of mitigative strategies have been provided by the proponent to deal with issues created by mining:

- a 100 metre buffer from the main stream of McPherson Creek will be implemented for expansion activities, as is done for Phase I.

There is no empirical evidence that a 100 metre buffer would be sufficient, in a complex topographic context with a large surface area disturbed by mining, to effectively filter and buffer the stream and the aquatic environment from overland flow from the mine site, especially if there are catastrophic operational and/or engineering failures of infrastructure. The extent of mining adjacent to McPherson Creek expands proportionately with Phase II plans as does the risk of sediment and other materials escaping from the mine site.

- streamflow augmentation to maintain adequate water volume in fish bearing streams.

There is no information available to suggest where water for augmentation of flows for McPherson Creek would come from, when most of its tributaries have been, or will be cut off by mining. These are lost flows, especially in the proponent's "closed loop" system. There is a real risk of winter stream flows diminishing to the point overwinter habitat for native trout would be seriously compromised either by lack of flow and/or flows low enough to cause the stream to freeze completely. No information exists on what winter stream flow amounts are, as a guide for assessing a winter instream flow need, or the science required to assess suitable winter flows. There is no risk analysis of the possible effects of water capture by underground mining and the subsequent effect on ground water sustaining stream flows required for native fish survival.

- a surface water management plan, and adaptive management plan based on continuous monitoring within the receiving stream.

Adaptive management seems to be the fall-back position, without much understanding of how the concept should be employed. It does not mean waiting for failures, then figuring out a fix, but anticipating what might go wrong, considering suitable solutions and having the facility to remedy the issue quickly. This assumes there are options available that are tested, timely, effective and the proponent is able (and willing) to take on additional economic burdens to affect these additional mitigative solutions.

Adaptive management must include a detailed experimental design (not just monitoring) and clearly articulated options to address the outcome of the experiments. If adaptive management is just business as usual with some form of monitoring that is not responsive to immediate problems, then it has little purposeful capability to address solutions.

- development of activities in a way to avoid direct impacts to fish habitat.

From an ecological perspective it is disingenuous to suggest mining can occur with no "direct impacts on fish habitat." Habitat for fish, including the native trout of McPherson Creek includes the sum total of the stream's watershed, the tributaries, the upland forests, the riparian zones, the ground water and the main stem of the stream. Cutting off most of the tributary streams, removing the upland forest which traps, stores and slowly releases water and interfering with ground water flow is a direct impact.

Assumptions made by the proponent need to be tested through a synoptic review of other surface and underground coal mines in Alberta and adjacent jurisdictions, but there is no evidence this has been completed for the Vista expansion plans. Case studies (actual monitored results of impact effects and mitigation undertaken) would provide more certainty and aid in decision making.

- monitoring quality and quantity parameters in multiple locations south of the mine disturbance before, during and after operations.

Impact assessments are short term and fail to capture the range of natural variation in the McPherson Creek watershed required to model the effects of mining, to understand monitoring results and to plan for effective impact resolution and mitigation.

In most cases, the monitoring proposed and undertaken for this coal development will not be rigorous, robust or sensitive enough to detect changes and impacts in a timely manner for correction. Many impacts will linger for decades, long after mining ceases and won't be accounted for in an assessment of effects and whether the mine should be expanded.

With the level of detail available from the proponent, it is virtually impossible to realistically understand and determine outcomes and consequences of the Vista mine operations and the cumulative impact on fish populations and their habitats, including the underground mining portion.

However, the impacts from other mining operations in similar terrain can be used as surrogates to assess the probable effects on species at risk trout and their

habitats of the Vista mine expansion. These documented impacts show there is a recurring failure to account for all the environmental risks of coal development and the effects of the activity on ecosystem integrity and the ability to meet biodiversity and species at risk recovery goals. Inevitably this failure has resulted in trout mortality and loss of critical habitats. This may well be the fate of the Athabasca rainbow trout and bull trout populations of McPherson Creek and other affected streams.

The Impact Assessment Agency of Canada (2021) has provided similar concerns with the proponent's mitigative strategies with the statement: "However, the details of the mitigation measures that will be implemented to eliminate or reduce potential effects of selenium and other contaminates are not known. There is uncertainty whether additional effects to water quality and fish and fish habitat could be limited through the physical activities design, the application of standard mitigation measures, or managed through existing legislative. mechanisms."

Since most of the watershed of McPherson Creek will be impacted (or already is) by mine development, species at risk trout and their habitats will be harmed, both directly and indirectly through loss of many of the stream's tributaries.

Mitigation/compensation actions proposed for mine expansion and undertaken on the existing mine are untested, unproven, unsuitable, theoretical and overly optimistic. The issue of selenium has not been dealt with, despite evidence this is a major concern in the McLeod watershed with demonstrably negative effects on species at risk trout.

There is no suitable mitigation or offsetting that would be effective, especially when dealing with species at risk trout where significant habitat issues and loss of habitat have already occurred on a local and regional watershed scale.

Insights on Coal Mine Environmental Failures

Repetitive operational and structural failures at coal mines are uncomfortably commonplace and do not provide any assurance of protection for fish populations and their habitats. This stems from systemic failures in government planning and standards, planning and engineering failures in the coal industry and on the part of those with oversight and regulatory responsibility (Fitch et al, 2021):

- There are significant topographical constraints to mining in the Eastern Slopes that experience suggests have not and probably cannot be successfully dealt with to protect water quality and native trout.
- Planning failures continue, especially the inability to incorporate climate change and extreme weather events into structural adaptations.
- Engineering limitations are glossed over and design standards set too low for prevailing and especially extreme conditions.
- Mine operations focus more on economics than on environmental protection.
- Lack of timely monitoring enhances risks and the magnitude of problems; and
- Failure of oversight and regulatory enforcement means the problems are allowed to continue.

High snowmelt runoff and major rainfall events have happened on a regular basis, often causing flows that were well above the levels that regulatory agencies and companies anticipated, included in modelling and for which infrastructure was designed and built. This will be exacerbated by climate change making historic rainfall, snowfall and flood data increasingly out of date for planning and engineering purposes.

An overburden landslide from Coleman Collieries Racehorse coal strip mine in the early 1970s impacted Racehorse Creek, a stream containing native westslope cutthroat trout and bull trout. The company was charged under the Federal *Fisheries Act* but the charge was dismissed due to a technicality (Duane Radford, former Regional Fisheries Biologist, pers. comm. 2021). The issue was unmitigated and it is unclear what the residual effects were on trout populations and aquatic habitats.

Also in the early 1970s an overburden dump failure and landslide on Coleman Collieries Tent Mountain coal strip mine completely covered the downstream portion of East Crowsnest Creek, a stream containing native westslope cutthroat trout. The company was charged under the Federal *Fisheries Act* and found guilty of negatively impacting trout habitat. Mitigation included the construction of two sediment ponds, to deal with continued erosion from the spoil pile (Duane Radford, former Regional Fisheries Biologist, pers. comm. 2018).

A physical habitat and biological survey of East Crowsnest Creek was conducted in 1976, part of an overall inventory of the Crowsnest watershed (Fitch, 1977). At that time the sediment ponds had completely filled with eroded material from the mine workings and were a flow-through system, without any capacity to slow,

accumulate or mitigate sediment from the overburden spoil pile. It was unclear how long after the spoil pile failure occurred that the sediment ponds were constructed, but they could not have been in operation for more than two to three years. Ostensibly, the design of the ponds was based on contemporary, or best engineering principles. Fish and Wildlife staff were assured that all sediment would be contained behind the structures, but clearly it wasn't.

During the 1995 flood the dam forming one settling pond failed completely and the entire contents of the pond were evacuated into East Crowsnest Creek and down Crowsnest Creek to Crowsnest Lake (D. Wig, retired Fisheries Biologist, pers. comm. 2021). It is believed the native cutthroat trout population of the upper portions of both streams failed shortly afterward.

Coal strip mines in the Coal Branch to Grande Cache have had similar sediment pond failures, the latest being the Obed Coal mine pond failure of 2013 that discharged massive amounts of sediment into Apetowun Creek, a tributary of Plante Creek, itself a tributary of the Athabasca River, and affected a long reach of the Athabasca River as well (Carl Hunt, retired Fisheries Biologist, pers. comm. 2018, and Agreed Statement of Facts-Provincial Court of Alberta-Between Her Majesty the Queen and Prairie Mines and Royalty ULC). These systems contained Athabasca rainbow trout.

The owner of the mine, Prairie Mines and Royalty was ordered, in a subsequent provincial judgement, to fund a "dam safety research project" related to coal mine water storage. The dam safety research was conducted by the University of Alberta as a result of creative sentencing (G. Neilson, Alberta Energy Regulator, pers. comm. 2020). The authors of the research proposal (Wilson and Beier, 2017) pointed out:

- There has been minimal consideration of the long-term behaviour of dams for coal and oil sands mines.
- Few tailings dams have been fully reclaimed and little is understood about the aging process, or failure modes they are subject to over time.
- Little is known about their performance long-term with respect to erosion and/or extreme storm events.

Coal fines and sediment from the processing facility at the Luscar mine obliterated a portion of Luscar Creek in the late 1960s. Bioassays using water downstream of the spill determined the materials were toxic resulting in total

mortality of test trout. The company was charged under the Federal *Fisheries Act* and was found guilty of placing a deleterious substance in waters containing fish (Paul Paetkau, former Pollution research biologist, pers. comm. 2024).

A settling pond failure leading to Sphinx Creek (Gregg River Resources) in the early 1990s resulted in a massive release of sediment and flocculant into the stream. There was a significant mortality of Athabasca rainbow trout. The company was never charged because the failure was deemed to be "an act of nature", a precipitation event that was not anticipated, even though other such runoff events were common in the area.

In a period from 1982 to 1993 five coal strip mines were monitored in west-central Alberta on a regular basis: Coal Valley at Robb on the Lovett River; Cardinal River Coal at Cadomin on the McLeod River; Gregg River Resources at Cadomin on the McLeod River; Smoky River Coal at Grande Cache on the Smoky and Muskeg rivers; and, Obed Mountain Coal in the Athabasca River watershed. In that time period there were a minimum of 22 serious incidences of sediment release, 12 of which were forwarded for charges under the Federal *Fisheries Act* (but no cases went forward for prosecution). These problems resulted from settling ponds insufficient to contain sediment-laden runoff resulting from heavy rainfall events as well as chronic levels of erosion from coal haul roads (Richard Quinlan, retired Habitat biologist, pers. comm. 2021). Athabasca rainbow trout and bull trout were impacted by these mine failures.

In one case at Cardinal River Coal, heavy rainfall around September 1, 1983 caused a settling pond to fail, the collapse of a mine pit and a haul road failure resulting in the inundation of Mary Gregg Creek with sediment, a stream containing Athabasca rainbow trout. Sediment from those sources filled the channel of the stream to the bank full level and into the riparian zone (1.0 - 1.5 metres deep) for approximately 400 metres downstream. The impact on the Athabasca rainbow trout population was a long-term population decline affecting not just the section of stream inundated with sediment, but downstream as well (Carl Hunt, retired Fisheries Biologist, pers. comm. 2020).

In the case of Smoky River Coal, the topography of the mine site, on very steep slopes, resulted in chronic erosion problems with every rainfall event. These coal mines in mountainous terrain were noted to have had slope stability issues, insufficient space to build settling ponds capable of containing runoff and inadequate planning for heavy and extreme runoff events, all leading to chronic

erosion and sediment delivery to receiving streams. Frequent slumps, overburden failures and mudslides were common and likely many were unreported, all affecting streams containing trout, or leading to trout streams.

In response to the catastrophic occurrences in these mines there were multiple investigations under Alberta's *Water Act* and Canada's *Fisheries Act*. Some of these proceeded to higher levels of Alberta bureaucracy for enforcement decisions, but they were inevitably ended by a lack of political will to prosecute industry. A few "cleanup orders" were imposed in response to catastrophic occurrences, but charges were almost non-existent in the government culture. There were no significant changes in mine operations.

In one case, where the complete water handling system of a mine was shown to be inadequate, an upgrade was ordered, during which a financial penalty, of sorts, was imposed on the company. That "penalty" was that the company would have to continue paying royalties for coal extracted until the new settling pond system was in-place, while other coal mines were exempt from paying royalties under a special program of the time.

Non-compliance with water quality guidelines occurred on a routine and regular basis with all coal mines in west-central Alberta from 1995 to 2009. This coincided with a period of self-regulatory monitoring. Non-compliance for total suspended solids (TSS) frequently occurred at monitoring stations at every coal mine. Monitoring stations were primarily located at the discharge point of settling ponds, designed to reduce TSS from a multitude of coal mining activities, including mine site disturbance and activity, haul road development and activity, pit dewatering, and valley fills. Settling ponds were the proposed solution to deal with issues of water quality, yet high incidences of non-compliance were well documented and are on file (Rudy Hawryluk, retired Fisheries Biologist, pers. comm. 2021).

Release of coal fines and/or toxic substances (including flocculants), some leading to fish kills led to many investigations. This included the release of large volumes of coal from conveyer belt systems. An estimated 12 to 15 tonnes of coal entered the Gregg River in January 2000 following a water pipe rupture inside the conveyer belt enclosure. A similar event occurred at the Smoky River Coal Mine, where large volumes of coal entered Sheep Creek as a result of cleaning operations within the conveyer belt enclosure. Despite investigations, no charges

were laid under the Federal *Fisheries Act* (Rudy Hawryluk, retired Fisheries Biologist, pers. comm. 2021).

On August 3rd, 2012, Environment and Climate Change Canada (ECCC) enforcement officers visited the Coal Valley Mine in response to a spill report, and determined that an effluent, a chemical flocculant, was being released from a waste-water pond. This effluent was judged to be deleterious to fish. ECCC enforcement officers subsequently issued a direction under the *Fisheries Act*, which resulted in the deposit being stopped. Further investigation by ECCC determined that there were two previous releases of deleterious effluent from waste-water ponds, on July 27th, 2011. The releases went into tributaries of the McLeod River, including the Erith River, which are identified by the Government of Alberta as "ecologically significant habitat" for Athabasca rainbow trout, a species at risk.

In 2015 an un-reclaimed spoil pile on the legacy Grassy Mountain strip mine failed during a rainstorm event causing a catastrophic spill of overburden into Gold Creek, one of the last streams in the Crowsnest watershed with genetically-pure westslope cutthroat trout. Rennie (2020) estimated the cutthroat population had declined 95 per cent following this sediment event. The AER investigated but could not determine that ongoing exploration activity caused the failure and took no action on this incident.

Two unreported incidents of coal wastewater releases by CST Canada Coal's (CST Coal) operations in Grande Cache were reported on by the Canadian Press (April 2023). The first incident occurred on Dec. 29, 2022 when approximately 107,000 litres of coal wash water was released from CST Coal's Grande Cache mine site. The larger of the two incidents took place on March 4, 2023 when 1.1 million litres of coal fines (water and coal fine particles) were released into the Smoky River.

A cumulative effects analysis of the Elk Valley, BC concluded "mining disturbance likely contributes the most intense hazard" to aquatic ecosystems (Elk Valley Cumulative Effects Management Framework, 2018). Cope (2016) noted three major habitat concerns for native trout populations in the Upper Fording River, BC, as a consequence of coal mining activity: water quality, loss of tributary habitats and stream channel degradation. These are consistent with issues of existing and proposed Alberta coal mines.

Teck Resources (2019) provided information on the impact of their coal mining operations on native westslope cutthroat populations in the Upper Fording River BC, in proximity to several coal mines. Adult westslope cutthroat populations had declined 93 per cent (76.3 fish/km to 8.6 fish/km) and fry and juvenile trout populations had declined 74 per cent (13.38 fish/100m^2 to 3.9 fish/100m^2), compared with 2017 population estimates. This impact on native trout occurred in spite of erosion protection, sediment containment and water quality treatment for selenium.

Teck Resources was charged and convicted under the *Fisheries Act* in 2021 for a 2012 discharge of selenium and calcite into the Fording River, BC, from their Fording River and Greenhills coal operations. The company was fined $60 million dollars for this offence, but the persistent discharge of deleterious substances from these mining operations was noted from 2009 to 2019.

The Independent Expert Engineering Investigation and Review Panel (2015), in an analysis of the Mount Polley mine tailings pond failure, undertook a review of failures in BC tailings dams. They found a historic failure frequency of 1.7X 10^{-3}/ dam year. The risk of a tailings pond dam failure was estimated at two failures in ten years and six failures in 30 years. Their blunt summary of the risk of tailings pond dam failures was: “It is axiomatic that nothing in engineering or in life, can be assured with 100 per cent certainty.”

A meta-analysis of the effects of coal mining on aquatic biodiversity in the US found watersheds impacted by mining had 32 per cent lower taxonomic richness and 53 per cent lower total abundance than unmined watersheds (Giam et al, 2018). These effects occurred across all taxa investigated (i.e., invertebrates, fish and amphibians). The authors also concluded that: “Even after post-mining reclamation, biodiversity impacts persisted”.

Monthly water quality monitoring upstream and downstream of the Cheviot, Luscar, and Gregg River mines by Alberta Environment between the late 1990s and 2016 (William Donahue, Independent environmental scientist, pers. comm. 2024) revealed significant increases in the average concentration of all manner of basic water quality parameters in the upper McLeod River, Luscar Creek, and Gregg River, respectively, that increase risk to some species of fish (e.g.,, 3-12x higher turbidity; 1.7-4.3 ℃ temperature increases; 5-38x higher NO3+NO2; 3-31x higher chlorine), as well as heavy metals (7-8x higher arsenic; 6-14x higher

selenium; 5-26x higher lead; 14-50x higher antimony; 13-50x higher manganese) and cations (8-80x higher sodium).

Cooke et al (2024) provide evidence that “Mountaintop removal coal mining leaves a legacy of disturbed landscapes and abandoned infrastructure with clear impacts on water resources; however, the intensity and persistence of this water pollution remains poorly characterised.” They reviewed the downstream impacts of over a century of coal mining in the Crowsnest Pass and found elevated levels of selenium downstream of the reclaimed Tent Mountain Mine after over 40 years of partial reclamation. Underground adits from the abandoned Grassy Mountain Mine periodically discharge mine effluent into receiving streams after over 75 years. Their overall conclusion was “Closed and reclaimed coal mines continue to impact water and sediment quality.”

Coal mines continue to be proposed for steep, erodible terrain in the Eastern Slopes, including the Vista mine site and proposed expansion. These high elevation areas are difficult, if not impossible (in any sense of relative time) to vegetate and reclaim. The procedure continues to be that heavy machinery (coupled with explosives) totally removes soil and rock overburden and then the coal beneath. This transforms steep landscapes from being unique, sensitive and relatively stable ecosystems to ones blasted, shattered, excavated, cut and dumped into unstable piles of rock, gravel, dirt and dust. The areas are highly vulnerable, at the mercy of rain, snow and wind, both during the mining phase and well beyond.

The existing Vista mine, despite the assertion it uses a “closed loop system which does not discharge processed water to the environment,” suspended mining operations in 2021 because of inadequate tailings cells. Coalspur applied to the AER to utilize a combination of runoff water, groundwater and fresh water to dilute the tailings recycle water to meet regulatory limits for discharge to McPherson Creek (Coalspur Mine (Operations) Ltd, 2020). The AER responded that the solution was “a dilute and pollute-up to strategy,” and “There is insufficient evidence to support a dilution strategy. More specifically, it is questionable if there would be sufficient ‘clean’ water available to dilute tailings recycle water within a reasonable timeframe to meet current regulatory limits” (AER, 2021). Authorization was also requested for modifications to “surface and groundwater management infrastructure.” This suggests inadequate planning, engineering and an unproven strategy to deal with mine tailings water.

Assumptions made by coal mine proponents need to be tested through a synoptic review of other surface coal mines in Alberta and adjacent jurisdictions, but never are. There is much reliance on modelling to predict impacts and the outcomes of mitigation strategies. Models commonly best serve to provide a hypothesis to test, but coal interests frequently present models as definitive, particularly with respect to abilities to ameliorate adverse effects. Modelled results are only as good as the data used for input and need to be verified to provide a sense of reality. Case studies (actual monitored results of impact effects and mitigation undertaken) would provide more certainty and aid in decision making.

Experience strongly suggests regulatory standards, oversight, monitoring and enforcement are insufficient to validate the promises made prior to mine development by governments and mine proponents for effective, “stringent” environmental protection during and after mine development. There have been repeated failures to achieve the stated (or promised) mitigation strategies to reduce and/or compensate for environmental impacts.

A recent search of the Alberta Energy Regulator data base indicates that since 2013 there has been 9 investigations and 10 enforcement actions related to coal. These numbers seem very low, given previous history. Of the enforcement actions only 2 led to prosecution which could be interpreted as either a high level of compliance or perhaps a systematic fault in holding violators accountable.

Once a coal mine is approved, monitoring, environmental problems, regulatory oversight and enforcement are inconsistently applied. The evidence suggests this comes at the expense of water quality, biodiversity maintenance and watershed integrity.

Summary

Coal mining operations in mountain and foothill settings, with steep terrain features are (and will be) subject to repetitive slope, road and settling pond failures, despite the application of engineering solutions. There are a litany of environmental issues and costs as a result.

The expectation is that climate change will produce greater weather variability, with higher rainfall events, plus more frequent and unpredictable deluges, beyond mine engineering designs. This will exacerbate current situations of erosion and

sediment transport, attempts at water quality amelioration, mine structure failure rates and downstream effects on fish and fish habitat.

Conclusions From a Review of Relevant Literature, Proponent Proposals for Mine Expansion and Observations of Coal Mining, Related to Athabasca Rainbow Trout and Bull Trout

Significant declines in provincial populations of Athabasca rainbow trout and bull trout have led to these species being categorized as species at risk, *Endangered* and *Threatened*, respectively. These designations are a signal that cannot be ignored, especially with the changes and losses of habitat in the McLeod River watershed. Proposed coal mine expansions for the Vista mine will add to the cumulative impact of existing mining on Athabasca rainbow trout and bull trout in the larger watershed and in McPherson Creek and several tributary streams.

This will occur because coal mining negatively impacts fish populations and the streams and watersheds upon which they depend. The risks to biodiversity of mine development are consistently underestimated, understated and imperfectly assessed.

Coal mines entirely remove existing, functional ecosystems replacing them with ones that are unstable, highly erodible, lack buffering capacity with vastly changed hydrological responses, including changes to the timing and amount of groundwater, and remain in this state for decades after mining has ceased. Watershed instability created by coal mining in McPherson Creek and other streams produces a high level of risk to population viability and persistence of Athabasca rainbow trout and bull trout.

Coal mining operations in mountain and foothill settings, with steep terrain features are (and will be) subject to repetitive slope, road and settling pond failures, despite the application of engineering solutions. These failure rates will likely increase as a consequence of climate change. There are a litany of environmental issues and costs as a result. Even just one operational or structural engineering failure will result in an irrevocable loss of species at risk trout, as has been the case in many other surface coal mines.

This means issues from sediment are (and will be) both acute and chronic. Coal mining and associated roads and infrastructure increase sediment loadings to streams and will do so on McPherson Creek and other streams. The evidence is unequivocal that sediment, anthropogenically derived, negatively impacts aquatic invertebrates, especially *Ephemeroptera* sp., *Trichoptera* sp., and *Plecoptera* sp., indicators of high water quality and the essential food for native trout.

Sediment infills the interstitial niches in the substrate where aquatic invertebrates find habitat. It interferes with successful trout spawning, egg incubation and fry survival. Trout fry and juvenile trout require sediment-free interstitial spaces in substrate to escape higher current velocity and evade predation. Sediment-free substrate forms critical habitat for both Athabasca rainbow trout and bull trout.

Mining changes drainage patterns as tributary streams are eliminated. This has already occurred with the existing Vista mine. Coal mining also has a high water demand. This diverts and diminishes stream flow that is essential to maintaining native trout life history requirements, especially overwinter survival. These changes, including the rerouting of groundwater, changing the timing of flows and diminishing groundwater amounts negatively impact ability of native trout to successfully reproduce.

Coal mines in the Eastern Slopes, especially in the McLeod River watershed are documented to produce significant issues with selenium contamination of receiving waters. The impacts of selenium on the aquatic environment and fish are not trivial, especially persistence and bioaccumulation downstream. Current treatment methods are at best, experimental concepts. There are no proven technologies to reduce selenium concentrations that have been demonstrated to be workable at mine scales, over lengthy time periods, including beyond the operating mine life.

There is incontrovertible and compelling evidence of the toxicity of selenium to fish and aquatic invertebrates that leads to genetic issues and inevitably to fish population declines. Despite the contention of the proponent the Vista mine and its proposed expansion will not create issues with selenium this remains unproven and speculative. The preponderance of evidence from other mines in the watershed is that additional mining will add to the cumulative impact of selenium on populations of Athabasca rainbow trout and bull trout.

Selenium sensitivity is species-specific which can lead to complex community responses. Native rainbow trout observed with embryonic deformities are within the geographic range of Athabasca rainbow trout, designated as *Endangered* under the *Species at Risk Act.* In addition, high selenium concentrations from coal mining also impair recruitment of other fish species, such as the bull trout, listed as *Threatened* in Alberta.

Mitigation/compensation actions proposed and undertaken tend to be untested, unproven, unsuitable, theoretical and overly optimistic. There is a lack of effective monitoring and empirical evidence of mitigation effectiveness. Mitigation or offsetting cannot be relied on to provide satisfactory compensation for losses of critical habitat for species at risk trout.

Every independent cumulative effects assessment and associated study indicates that maintaining the status quo in land use (i.e., increasing the footprint) leads to, or has exceeded the thresholds for ecological integrity and resilience. All land use impacts at a stream and watershed level are cumulative and many are synergistic, with negative impacts on native trout persistence.

Maintenance of any metric of ecological integrity (i.e., water quality, stream flows, groundwater, biodiversity) cannot be assured with coal development, on top of timber harvest, petroleum development and recreation (especially motorized forms). Additionally, less than five per cent of mine surfaces in the McLeod watershed have restored, functioning forest ecosystems to reestablish hydrologic function and reduce erosion. At a watershed scale this means risks to native trout will persist for long time periods, even with existing mines.

McPherson Creek, its tributaries (MCT2), Trail Creek and the unnamed tributaries to the Athabasca and McLeod rivers constitute critical habitat for Athabasca rainbow trout and/or bull trout. These streams and their trout populations are not separate from their watersheds, or the larger McLeod River and Athabasca River watersheds. No streams and no trout populations are surplus— all are required for recovery efforts for both populations of species at risk trout. No measures will protect these populations from harm if mining continues and is expanded to include both surface and subsurface mining.

Coal mining in the McPherson Creek watershed and other tributaries will be similar to operations in other surface coal mines in the McLeod watershed and throughout the Eastern Slopes of Alberta. With continuation of coal mining,

including expansion of the surface mine footprint and underground mining it is highly likely that a combination of acute and chronic issues, including changes in hydrology, water quality and aquatic habitat will result in population declines and possibly loss of Athabasca rainbow trout. These negative changes in the watershed will preclude any recovery options for both Athabasca rainbow trout and bull trout populations.

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Appendix: Curriculum Vitae for Lorne Fitch, P. Biol.

Lorne A. Fitch **Curriculum Vitae**

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ACADEMIC BACKGROUND

- Graduate from the University of Calgary (1974):
  Bachelor of Science; major in Zoology; minor in Physical Geography

PROFESSIONAL REGISTRATION

- Certified Professional Biologist – Alberta Society of Professional Biologists - #176

PROFESSIONAL ACTIVITIES/MEMBERSHIPS/ASSOCIATIONS

- Great Plains Fishery Workers Association – President (1990), Secretary Treasurer (1982)
- Alberta Society of Professional Biologists- Director (1983-84)
- The Wildlife Society (Alberta Chapter) – Director (1992-93)
- American Fisheries Society
- Alberta Native Plants Council
- Society for Range Management
- Riparian Wetland Research Program, University of Montana
- Oldman Watershed Council- Director at large (2006-2009)
- Oldman Watershed Council- Headwaters Action Team member
- Water Matters- Founding Director
- Nature Conservancy of Canada- Alberta Board member (2006-2014)
- Nature Conservancy of Canada- Alberta Conservation Advisory Committee member
- Trout Unlimited- National Resource Advisory Committee member
- Crown of the Continent Conservation Initiative- Board member
- Alberta Society of Professional Biologists- Discipline Committee member
- National Riparian Stewardship Working Group- Alberta member
- Alberta Chapter, The Wildlife Society- Conservation Affairs Committee
- Alberta Endangered Species Conservation Committee member
- Alberta Fisheries Management Advisory Committee member

AWARDS

- Honorary Life Membership – Great Plains Fishery Workers Association (1992)
- Recognition of Achievement Award – Alberta Fish and Wildlife Division (1992)
- Alberta Emerald Award – Antelope Creek Ranch-Research and Innovation category (1996)
- Alberta Emerald Award – Barry Adams and Lorne Fitch-Corporate or Institutional Leadership category (1997)
- President's Special Award (1998)- Society for Range Management
- Alberta Order of the Bighorn Award – Bow Habitat Station Core Committee (1998)
- Growing Alberta – Green Team Award; Knowledge Builder category (1999)
- Premier's Award of Excellence – Fish in Schools (FINS) program (2000)
- Recognition of Achievement Award- Alberta Sustainable Resource Development (2003)
- Wildlife Administrator Award- The Wildlife Society (2003)
- Canadian Environment Gold Award- Cows and Fish- Environmental Learning category (2003)
- Alberta Emerald Award- Cows and Fish- Education category (2005)
- Special Achievement Award- Western Association of Fish and Wildlife Agencies (2005)
- Peggy Thompson Publication Award (2009)- Alberta Society of Professional Biologists
- William Rowan Distinguished Service Award (2012)- Alberta Chapter, The Wildlife Society
- Wildlife Outreach Award (2014)- Alberta Chapter, The Wildlife Society
- Wildlife Publication Award (2017)- Alberta Chapter, The Wildlife Society
- Queen Elizabeth II's Platinum Jubilee Medal (Alberta)- 2023
- Wildlife Publication Award (2024)- Alberta Chapter, The Wildlife Society

ADDITIONAL TRAINING

Habitat Evaluation Procedures; Instream Flow Needs assessment procedures; Remote sensing; Collection and preservation of environmental evidence; Cumulative effects analysis; Wildlife Resource inventory and assessment; Environmental mitigation; Riparian health evaluation methodology; Conflict Resolution

PROFESSIONAL EXPERIENCE

1971 to 1973 Alberta Fish and Wildlife Division, Red Deer

- **Biological Assistant** – Fisheries investigations of rivers, streams, alpine lakes in support of fisheries management and aquatic habitat protection. Carried out field component of northern pike reproduction research project in a saline lake. Assisted with range evaluations of grazing allotments. Assisted with Canada goose research project. Operated field check stations for deer hunters.

1974 to 1975 Alberta Fish and Wildlife Division, Red Deer

- **Fisheries Biologist** – East Slope trout stream investigations; detailed physical, chemical and biological surveys of streams in support of management objectives. Carried out lake surveys to assess stocking potential, investigated pollution/habitat complaints and assessed impacts of land use activities on fish and fish habitat.

1976 to 1980 Alberta Fish and Wildlife Division, Lethbridge

- **Fisheries Biologist** – East Slope trout stream investigations; physical habitat inventories, fish population estimates, water chemistry assessment, management assessments and stream habitat protection recommendations. Review, research and assessment of the effects of land and water use activities on fish populations and the aquatic environment. Carried out research activities on lake ecosystems and fish population interactions. Investigated and collected evidence in pollution/habitat infractions.

1980 Lethbridge Community College, Lethbridge

- **Instructor** – Taught laboratory component of Fisheries Resource Management course.

1981 to 1993 Alberta Fish and Wildlife Division, Lethbridge

- **Section Head, Regional Habitat Management** – Responsible for the regional delivery of fish and wildlife habitat protection, habitat development and habitat planning programs.

1993 to 1996 Alberta Fish and Wildlife Services, Lethbridge

- **Biologist, Regional Programs, Fisheries Management Division** – Responsible for the regional delivery and coordination of fisheries and wildlife habitat programs, evaluation of habitat projects, habitat related research activities and ecosystem management planning.

1996 to 1999 Natural Resources Service, Fisheries Management Division, Lethbridge

- **Section Head, Regional Fisheries Management** – Responsibilities for fisheries inventory, management/regulation, sport/commercial fisheries allocation, research, habitat enhancement, habitat protection and watershed planning.

1999 to 2006 Fish and Wildlife Division, Resource Coordination and Planning Branch, Edmonton

- **Provincial Riparian Specialist** – Manage a provincial riparian program. Direct extension programs, develop extension materials and work with a multidisciplinary group to research facets of biodiversity, water quality, forage production and ecological functions related to riparian condition. Provide training and training materials for riparian health assessment. Develop, implement and evaluate community- based riparian programs in rural and urban municipalities.

2006 to 2017 Alberta Riparian Habitat Management Society (Cows and Fish Program), Lethbridge

- **Provincial Riparian Specialist** – Provide provincial level support through development of extension materials, presentations, program evaluation and training. Provide direction to riparian health inventory element, research components (biodiversity, forage and livestock behaviour), riparian restoration projects and extension initiatives. Interaction with federal, provincial and local governments, on delivery of Water for Life, Land Use Framework, and Species at Risk elements. Liaison with conservation community and livestock industry on biodiversity conservation.

1996 to 2015

- **Riparian Consultant** – Consult to provincial/federal agencies, conservation groups, rural/urban municipalities and agricultural groups on riparian issues, management, research, implementation and evaluation.

2004 to 2018

- **Adjunct Professor, Faculty of Environmental Design, University of Calgary-** Guest lecturer, seminar leader, member of MSc degree project committees.

PROFESSIONAL RESPONSIBILITES

Undertook and directed habitat and fisheries inventories of Eastern Slope trout streams (Waterton, St. Mary, Belly, Castle, Crowsnest, Oldman, Red Deer and North Saskatchewan drainages), prairie and parkland rivers (Red Deer, Oldman, Bow, South Saskatchewan rivers), alpine lakes, prairie and parkland lakes/potholes and irrigation reservoirs. Collected and analysed data on:

-physical habitat parameters, benthic invertebrate populations, water quality, fish species composition, fish population estimates, angler use, fish movement, migration, distribution, fish health, fish ecology, fish kill investigations, fish collection for heavy metals, pesticides, instream flow needs for fish population maintenance, impact of land use practices on fish and fish habitat, fish stocking

Initiated or directed the assessment of resource utilization plans, land use practices, impact assessments and land and water use referrals to ensure compatibility with the production and maintenance of fish and wildlife resources. This included impacts from the following land use categories:

-agriculture (cultivation, grazing), energy development (petroleum exploration, development), forestry/timber harvest, mining (coal, gravel), urban development, linear disturbances (roads, trails, power/pipelines), recreation (motorized and non-motorized),

rural residential subdivisions, water management (water abstraction for irrigation, domestic, industrial uses)

Participated, as the Alberta Fish and Wildlife Division representative, on river basin plans and on large water management planning, construction and mitigation projects:

-Oldman River basin study, Brocket dam site study – Oldman River, Little Bow basin study, Little Bow reservoir EIA, Willow Creek basin study, Pine Coulee EIA, Milk River basin study, South Saskatchewan River basin study, Southern tributaries IFN (instream flow need) study (Belly, Waterton, St. Mary rivers)

Designed terms of reference for impact assessments related to fish, wildlife and habitat for the following water management projects:

-Keho Lake Reservoir upgrading – LNID, Badger Lake Reservoir – BRID, Stafford Lake Reservoir – SMRID, Forty Mile Coulee Reservoir – SMRID, Crawling Valley Reservoir – EID, Little Bow Reservoir ,Pine Coulee Reservoir

Led teams to assess land use impacts, effects on fish and wildlife populations and the need for mitigation, as compensation for habitat losses. Quantified the amount of habitat development required to mitigate losses. Negotiated and directed mitigation efforts including evaluation components:

-Undertook research to define the impacts of channelization on the physical, chemical and biological features of Racehorse Creek.

-Designed and undertook a study to assess the current status of bull trout in the Oldman River watershed. Determined inflection points for declines in populations on a sub-watershed level, reasons for population declines and significance of population declines in aid of provincial bull trout management planning.

Participated in and led planning teams for the Oldman River Dam mitigation program which included:

-Development, in team setting, of inventory programs for impact assessment; designed terms of reference.
-Co-chaired the development of strategic plans for mitigation including direction to consultants, negotiation over mitigation definitions, interactions with public advisory groups and coordination within the Fish and Wildlife Division.

-Participated in the development of action plans for mitigation including direction to consultants and professional advice to the proponent.

-Directed fisheries and wildlife mitigation efforts through technical advisory committees.

-Reviewed and provided critical input on technical reports from inventory, implementation and evaluation components.

-Participated in the development of evaluation programs to measure impacts of mitigation and act as the Division's representative on an interdepartmental monitoring committee.

-Designed evaluation criteria to measure efficacy of mitigation programs.

Initiated a mitigation program for stream habitat with industry, other government agencies, municipalities and landowners and directed the following components:

-Inventories of stream bank disturbance to quantify problems, An awareness program through presentations, to inform and educate land use proponents, Implementation of demonstration projects to test methods and show construction methodology, Negotiation to ensure stream habitat mitigation became part of project planning and implementation, Designed and implemented evaluation and monitoring programs to measure efficacy of mitigation techniques.

Act as an expert witness in prosecutions related to aquatic habitat and fisheries management:

R. v. Lefthand, ABPC, 2001, qualified as an expert in "fish, fish habitat and fisheries management in Alberta, including the Eastern Slopes Region of Alberta."

R. v. SouthWest Concrete, 2001, qualified as an expert in fish, fish habitat, aquatic invertebrates and the impacts of sediment on aquatic invertebrates and fish, including southern Alberta.

R. v. Eagle Child, ABPC, 2003, qualified as an expert in "fish, fish habitat and fisheries management in Alberta, including the Eastern Slopes Region of Alberta."

R. v. Goodstriker, ABPC, 2009, qualified as an expert in "fish, fish habitat, and fisheries management in Alberta, including southern Alberta and the St. Mary River watershed in southern Alberta."

Provided expert testimony on the effects of development projects on fish and wildlife populations and their habitats in provincial hearings:

-Vacation Alberta Westcastle Four Season Resort EIA hearing- 1993
-Petro-Canada Sullivan Field Development Project EIA hearing- 2008

Initiated a riparian habitat management project. Developed a partnership between Alberta Cattle Commission, Trout Unlimited, Canadian Cattleman's Association, Alberta Agriculture, Alberta Environmental Protection, and Department of Fisheries and Oceans. In a team setting, arranged for demonstration sites, with changes in grazing management practices. Designed monitoring components for aquatic habitat, wildlife habitat and wildlife responses. Provide an extension effort on compatible grazing management to achieve riparian system health. Manage a provincial, non-government program known as "Cows & Fish" (Alberta Riparian Habitat Management Society).

Directed the delivery of a regional habitat development program for both fisheries and wildlife which included the following projects:

-Moose habitat renovation using both mechanical clearing techniques and fire, Elk habitat enhancement projects, Wetland creation for ungulates, birds and fur bearers, Trout stream restoration and enhancement, Landowner Habitat Program, maintenance of habitat on private lands, Development of landscape management plans to provide multi-use benefits to land users and wildlife, Projects to enhance habitat for non-game species and the development of Watchable Wildlife project sites.

Provided regular guest lectures at University of Alberta, University of Calgary, University of Lethbridge, Northern Alberta Institute of Technology and Lethbridge College on topics related to fish and wildlife management, riparian/stream ecosystems, riparian extension programs, community involvement in landscape management and evaluation/monitoring of community-based conservation actions. Instructed the fish and wildlife ecology portion of the Alberta Sustainable Resource Development, Public Lands Division- "Stockman's Course." Assisted in the development of the "Rancher's Range Management Course" and provide the biodiversity portion and riparian health instruction.

Developed and deliver workshops on communication skills, interaction and engagement techniques with resource users and landowners and coaching in the delivery of difficult, contentious messages.

Participated on the Alberta Westslope Cutthroat Trout Recovery Team as a professional advisor for an environmental coalition. Provided input, review and strategic advice on the preparation and delivery of the Alberta Westslope Cutthroat Trout Recovery Plan 2012-2017.

Participate on the Alberta Bull Trout Provincial Advisory Committee, providing input and review for the preparation of a provincial recovery strategy for the species (2015 to 2020).

Assess and provide independent reviews of land use impacts on aquatic resources, including "threatened" species (i.e. westslope cutthroat trout, bull trout) in the southwestern portion of the Eastern Slopes.

Undertake voluntary tracking/inventory of bull trout spawning in selected streams in the Oldman watershed- Racehorse Creek, South Racehorse Creek, Hidden Creek, Dutch Creek, Oldman River (2011 to present).

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Sent: May 22, 2019 4:11 PM
To: 'Will Fisher' <WFisher@Navigatortechnical.com>
Cc: Curtis Brinker <CBrinker@bighornmining.com>; Amanda Buchanan <ABuchanan@bighornmining.com>
Subject: Vista Coal Mine - information request

Hello Mr. Fisher

I am emailing to let you know that the Canadian Environmental Assessment Agency (the Agency) has received an additional request for information from Ecojustice. This request is for documents provided to the Agency by Coalspur Mines Ltd. detailing its plans for the Vista Coal Mine Phase II project and on which the Agency's decision was made on the Phase II project.

In keeping with requirements for access to information and privacy, copies of relevant correspondence will be shared with the requestor. We will redact any personal information such as signatures.
The titles of the relevant documents are as follows:
Project Summary CEAA 8-28-18.pdf
Reg Map Project Descript AER.pdf
Phase II Project Summary Table AER.pdf
CEAA PPT 8-27-18.pfd
PH1-II Project Descript AER.pdf
2018-10-31 Coalspur Updated – Area of Mine Calculations Response.pdf

Should you have any questions please respond to me and Susan Tiege at susan.tiege@canada.ca by **May 30, 2019**, as we intend to provide the documents to Ecojustice on May 31, 2019.

Regards,
Shelly

Shelly Boss

Project Manager, Prairie and Northern Region
Canadian Environmental Assessment Agency / Government of Canada
shelly.boss@canada.ca / Tel: 780-495-2580

Gestionnaire de projets, Région des Prairies et du Nord
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
shelly.boss@canada.ca / Tél.: 780-495-2580

From: Boss, Shelly (CEAA/ACEE) <shelly.boss@canada.ca>
Sent: Wednesday, May 22, 2019 6:11 PM
To: Will Fisher <WFisher@Navigatortechnical.com>
Cc: Amanda Buchanan <ABuchanan@bighornmining.com>; Curtis Brinker <CBrinker@bighornmining.com>
Subject: Vista Coal Mine - further items

Mr. Fisher,

Further to my recent email regarding an information request on Vista Coal Mine, on May 16, 2019, the Agency received a letter from Ecojustice asking the Agency to reconsider it's determination regarding the Vista Coal Phase II expansion Project and the application of CEAA 2012. Ecojustice provided information from an AER amendment to the Vista Coal Phase I Project, dated January 2019, which includes a decrease in the surface disturbance area of Phase I. Please confirm the area of mine operations for the Phase I project and any other relevant changes, and information on any related AER approvals. As I will be on travel status next week, please respond to me and Susan Tiege at susan.tiege@canada.ca. The Agency may request further information from you on this matter.

Also, I understand that the Minister of Environment Climate Change Canada received a letter dated May 17, 2019, requesting that she designate the Coalspur Vista Phase II project under s.14(2) of CEAA 2012. The Agency will provide you with further information once available.

Regards,
Shelly

Shelly Boss

Project Manager, Prairie and Northern Region
Canadian Environmental Assessment Agency / Government of Canada
shelly.boss@canada.ca / Tel: 780-495-2580

Gestionnaire de projets, Région des Prairies et du Nord
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From: Will Fisher <WFisher@Navigatortechnical.com>
Sent: May 30, 2019 12:47 PM
To: Boss, Shelly (CEAA/ACEE) <shelly.boss@canada.ca>; Tiege, Susan (CEAA/ACEE) <susan.tiege@canada.ca>
Cc: Andrew Hutchison <ahutchison@bighornmining.com>; Thomas Cook <tcook@navigatortechnical.com>
Subject: RE: Vista Coal Mine - further items

Ms. Tiege

Please find attached Coalspur's response to the information requested by CEAA regarding the current area of mine operations for Phase I of the Vista Mine and other relevant updates pertaining to their plans for Phase II. Should you have any questions or require any additional information please feel free to contact me.

Will Fisher
wfisher@navigatortechnical.com
304-561-4490 (cell)
304-586-6291 (office)

NAVIGATOR
ENVIRONMENTAL & TECHNICAL SERVICES, INC.

3908 Teays Valley Road
Hurricane, WV 25526

May 30, 2019

Shelly Boss
Project Manager, Prairie and Northern Region
Canadian Environmental Assessment Agency
Canada Place
9700 Jasper Ave, Suite 1145
Edmonton, AB T5J 4C3

RE: Coalspur Mines Ltd./Phase II Vista Coal Mine Project

Dear Ms. Boss

Further to your emails sent on 5/22, Coalspur presents the following to clarify the current mine footprint for Phase I of the Vista Mine and proposed mine footprint for Phase II.

Since Coalspur's initial conversations with CEAA (the Agency) in 2018 concerning its plans for Phase II of the Vista Mine, Coalspur has received two additional Integrated Amendment approvals which have modified the footprint of the existing coal mine. These changes have subsequently altered Coalspur's plans for Phase II of the site. As the site continues to be developed the need to revise certain aspects of the existing approvals has arisen. These applications were necessary to increase operational efficiencies while creating a mine with production capacities capable of competing in today's markets.

In January 2019, AER approved an amendment application which reduced the footprint of the Vista Mine. In this application, as with previous applications, refinements were made to the overall project which resulted in less material for dumps, a smaller pit shell and a more contemporaneous reclamation plan. The resulting footprint after approval was reduced from 1956 ha to 1520.4 ha as described in the application submittal and during the SIR process. In April 2019, Coalspur received an approval from AER for a modification to an external dump licence. The licence was for a coal rejects dump adjacent to the processing plant and is designated as the North Dump in the tables below. The dump was modified to move the site closer to the plant to reduce the distance from which initial coal rejects must be moved and shortened the construction time of the conveyor which would transport coal rejects to the dump. The changes made in this application altered the size of the North Dump, a few topsoil storage areas as well as some water management structures. These changes further reduced the footprint of the site from 1520.4 ha to 1510.28 ha.

Since it's previous communications with CEAA, Coalspur has further evaluated its initial proposal for Phase II by considering environmental baseline data collected, further reserve evaluations as well as the interests of adjacent stakeholders with facilities along the western border and concluded a reduced Phase II footprint is more appropriate than what has been previously planned.

As directed previously by the Agency, the following tables consider area of mine operations for Phase I and Phase II using the suggested format so that it can be clearly shown which incidental components of the mine are and are not considered in the overall area of mine calculations.

Ancillary facilities, as Coalspur understands them to be, have been omitted when determining the area of mine as defined in *CEAA 2012*. As shown in the table below, Phase I of the Vista Mine Project now comprises a total 1510.28 hectares of which 1435.08 hectares are considered in the area of mine calculations for future expansions. Below is summary of the mine features associated with Phase I.

Phase I - Vista Coal Mine Recent Developments

Mine Feature	Mine Plan Amendment (Feature Disturbance in ha) 1520.4 ha - approved Jan 2019	North Dump Amendment (Feature Disturbance in ha) 1510.28 ha - approved April 2019	
Val d'Or Mine Pit	484.4	484.4	Features considered in CEAA Area of Mine calculations
McCleod/McPherson Mine Pit	311.8	311.8	
Haulroad and Access Roads	10.8	10.8	
North Dump	171.3	176	
South Dump	80.6	80.6	
Subcrop Dump	88.6	88.6	
Centre Dump	126.4	126.4	
Plant Site Area	25.6	25.6	
Topsoil Storage	85.4	70.05	
Water Management	38.2	38.73	
Freshwater Pond	11.8	11.8	
Shop Location	0.8	0.8	
ROM Conveyor	4.8	4.8	
Aggregate Pit	4.7	4.7	
Access Corridor	47.9	47.9	Ancillary areas not considered in CEAA mine footprint calculations.
Train Loadout	1.9	1.9	
Office Area	0.4	0.4	
Coal Domes	0.6	0.6	
Power Line	24.4	24.4	
Total Footprint Considered for Project Expansion	**1445.2**	**1435.08**	

Phase II of the Vista Mine Project will use much of the infrastructure already constructed on Phase I. A breakdown of the Phase II surface disturbance is below. This includes an extension of the North Dump to

account for the additional coal to be processed and a reduction to the South Dump area previously approved on the Phase I site and is currently undisturbed.

Phase II – Vista Coal Project		
Mine Feature	**Surface Disturbance**	All considered in Area of Mine calculations. 633.6 ha
Mine Pit	586.2	
North Dump Extension	66	
Ponds/Drainage	43.3	
Phase I South Dump Reduction Area	-61.9	

The area of mine calculation for the current Phase I area which only includes components defined under the Regulations as "*the area at ground level occupied by an open pit or underground workings, mill complex or storage area for overburden, waste rock, tailings or ore*" is 1435.08 hectares. When considering the same requirements and changes proposed for the Phase II mine application, the footprint calculation is 633.6 hectares. This equates to an overall increase of 44.1% from the current Phase I area of mine.

We appreciate this opportunity to discuss the Phase II project with CEAA during this iterative process. As engagement and environmental baseline collection continues the project may evolve before final submission of the application to AER. The footprint described herein is intended to be an update of the major components as development of the Phase II application continues.

We hope with this letter and supporting figure, CEAA can confirm the proposed Phase II Vista Coal project will not be considered a designated project under CEAA 2012. Phase II of the Vista Coal Project, as currently proposed, is under 50% of the existing mine operation when excluding all incidental components of the Phase I. Should you require any additional information please feel free to contact me. Thank you for your attention in this matter.

Sincerely,

Will Fisher,
Project Manager
Navigator Environmental & Technical Services, Inc.
On behalf of Coalspur Mines Ltd.

Canadian Environmental Assessment Agency | Agence canadienne d'évaluation environnementale

Prairie and Northern Region
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July 15, 2019

Coalspur Mines (Operations) Ltd.
P.O. Box 6146, 110 McLeod Avenue
Hinton, AB T7V 1X5

Care of:
Will Fisher
Navigator Environmental & Technical Services, Inc.

Sent via email: WFisher@Navigatortechnical.com

Dear Mr. Fisher,

The Canadian Environmental Assessment Agency (the Agency) considered the most recent information provided by Coalspur Mines (Operations) Limited regarding the Coalspur Vista Coal Mine Phase II Project (the Project), located near Hinton, Alberta. The Agency determined that the Project as proposed is not a designated project under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) as it does not appear to meet the thresholds set out in the *Regulations Designating Physical Activities* (the Regulations). The Agency should be notified of any Project changes to confirm the application of CEAA 2012.

In May of 2019, the Minister of Environment Climate Change Canada (the Minister) received several letters requesting that the Project be designated under subsection 14(2) of CEAA 2012. Under subsection 14(2), the Minister the may, by order, designate a physical activity that is not prescribed in the Regulations for the purpose of requiring an environmental assessment. The Minister may do this, if, in the Minister's opinion, either the carrying out of the physical activity may cause adverse environmental effects or public concerns related to those effects may warrant the designation.

The Agency will review the Project and its potential environmental effects, and provide a recommendation to the Minister on whether the Project should be designated.

As such, the Agency requests Coalspur Mines (Operations) Limited provide updated information regarding the Project, its views and comments on whether the Project should be designated under CEAA 2012, along with any information you have about the surrounding environment. This should include:

- a description of the Project and any incidental physical activities required to construct, operate, or decommission the Project;
- any maps or diagrams of the Project that may have been produced;

- any available information regarding potential effects to fish and fish habitat, migratory birds, species at risk, federal land and lands outside of Canada, and Indigenous peoples (e.g., potential impacts to health and socio-economic conditions, physical and cultural heritage, current use of lands and resources for traditional purposes, and structures, sites or things of historical, archaeological, paleontological, or architectural significance); and
- any other information that may be informative in our review of the Project.

In addition, please provide any information you have about potential provincial approvals or processes that may be required for the Project, including proposed timing and related documents.

In preparing its recommendation, the Agency may use the information to seek and consider input from other entities.

Please provide this information by **August 2, 2019.**

Additional information regarding the Agency process for designation requests can be found at the following link: https://www.canada.ca/en/environmental-assessment-agency/services/policy-guidance/designating-project-under-canadian-environmental-assessment-act-2012.html. Further questions regarding this request can be directed to Shelly Boss at (780) 495-2580 or by email at shelly.boss@canada.ca.

Sincerely,

<Original signed by>

Shelly Boss
Project Manager, Prairie and Northern Region

Impact Assessment Agency of Canada
Agence d'évaluation d'impact du Canada

President
160 Elgin St., 22nd floor
Ottawa ON K1A 0H3

Président
160, rue Elgin, 22e étage
Ottawa ON K1A 0H3

September 29, 2021

PROTECTED B
MIN 282085

MEMORANDUM TO MINISTER

VISTA COAL UNDERGROUND MINE AND VISTA MINE PHASE II EXPANSION PROJECTS – RECOMMENDATION ON WHETHER TO DESIGNATE
(Decision and Signature)

TIMELINE

Your decision is requested by **September 29, 2021 (internal deadline)** to allow the Impact Assessment Agency of Canada (the Agency) to post your response at the same time as the Department of Justice files its appeal. There is no legislated timeline.

PURPOSE

To seek your decision on whether to designate the physical activities of the Vista Coal Underground Mine (VUM) and Vista Mine Phase II Expansion (Phase II Expansion) pursuant to subsection 9(1) of the *Impact Assessment Act* (the IAA).

SUMMARY

- Coalspur Mines (Operations) Ltd. (the Proponent) is proposing two physical activities: an underground coal mine (VUM) and an expansion of the thermal coal surface mine (Phase II Expansion) to expand the existing Vista Coal Mine (Phase I), located near Hinton, Alberta (Annex I).
- On July 19, 2021, the Federal Court granted the application for judicial review filed by Ermineskin Cree Nation, set aside your order of July 30, 2020 designating the physical activities (the Order), and remanded the matter for reconsideration.
- The Agency's Analysis Report (Annex II) considers information from Indigenous groups (Annex III), federal authorities, publicly available information, and information from the two previous designation request processes and the now-terminated planning phase. The Agency also considered the extent to which thermal coal contributes to global climate change, and related implications to Canada's international and domestic commitments.
- The Agency recommends that you designate both physical activities based on potential direct and cumulative adverse effects (including from deposition of selenium) to fish, including species at risk, their habitat and critical habitat, and potential direct and cumulative impacts to Indigenous peoples and their rights.
- Should you concur, upon your decision, the Agency will post on the Canadian Impact Assessment Registry internet site: its Analysis Report (Annex II); your response with reasons (Annex IV); and a new designation order (Attachment I). Response letters (Attachments II, III, IV) will be sent upon your signature.

CONTEXT AND CURRENT STATUS

The Physical Activities
The Proponent is proposing two physical activities involving the expansion of the existing Vista Coal Mine Phase I (Phase I), a surface coal mine located approximately 10 kilometres east of Hinton, Alberta. The operation would extract and export thermal coal to international markets. Both physical activities would use existing infrastructure, such as coal processing facilities, coal conveyors, a primary access corridor, equipment parking and maintenance areas, and a coal load-out facility.

The first physical activity is an underground coal mine (Vista Underground Mine - the VUM) situated within the Phase I permit area, anticipated to produce 1,740 tonnes per day of "clean" (impurities removed for market) coal. The Proponent states that it takes 1.6 to 1.8 tonnes of raw coal to produce one tonne of clean coal. New surface disturbance due to the VUM is limited to less than 10 hectares and the area of underground mining will be approximately 121.8 hectares. The Proponent has submitted an application to the Alberta Energy Regulator (AER) for approval of these activities. A provincial environmental assessment is not required. Provincial approval may occur as early as the week of September 27, 2021.

The second physical activity is a westward expansion of the existing Phase I surface mine pits (Phase II Expansion). The Phase II Expansion would result in approximately 600 hectares of additional surface disturbance with a maximum daily production of 50,000 raw tonnes per day (close to 18 kilotonnes of "clean" coal processed for market). Phase II requires a provincial Environmental Impact Assessment, of which the Final Terms of Reference were issued to the Proponent on June 18, 2019. The Proponent has yet to submit its provincial Environmental Impact Statement, but is anticipated to do so within 2021.

Since the 2020 designation process, when the expansion footprint was extremely close to the 50 percent expansion threshold (up to 49 percent) described in paragraph 19(a) of the *Physical Activities Regulations* (the Regulations), new sources of publicly available information have become available to the Agency regarding modified plans for the physical activities. As such, the Agency has recalculated the potential expansion footprint to confirm that the physical activities, even together, do not meet the expansion threshold and are not subject to the Regulations. Key changes include a slightly increased footprint for the VUM, but a reduced footprint for haul roads, and the removal of the North dump expansion. Based on Agency calculations, even if the two physical activities were considered collectively, the resulting increase in area of mining operations would be no more than 43 percent. Thus, despite the coal production capacity exceeding the 5,000 tonnes per day threshold described in the Regulations, the physical activities do not meet the minimum 50 percent expansion threshold and thus are not physical activities designated under the Regulations. Despite this, the production capacity remains very high and is a relevant consideration.

Designation and IAA Planning Phase Timeline
On December 20, 2019, you responded that the Phase II expansion did not warrant designation. In 2020, new requests to designate the physical activities were received following the Proponent's provincial application for the VUM. On July 30, 2020, you designated the physical activities by order under subsection 9(1) of the IAA. Both responses and the Order are posted to the Canadian Impact Assessment Registry.

On May 6, 2021, the Agency initiated the Planning Phase under the IAA and held a 20-day public comment period on the Proponent's initial project description (Annex V). On June 4, 2021, the Agency issued the Summary of Issues (Annex VI) to the Proponent, including consideration of comments from 11 Indigenous groups.

Reconsideration Process – 2021
Following the July 2020 Order, the Proponent and Ermineskin Cree Nation both filed separate judicial review applications in Federal Court challenging the Order. On July 19, 2021, the Federal Court rendered its decision (Annex VII) in favour of Ermineskin Cree Nation, setting aside the Order on the basis that the duty to consult was breached because Ermineskin Cree Nation was not given notice or the benefit of any consultation. The Court remanded the matter for reconsideration. As a result of this decision, the Agency terminated the IAA planning phase that was underway. Because the Order had been set aside by the Federal Court in the Ermineskin Cree Nation application for judicial review, the Court deemed the Proponent's judicial review application moot and therefore dismissed it (Annex VIII).

In light of the Federal Court decision, the Agency initiated a process to reconsider the designation requests (Reconsideration Process). During the Reconsideration Process, the Agency engaged extensively with Ermineskin Cree Nation and sought input from an additional 43 potentially affected Indigenous groups. The majority of these groups were engaged in the first designation process and the planning phase, but engagement was not undertaken in the second designation process aside from with the two Indigenous requesters, Louis Bull Tribe and Stoney Nakoda Nations. A summary of the Agency's engagement activities and key comments from Indigenous groups is included as Annex III.

CONSIDERATIONS

Legislative Requirements
Subsection 9(1) of the IAA provides you with the authority to designate physical activities. No action has been taken at this time that would prevent you from exercising your authority. However, we understand that the AER approval for the VUM is imminent (likely September 29). If, following this decision, the Proponent starts carrying out the physical activity (VUM), paragraph 9(7)(b) of the IAA may preclude you from designating the VUM if it is determined that the physical activity has substantially begun.

The Regulations identify that coal mine expansions would constitute designated physical activities if the area of mining operations increases by 50 percent or more, and the total coal production capacity is 5,000 tonnes per day or more after the expansion. The physical activities do not meet the expansion criterion, either separately or together.

Legal considerations
Solicitor/Client Privilege [redacted]

It is unlikely that Ermineskin Cree Nation would pursue legal action related to the designation decision. Agency officials were able to engage in an in-depth and productive dialogue with Ermineskin Cree Nation with regard to both the physical activities, as well as the community's larger concerns with regard to industrial activity in the Eastern Slopes area of Alberta.

On September 24, 2021, Ermineskin Cree Nation provided the Agency with a letter summarizing the outcomes of this dialogue (Annex IX). Ermineskin Cree Nation indicated that it felt that, as a result of the Reconsideration Process dialogue, the Agency now understands its rights-related concerns tied to hunting, fishing, and traditional land uses connected to the physical activities. The letter also noted "for accuracy and fairness" that the Reconsideration Process had not considered the details of the Impact Benefit Agreement. The letter concluded by stating that Ermineskin Cree Nation "neither supports or opposes a federal review of the Projects."

ANALYSIS/ASSESSMENT

For your consideration, the Agency has completed a new analysis and prepared a report that summarizes its findings (Annex II). The new analysis builds upon the analyses completed for the 2019 (Annex X) and 2020 (Annex XI) designation requests, and focuses on information obtained since the previous designation request processes. The analysis considers whether the physical activities may cause adverse effects within federal jurisdiction, or adverse or direct or incidental effects as defined in section 2 of the IAA, and considers the public concerns related to those effects. The analysis also considers the potential for adverse impacts on the rights of Indigenous peoples of Canada, that are recognized and affirmed by section 35 of the *Constitutional Act, 1982*.

Potential Effects within Federal Jurisdiction

In its new analysis, the Agency considered information provided by the Proponent, Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC), Natural Resources Canada, Indigenous Services Canada, Health Canada, Women and Gender and Equality Canada, Transport Canada, Indigenous groups, and publicly available information. This includes information provided during the planning phase conducted from May 6, 2021, until July 19, 2021. Information from the two prior designation analyses is also considered.

The potential adverse effects and mitigations include:

Migratory Birds:

- ECCC indicated potential adverse effects of the physical activities on migratory birds through habitat alteration, increased mortality due to collisions and interactions with the physical activities, habitat fragmentation, and impacts to movement patterns are anticipated.

- The Proponent proposed measures to mitigate the habitat loss including undertaking nest sweeps prior to the commencement of the physical activities, working outside the restricted activity period for breeding birds when possible, and undertaking progressive reclamation to limit habitat loss.

Fish and Fish Habitat:

A key change that has occurred since the 2020 designation is the September 2020 finalization of the *Recovery Strategy for Rainbow Trout (Oncorhynchus mykiss) in Canada (Athabasca River population)*, including the identification of critical habitat, and the *Recovery Strategy for the Bull Trout (Salvenlinus confluentus), Saskatchewan-Nelson River populations, in Canada.* Rainbow Trout are listed as Endangered and Bull Trout as Threatened under the *Species at Risk Act*. Both species occur within the area of the physical activities. The physical activities are located within the Bull Trout Recovery Area and critical habitat for Rainbow Trout is found within the Phase II Expansion footprint and downstream from both physical activities. Both physical activities have the potential to impact Rainbow Trout critical habitat, to varying degrees.

Potential harmful alteration or destruction of habitat, including critical habitat

- The Proponent has identified 13 fish species in the vicinity of the physical activities, with Rainbow Trout as the most prolific.
- During the Reconsideration Process for both physical activities, DFO advised the physical activities have the potential to cause the harmful alteration, disruption, or destruction of fish habitat, or death of fish. In addition, the physical activities have the potential to cause adverse effects to populations and the critical habitat of Athabasca River Rainbow Trout.
- Genetically pure strain individuals of Rainbow Trout have been identified within the Phase II footprint. The 2020 Recovery Strategy identifies increasing the number of pure strain (core) populations as a key population and distribution objective. A decline in all existing human threats and their effects on populations of Athabasca Rainbow Trout, whether through mitigation or overall reduction due to best practices or legislation, is one performance indicator in the progress towards achievement of this objective.
- DFO expressed concern that even with measures to offset harm to fish and fish habitat, there is high uncertainty as to whether Phase II could be carried out in a way that will not jeopardize the survival and recovery of fish species at risk.
- The Proponent has proposed the following monitoring, mitigation and avoidance measures:
    - a 100-metre buffer from the mainstream of McPherson Creek will be implemented for expansion activities, as is done for Phase I;
    - stream flow augmentation to maintain adequate water volume in fish-bearing streams;
    - a surface water management plan and adaptive management plan based on continuous monitoring within the receiving stream;
    - development of activities in a way to avoid direct impacts to fish habitat; and
    - monitoring quality and quantity parameters in multiple locations south of the mine disturbance before, during and after operations.

- The physical activities have the potential to affect stream flow in fish-bearing waters through water withdrawal and discharge, including dewatering of the underground mine. They also have the potential to affect surface water quality through increased contaminants or sediments from physical activities, including increased mining and associated activities and groundwater-surface water interactions during underground mining.

Potential deposition of deleterious substances

- The physical activities have the potential for deposition of deleterious substances such as selenium into waterbodies frequented by fish.
- ECCC indicated potential impacts from the physical activities to fish and fish habitat by calcite deposition. Calcite from coal cleaning can deposit in receiving waters and subsequently make stream substrates uninhabitable to invertebrates that form the base of the aquatic food chain, and eliminates the loose gravels necessary for successful fish spawning.
- ECCC indicated that runoff from coal mine operations typically includes contaminates including selenium, and the physical activities may result in deleterious substances entering McPherson Creek watershed and the McLeod River.
- DFO noted the potential that impacts to the survival and recovery of Athabasca River Rainbow Trout could occur as a result of deleterious substances being deposited in water from the proposed activities and that there is no federal mechanism to require monitoring to ensure that contaminants do not reach fish and fish habitat in a manner that becomes deleterious.
- While Proponent tests within Phase I and Phase II Expansion mine pit areas and surface water samples in the watershed indicate low levels of selenium in the formation compared to more selenium-enriched formations (such as in the Elk Valley in B.C.), other coal mines upstream from the physical activities on the McLeod River basin have already contributed to elevated selenium levels.
- At this time, specific mitigations that will be implemented to eliminate or reduce potential effects of selenium are not known, however, the Proponent has stated it will perform several mitigation actions to minimize potential selenium runoff from the Phase II Expansion and a water management plan will be made a part of the Phase II Expansion proposal.

Overall, federal authorities have advised that both the VUM and the Phase II Expansion have the potential to impact water quality and quantity, which would in turn impact the fish-bearing water within and downstream from the site of the physical activities, including critical habitat for Rainbow Trout. The Phase II Expansion may result in the direct alteration or destruction of fish habitat and there is potential that critical habitat within the proposed footprint will be affected.

As such, the Agency views that these potential adverse effects are an important consideration.

Traditional and cultural use, health, social or economic conditions of Indigenous peoples:
Numerous Indigenous groups raised concerns about:

- Loss of land, ability to access sites of ceremonial and spiritual significance and subsequent impacts on intergenerational transfer of knowledge;
- Potential adverse effects to wildlife, fish, and migratory birds of importance including loss of habitat and access to resources;
- Potential adverse impacts to Indigenous peoples' health through project-related changes to air quality, water quality, noise, consumption of drinking water, country foods and medicinal plants including realized or perceived contamination. Health Canada has also indicated that Indigenous groups have raised concerns that the physical activities could have impacts to country foods and food security, which could cause adverse health effects to Indigenous peoples;
- Potential adverse impacts to mental and physical health of Indigenous peoples through loss of connection and solace in the land due to direct and cumulative environmental change and fragmentation;
- Need for clarity on the economic opportunities, revenue sharing and other agreements presented to Indigenous groups generated by the physical activities;
- Potential impacts to gravesites or other sites of historical site of cultural importance;
- Potential cumulative effects to waterways that could adversely effect traditional and cultural use, health, and social conditions; and
- Several Indigenous groups indicated that they have not had the opportunity to undertake site-specific traditional land use studies related to the physical activities footprint and potential effects, so they are challenged in identifying potential impacts specific to the proposed physical activities, as opposed to more general concerns regionally.

The majority of these concerns were shared during the previous designation request processes, but also reiterated in the IAA planning phase and reconsideration process. It is worth noting that since the previous designation request processes, three Indigenous groups, Aseniwuche Winewak Nation, Descendants of Michel First Nation, and the Elders of Mountain Cree Camp, have written letters of support for the physical activities and expressed the view that a federal impact assessment should not occur. The groups have indicated that the Proponent will mitigate environmental impacts, provide economic gains for their community and work with their communities in collaboration during operations. Similarly, Ermineskin Cree Nation has indicated that they have negotiated economic gains for their community with the Proponent through an impact benefit agreement, although they have not expressed explicit support for the physical activities to the Agency.

Potential Adverse Direct or Incidental Effects
Direct or incidental effects refer to effects that are directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out, in whole or in part, of a project, or to a federal authority's provision of financial assistance to a person for the purpose of enabling that project to be carried out, in whole or in part.

The physical activities require a *Fisheries Act* authorization and may require other exercise of powers, duties, or functions to proceed, such as a *Species at Risk Act* permit or a Navigation Protection Program approval under the *Canadian Navigable Waters Act*. Therefore, direct or incidental effects are possible. Additional information would be required to understand the potential effects.

Public Concerns

The public concerns that relate to the areas of federal jurisdiction included all potential adverse effects noted above. The level of public concern is high. The Agency has received comments both in favour of and opposed to the physical activities. Those in favour generally cite economic benefits.

The majority of the concerns centre on the direct and associated cumulative effects on the environment, including to the watersheds, fish and fish habitat, human health, greenhouse gas emissions, climate change, and impacts to Indigenous peoples.

Potential Impacts to Section 35 Rights

There is the potential for the physical activities to cause adverse impacts on the rights of the Indigenous peoples of Canada that are recognized and affirmed by section 35 of the *Constitution Act, 1982*. The environmental assessment by the Province of Alberta for the Phase II expansion will include consultation, albeit more limited in scope than the Agency would require should the physical activities be designated. The Alberta Aboriginal Consultation Office has determined that there is no consultation required for the VUM regulatory process.

Further detail on what the Agency has heard through the reconsideration process is included in Annex II. These include the potential adverse and beneficial impacts to Indigenous peoples and established Aboriginal and Treaty rights.

Many Indigenous groups raised strong concern about the potential for direct and cumulative effects from the physical activities to adversely impact their practice of rights through further taking up of lands, contamination of waterways, air, plants, and animals that are used for traditional purposes, and the subsequent impacts to health and well-being. Direct loss and real or perceived loss due to contamination adversely impact the ability to undertake meaningful practices in areas of significance, also impeding the intergenerational transfer of knowledge, culture, and language.

OTHER CONSIDERATIONS

Government of Canada Policy

- On June 11, 2021, the government of Canada announced its Policy Statement on future thermal coal mining projects and project expansions with commitment to reducing global greenhouse gases in the fight against climate change. The Policy states that new thermal coal mining projects or expansions are likely to cause unacceptable environmental effects within federal jurisdiction and are not aligned with Canada's domestic and international climate change commitments.

- Simultaneously on June 11, 2021, you issued a notice to Coalspur Mines (Operations) Ltd. under Section 17 of the IAA (Annex XII) that you are of the opinion that it is clear that the physical activities would cause unacceptable environmental effects within federal jurisdiction.
- Coalspur Mines (Operations) Ltd. indicated that they remained interested in continuing with the impact assessment and were in the process of developing their detailed project description when the planning phase was terminated.

Greenhouse Gas Emissions:

- The Agency understands that activities associated with the physical activities will result in increases of greenhouse gases (GHG) emissions both in Canada and internationally.
- Sources of GHG emissions include the operation of diesel machinery and fugitive emissions of coal bed methane release associated with coal extraction.
- The Proponent indicates that underground mining proposed for the VUM uses electrical equipment and reduces the volume of overburden that needs to be hauled; therefore overall GHG emissions would be reduced. However, the coal proposed by the VUM is not considered to be economically viable by surface mining and would not otherwise be extracted.
- The physical activities are expected to release an average of 35,000 tonnes of direct greenhouse gas emissions per year (43,000 tonnes total considering direct plus acquired emissions from power generation) over nine years.
- The physical activities will be subject to federal greenhouse gas emissions reporting requirements, pursuant to the *Canadian Environmental Protection Act, 1999*, if they emit 10 kilotonnes or more of greenhouse gas emissions, in carbon dioxide equivalent units per year.

Regional and Strategic Assessments

Canada has prepared a Strategic Assessment of Climate Change that identifies information requirements to be considered in the impact assessment process of designated projects. The Strategic Assessment of Climate Change includes the information that the Proponent needs to submit regarding greenhouse gas and climate change. Emissions generated by downstream use after the product has gone to market are not included as direct project effects.

In 2019, Canada announced the launch of a strategic assessment to provide guidance on how future new thermal coal mine physical activities will be assessed under the IAA. However, ECCC has informed the Agency that as a result of the Government of Canada Policy Statement on June 11, 2021, regarding future thermal coal mining projects and project expansions, the Strategic Assessment of Thermal Coal Mining is no longer needed and has been cancelled.

RECOMMENDATION

The Agency recommends that you designate the physical activities.

NEXT STEPS

- If you concur, the Agency requests that you sign the Order (Attachment I) and the correspondence conveying your decision (Attachments II, III, IV).
- The Agency will then post your response (Annex IV), the Analysis Report (Annex II), and the Order (Attachment I) on the Canadian Impact Assessment Registry internet site.
- The Agency will inform the Indigenous groups, federal authorities and provincial ministries of your response.

Hubbard, Terence

Digitally signed by: Hubbard, Terence
DN: CN = Hubbard, Terence C = CA O = GC OU = EC-EC
Date: 2021.09.28 16:47:28 -04'00'

Terence Hubbard
Acting President

√ **I concur** ___ **I do not concur**

September 29, 2021

Jonathan Wilkinson

Attachments (16):

- *Attachment I – Order Designating Physical Activities*
- *Attachment II – Letter to Proponent (Decision)*
- *Attachment III – Letters to Indigenous Groups (Decision)*
- *Attachment IV – Letter to Requester (Decision)*
- *Annex I – Project Location Maps*
- *Annex II – Analysis Report - Reconsideration of Designation under IAA*
- *Annex III – Summary of Indigenous Engagement and Consultation*
- *Annex IV – Minister's Response*
- *Annex V – Initial Project Description*
- *Annex VI – Summary of Issues*
- *Annex VII – JR Decision Ermineskin*
- *Annex VIII – JR Decision Coalspur*
- *Annex IX – Letter from Ermineskin Cree Nation (September 24, 2021)*
- *Annex X – 2019 Phase II Expansion Analysis Report*
- *Annex XI – 2020 VUM Analysis Report*
- *Annex XII – Section 17 Notice*

Drafting Officer's Name: Terence Hubbard
Directorate/ Branch: Vice-President, Operations
Phone No: 613-724-8288
Date Drafted: September 28, 2021

August 14, 2020

Rushang Joshi
Manager - Coal Mining Authorizations
Alberta Energy Regulator

<submitted by email only to coal.applications@aer.ca: cc'ed to irene.chia@aer.ca>

Dear Mr. Joshi,
Re: Coalspur Mines (Operations) McPherson Pit Tailings Cells

Through this letter and supporting documentation, Coalspur is requesting amendments to Pit License C2014-5C, Coal Mine Permit C 2011-5F, Coal Processing Plant approval C 2011-3E, Subcrop Dump License C 2014-6A, North Dump License C 2014-7D, Water Act License 311965-00-00 as amended, Water Act Approval 311969-00-00 as amended, and EPEA Approval 301345-00 as amended to allow repurposing of the mined out McPherson pits for the storage, settling, and dewatering of fine plant refuse.

Coalspur Mines submits the following application and technical reports in support of the McPherson Tailings Cells application. As discussed during the August 4th 2020 meeting, Coalspur recognizes that the McPherson Tailings Cells are in early phases of operation / development and additional data is required to support discharge to the environment from the McPherson Tailings system. Coalspur has elected to establish the McPherson Tailings Cells as closed loop system, no discharge to the environment.

There will be no changes in material process for the purpose of refuse deposition as part of the proposed development of the following sequential McPherson Tailings Cell 2-9. Therefore, no alteration in the current water chemistry is anticipated in comparison to the approved McPherson Tailings Cell 1. Coalspur Mines will continue to collect and present findings to the AER regarding settling rates, concentration parameters and related topics as part of the annual wastewater management reports and tailings cell performance.

Coalspur Mines, as part of planned future development, is updating models to incorporate the tailings cells operations into air, surface and groundwater models. The updated models will be presented to the AER as part of future development plans.

Please feel free to reach out to the undersigned to discuss the application.

Regards,

Brian Gregg
VP of Engineering and Environmental

Cell: 780-817-0912
Office: 780-740-2509
E-mail: bgregg@bighornmining.com

Coalspur Mines (Operations) Ltd.

Vista Mine

McPherson Pit Tailings Cells

TO AMEND:

- C 2014-5C Pit License
- C 2011-5F Coal Mine Permit
- C 2014-6A Subcrop Dump Licence
- C 2014-7D North Dump License
- C 2011-3E Coal Processing Plant Approval
- EPEA 00301345-00-00 (As Amended)
- Water Act 00311969-00-00 (As Amended)
- Water Act 00311965-00-00 (As Amended)

August 2020

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Appendix A-1	Highwall Mining Assessment
Appendix A-2	McPherson Groundwater Model Report
Appendix A-3	McPherson Tailings Cell #2 and Cell #3 Design Study
Appendix B	McPherson Tailings Cells Pumping System
Appendix C	SDS Documents
Appendix D	Updated Source Water Supply Plan
Appendix E	Vista Mine Progressive Reclamation Plan

1. Introduction

1.1 Background Information

Coalspur Mines (Operations) Ltd. (Mine) operates the Vista Coal Mine located in townships 50 and 53, ranges 23 and 24, West of the Fifth Meridian, approximately 10 km east of Hinton, Alberta. The Mine has been in operations since 2018 and supplies coal to foreign markets. The existing Mine permit area occupies a total area of approximately 5,490 ha (**Figure 1**).

The Mine has experienced an increased volume in the material being generated from the underflow of the Processing Plant's thickener cells. This increase has caused the mine to fully utilize the capabilities of the Filter Press Plant and therefore do not have the capacity to process the excess underflow being generated.

The Mine applied for an amendment (EPEA Application No. 007-00301345) to utilize the mined-out McPherson Pits as tailings cells for storage, settling, and dewatering of fine plant refuse. Approval was provided for the McPherson Pit Settling Cell 1 (now referred to as McPherson Tailings Cell 1) on February 6, 2020 as EPEA Approval amendment 00301345-00-06, with the anticipation of additional cells requiring approval in the near future.

1.2 Proposed Activity

As volumes within the first McPherson Tailings Cell increase and the mining progresses east within the McPherson Pit mine plan, additional tailings cells will be available and required. Coalspur is requesting amendments to the following permits and approvals in order to obtain an authorization process to construct the remainder 8 McPherson Tailings Cells (McPherson Tailings Cells 2 to 9).

- C 2014-5C Mine Pit License
- C2011-5F Coal Mine Permit
- C2014-6A Subcrop Dump License
- C2014-7D North Dump License
- C 2011-3E Coal Processing Plant Approval
- Water Act Approval 00311969-00-00 (as amended)
- Water Act License 00311965-00-00 (as amended)
- EPEA Approval 00301345-00-00 (as amended)

The construction, management, and performance of the Tailings Cells will be similar to the Tailings Cell 1. The Mine would like to develop a notification process for the construction of future Tailings Cells. The authorization process would involve submitting the engineering plans and details for the individual tailings cells and their associated in-situ plugs once they become available and required. This process would also include the documentation on test results and geotechnical engineering work performed for each in-situ plug.

Coalspur acknowledges that the construction of the dam is initiated upon the removal of overburden east of the in-situ plug below the bottom till contact and will use this understanding for the timing of completion for the compliance condition above. A qualified professional will be engaged to review and assist in the development of the required plans to ensure compliance with environmental Conditions and the Dam Safety Directive. The Mine proposes to provide the technical designs and assessments to the Director 180 days prior to construction. This timeline adheres to the Water Approval condition 4.1 timeline for dam or canal design submission to the Director prior to beginning of construction.

Concurrent to the above proposal, the Mine is requesting authorization to construct the McPherson Tailings Cells 2 and 3. Section 4 provides the detailed engineering plans for both cells and their associated in-situ plug, including geotechnical stability and seepage analysis. The process outlined in **Section 4** will be consistent throughout the authorization process for all Tailings Cells.

1.3 Changes to Permits, Licenses, and Approvals

The proposed activities require amendments under the terms and conditions of the Mine's Licenses and Approvals as listed above. The proposed activity will also require modifications to certain terms and conditions. **Table 1** outlines the conditions in the current Licenses and Approvals that will require modification in order to construct and operate the McPherson Tailings Cells.

Table 1 – Terms & Conditions Requiring Amendments		
License/Approval	**Terms/Conditions**	**Proposed Amendments**
Pit Licence C 2014-5C	10) The Licensee shall backfill each highwall mining panel such that there are no more than 10 highwall penetrations open at one time and no highwall penetration shall remain open in excess of 30 days following its completion.	The McPherson Coal Seam highwall mining panels will not be backfilled. As per Barr Engineering's Highwall Mining Assessment (Appendix A-1), engineer design with a design stability factor of 2.3 without backfilling activities is not anticipated to have long term settlement or safety concerns.
	14) The maximum operating elevation of the McPherson Pit Settling Cell 1 shall not exceed 1187 meters above sea level (masl) and shall remain below the till/bedrock geological contact excluding the freeboard requirement, unless otherwise directed by the AER.	Applicable to all Tailings Cells. Reference all McPherson Tailings Cells.
	15) The Licensee shall monitor the geotechnical performance of the McPherson Pit Settling Cell 1 tailings material and shall submit on a quarterly basis to the satisfaction of the AER, or at such other frequency the AER may stipulate, a report which analyzes the results from the geotechnical monitoring.	
	16) The Licensee shall notify the AER of any geotechnical instabilities associated with the McPherson Pit Settling Cell 1 area.	
	17) Three months prior to backfilling the McPherson Pit Settling Cell 1 with any mine discard material, the Licensee shall submit to the satisfaction of the AER, a backfill design and supporting geotechnical stability analysis	
Coal Mine Permit C 2011-5F	2) The Permittee shall construct, operate, and reclaim the approved project with current specifications, standards, as well as commitments and other information referred to in a. Application No. 1726915 registered on May 4, 2012 b. Application No. 1819010 registered on December 19, 2014 c. Application No. 1896853 registered on September 5, 2017 d. Application No. 1909172 registered on May 3, 2018 a. Application No. 1925597 registered on November 15, 2019 and a. Application No. 1928090 registered on April 8, 2020	Include this application
Subcrop Dump Licence C 2014-6A	2) The Licensee shall construct, operate and reclaim the approved project in accordance with current specifications, standards, as well as commitments, and other information referred to in a. Application No. 1726927 registered May 4, 2012 and b. Application No. 1909173 registered on May 3, 2018, and its submissions unless the AER directs otherwise.	Include this application
North Dump Licence C 2014-7D	2) The Licensee shall construct, operate, and reclaim the approved project in accordance with current specifications, standards, as well as commitments, and other information referred to in a. Application No. 1726927 registered on May 4, 2012; b. Application No. 1819012 registered on December 19, 2014; c. Application No. 1909173 registered on May 3, 2018; d. Application No. 1918901 registered on February 11, 2019; and e. Application No. 1925598 registered on November 15, 2019, and its submissions unless the AER directs otherwise.	Include this application
Coal Processing Plant Approval C 2011-3E	2) The Licensee shall construct, operate and reclaim the approved project in accordance with current specifications, standards, as well as commitments, and other information referred to in a. Application No. 1726923 registered on May 4, 2012; b. Application No. 1819004 registered on December 19, 2014; c. Application No. 1896854 registered on September 5, 2017; d. Application Np. 1909174 registered on May 3, 2018; and e. Application No. 1925599 registered on November 15, 2019	Include this application
Water Act Approval 00311969-00-00 (as amended)	4.6 Unless otherwise authorized by the Director, the Approval Holder shall submit the first Annual Performance Review, in accordance with the *Alberta Dam and Canal Safety Directive,* 12 months after start of construction, and submit the subsequent Annual Performance Reviews every 12 months thereafter.	The subsequent Annual Performance Reviews will include all active Tailings Cells (the combination of the uncapped cells and operational cell) and will be provided to the Director on or before March 31st of every year.
	4.11 Prior to initiation of deposition of treated fine tailings in the McPherson Pit Settling Cell 1 tailings pond, the Approval Holder shall conduct a detailed topographic survey of the fully excavated settling cell, to a resolution of 0.1 metre or smaller, to provide a benchmark for reporting against filling curves, and as an additional measuring point to quantify volumes of water exchanged between the cell and the	Applicant Reference all McPherson Tailings Cells.

Table 1 – Terms & Conditions Requiring Amendments		
License/Approval	**Terms/Conditions**	**Proposed Amendments**
	overburden and bedrock units.	
	4.12 The Approval Holder shall ensure the inclinometer as proposed within the McPherson Pit Settling Cell 1 tailings pond insitu plug is installed and instrument monitoring has commenced prior to excavating below 1187 metres elevation on the east side of the insitu plug.	
	4.13 Notwithstanding Condition 4.1, a minimum 90 days prior to excavating below 1187 metres elevation on the east side of the McPherson Pit Settling Cell 1 tailings pond insitu plug, or another timeframe specified in writing by the Director, the Approval Holder shall ensure all required designs and supporting information by the Alberta Dam and Canal Safety Directive has been submitted to the Director, for written authorization.	
	4.14 The Approval Holder shall maintain the McPherson Pit Settling Cell 1 tailings pond at a maximum operating level of the lower of either 1187 metres elevation, or a minimum 2 metres of freeboard below the bedrock-overburden interface around the perimeter of the pond.	
	4.15 Notwithstanding Condition 4.9, the Approval Holder shall submit to the Director for written authorization a closure plan, as defined in the *Alberta Dam and Canal Safety Directive,* for the McPherson Pit Settling Cell 1 tailings pond a minimum of 90 days before initiation of placement of material on top of the tailings pond, or another timeframe specified in writing by the Director.	
	4.16 The Approval Holder shall minimize the ponding of water in the McPherson Pit Settling Cell 1 tailings pond via a continuously operated pumping system. The pumping system is to be designed with a capacity enabling rapid removal of water from the tailings pond during and following design storm events, commensurate with the consequence classification of the tailings pond and the approved maximum operating level.	
	4.17 The Approval Holder shall submit the McPherson Pit Settling Cell 1 pumping system details referenced in Condition 4.16 to the Director, by March 31, 2020, or another deadline authorized in writing by the Director, as a Major Works, in accordance with Conditions 3.6, 3.7 and 3.8, for written authorization. The pumping system details are to include, at a minimum:	
	4.18 The McPherson Pit Settling Cell 1 pumping system reference in Condition 4.16 is to be implemented as authorized.	
Water Act Approval 00311965-00-00 (as amended)	N/A	Update to the Source Water Supply Plan
EPEA Approval 00301345-00-00 (as amended)	(jjjj) "treated fine tailings" means the thickener underflow refuse that is to be treated and placed in the McPherson Pit Settling Cell 1, as further described in the application 007-00301345;	
	4.2.3.1 The approval holder shall only contain tailings water from the treated fine tailings process in the McPherson Pit Settling Cell 1 unless an amendment is obtained from the Director.	
	4.2.4 The approval holder shall only place: (b) Treated fine tailings and tailings water in the McPherson Pit Settling Cell 1.	Reference all McPherson Tailings Cells.
	4.2.12.1 The approval holder shall only use AN2340 as identified in application 007-00301345 to treat fine tailings from the thickener refuse prior to placement in the McPherson Pit Settling Cell 1, unless approval amendment is obtained from the Director.	
	4.2.19 & 4.2.20 Three months prior to commencing capping, the approval holder shall submit a Capping Plan and Mine Wastewater Management Program proposal, unless otherwise authorized in writing by the Director.	
	4.2.8 TABLE Mine Wastewater Handling Facilities	Revise C13 (Freshwater Pond #2) from Major Ponds to Ponds That Do Not Directly Release To The Environment.
	TABLE 4.4-A: McPherson Pit Settling Cell 1 Groundwater Monitoring Program	Include Groundwater Monitoring Wells associated with McPherson Tailings Cells 2 & 3

2. Mine Plan and Mining Activities

Adjustments to the Mine Plan are proposed in order to properly and safely operate the McPherson Tailings Cells. These adjustments take into consideration the geotechnical stability assessment for the cell designs, the highwall mining operations, as well as the safety factor for the in-situ plugs. As per condition 6) of the Pit License (C 2001-5C), *the Licensee shall advise the AER of any technical modifications to the mining plan and obtain its approval prior to affecting such modifications.* The Mine is advising the AER of the following modifications to the Mine Plan as part of this Amendment Application.

2.1 McPherson Pit Design and Coal Sterilization

As part of amendment application No. 007-00301345, the Mine incorporated the in-situ plug designs for tailings cells 1 to 7 into the life of mine plan to assess the volume of coal to be sterilized by the in situ ground plugs as required by the Coal Conservation Rules and Pit Licence C2011-5D, clause 12. Mining adjustments to the currently approved Mine Plan for the McPherson Pit series of panels is required to accommodate the geotechnical requirements for the construction and development of the McPherson Tailings Cells and their associated in-situ plugs. The previous application for the McPherson Tailings Cells showed a total of 7 cells being constructed. During the conceptual design of cells 6 & 7 the Mine noticed the top of till / top of rock contact dipped significantly to the east of the reserve causing both cells to have minimal storage capacity. The proposed design was revised by creating 4 cells in this area (cells 6-9). In doing so, the pits were also adjusted to the north due to the southern crop line in the McPherson pits 8 & 9 allowing for additional coal to be mined. A comparison of this revision is shown in **Table 2**, outlining the clean ton equivalency and **Figure 2**, which results in a net increase of 95,000 RAW tonnes being mined.

Table 2 – Clean Ton Equivalent Reserve Comparisons

	2018 Amendment	**McPherson Tailings Cells Application**
Surface	60,655,000	59,315,000
Highwall Mining	12,724,000	12,070,340
Total	73,379,000	71,385,340

This adjustment is made in the normal course of operations and is not anticipated to cause any adverse effect and does not contravene the purpose or intent of the currently approved Mine Plan. Coal sterilization of the in-situ ground plugs are summarized in **Table 3** and can be seen in **Figure 3**.

Table 3 – In-Situ Plug Coal Sterilization	
In-situ Plug #	**Raw Tonnes Sterilized**
P1	238,000
P2	257,000
P3	290,00
P4	267,000
P5	237,000
P6	234,000
P7	226,000
P8	293,000
Total	**2,042,000**

2.2 Highwall Mining

As part of this application Coalspur engaged Barr Engineering & Environmental Science Canada Ltd. (BARR) to review the previously approved McPherson coal seam highwall mining design. As part of this review, BARR reviewed available geology data, knowledge of material strength data from local geology, the desire to minimize long term settlement and the impact of water saturating materials due to the tailing's deposition. From this analysis and design work, BARR recommended increasing the factor of safety to 2.3 versus the previous design of 2.01 to improve long term stability of the highwall and decrease the possibility of long-term settlement. The previous design had a web pillar thickness of 11 meters, a barrier pillar thickness of 37 meters and 20 highwall mining holes in each panel. Coalspur asked BARR to provide design for 305 m, 366 m and 427 m holes shown below in **Table 4**. Coalspur intends on mining the first hole to help determine the optimal depth of cut. Based on these results Coalspur will design the panel based on the design criteria below for depth of cut. Please refer to **Appendix A-1** for BARR's technical memorandum for the highwall mining assessment.

Table 4* - Optimal Design for Long Term Stability – Post Backfill and As-Mined Loading Conditions

Highwall Mining Scenario	Distance from Highwall (m)	Seam Thickness (m)	Weighted Average Cover Density (SG)	Max. Effective Depth at Default Density (m)	Hole Width (m)	Web Thickness (m)	Barrier Width (m)	Total Hole Length (m)	Max. # of Holes per Panel (#)	ARMPS – HMS Stability Factors		
										Web-Only Pillar (SF)	Barrier Pillar (SF)	Overall Design (SF)
Post Backfill Scenarios												
Option 1 – 427 m Full cut Height	427	7.07	2.44	142	3.6	13.5	36.0	127	17	2.3	2.3	2.7
Option 2 – 366 m Full cut Height	366	7.10	2.45	133	3.6	12.5	34.0	366	18	2.3	2.4	2.6
Option 3 – 305 m Full cut Height	305	7.13	2.49	126	3.6	11.7	32.0	305	19	2.3	2.4	2.6
As-Mined Scenarios												
Option 1 – 427 m Full cut Height	255	7.17	2.49	112.9	3.6	13.5	36.0	427	17	3.3	2.8	3.3
Option 2 – 366 m Full cut Height	255	7.17	2.49	112.9	3.6	12.5	34.0	366	18	2.7	3.0	3.1
Option 3 – 305 m Full cut Height	255	7.17	2.49	112.9	3.6	11.7	32.0	305	19	2.5	2.8	2.9

**McPherson Pit Highwall Mining Geotechnical Assessment, Table 5-1 (BARR, June 30 2020)*

2.3 Subcrop Dump

An additional area to the Subcrop Dump will be utilized for out of pit spoil placement just south of the McPherson Pit #2 as shown on **Figure 4**. The dump is within the currently approved Subcrop Dump License boundary. The dump will follow the design parameters within the current Approvals.

3. Construction Summary

Recoverable coal will be removed from the McPherson pits. Once mined out, the Mine will utilize the McPherson Pits for storage and dewatering of coarse and fine plant refuse. **Figure 1** provides an overview of the McPherson Pits to be converted into tailings cells as mining progresses and **Figure 5A - 5H** outlines the conceptual designs for all 8 Tailings Cells. Detailed Tailings Cell Designs and Assessments will be provided to the Director as part of the authorization process as discussed in Section 1.2 and as provided in **Section 4** for the purpose of the authorization request for the construction and operation of McPherson Tailings Cells 2 and 3. Plant refuse will be transported to the active Tailings Cell as a slurry in HDPE pipeline. The initial deposition (inlet of the fine refuse) will start in the Northwest corner in each cell. As the pit fills and the solids settle, recyclable water will be pumped from the Southeast corner of the cells to the freshwater pond and re-used in the Coal Processing Plant (CPP) (**Figures 6A - 6H**). The cells will operate at the lowest possible level, optimizing the recovery of water as well as the dewatering of solids to facilitate the development of strength in the remaining solids to minimize the time needed to become ready for reclamation.

Table 5 outlines the conceptual design details for each cell. The maximum operating volume will be observed in McPherson Tailings Cell 9, reaching 5,200,000 m^3 (**Figure 5H**). A minimum freeboard of 2 m will be maintained within all Tailings Cells, providing capacity before reaching the lowest point of the rock till interface and ensuring a safety factor is maintained in the event of a pump malfunction or extreme weather conditions.

Table 5 – Conceptual Tailings Cell Design

Tailings Cell	Dimension (m)	Tailings Elevation (masl)	Rock/Till contact (masl)	Max Operating Volume (m^3)	Capacity* (m^3)
McPherson Tailings Cell 2	590 x 200 x 36	1,192	1,194	3,200,000	3,500,000
McPherson Tailings Cell 3	777 x 184 x 30	1,186	1,188	3,100,000	3,400,000
McPherson Tailings Cell 4	990 x 234 x 27	1,183	1,185	3,800,000	4,400,000
McPherson Tailings Cell 5	993 x 234 x 24	1,181	1,183	3,900,000	4,400,000
McPherson Tailings Cell 6	674 x 234 x 30	1,171	1,173	2,300,000	2,600,000
McPherson Tailings Cell 7	724 x 234 x 30	1,166	1,168	2,300,000	2,600,000
McPherson Tailings Cell 8	650 x 266 x 35	1,155	1,157	4,500,000	4,900,000
McPherson Tailings Cell 9	654 x 257 x 53	1,150	1,152	5,200,000	5,600,000

**Before reaching the lowest point of the rock till interface*

The Mine will follow the conditions outlined in the Water Act Approval associated with the construction of the McPherson Tailings Cell 1 for all Tailings Cells going forward. The Mine will ensure inclinometers

are installed in the in-situ plugs and monitoring is initiated prior to excavation below the expected tailings elevation level of each cell (**Table 5,** Tailings Elevation Column) on the east side of the plug. The Mine acknowledges that construction of the Tailings Cells is initiated when excavation activities reach below the bottom till contact. Detailed engineering plans and analysis reports for the Tailings Cells as Major Works will be provided to the Director 90 days before the beginning of construction below the bottom till contact and will provide as-built reports within 90 days of completion. The as-built reports will include a detailed topographic survey of the fully excavated tailings cell, to a resolution of 0.1 metre or smaller, prior to initiating the deposition of the tailings material in the Tailings Cells.

4. Operations

4.1 Fill Placement and Duration

Plant refuse material will be pumped to a single operational tailings cell until the cell has reached its full capacity. Once capacity is reached, the following cell will be sequentially activated. Plant refuse material will be pumped through high-density polyethylene (HDPE) lines. Inlet of plant refuse will be located in the Northwest corner of each cells, the furthest point from the water recycling pump, to be located in the southeast corner of the cells (**Figures 6A - 6H**). The water from the McPherson Tailings Cells will be recycled to the Freshwater Pond and re-used in the Coal Process Plant. The maximum operating elevation of the McPherson Tailings Cells will be consistent with the conditions outlined in the Pit License (No. 2014-5C) and Water Act Approval and will not exceed the tailings elevations outlined in **Table 5** and will remain below the till/bedrock geological contact excluding the freeboard requirements. Backfilling will commence once the cells reach their full capacity and geotechnical stability is adequate. Upon meeting the operational capacity as a storage facility, all water will be recycled to the freshwater pond. A geotechnical assessment of the settled solids will be conducted to determine the strength of the materials and the ability to support the weight of reclamation materials to be placed. Slump test results and criteria established with guidance from a geotechnical consultant will be utilized to determine when the tailings are ready for capping.

As per the terms and conditions of the Mine's EPEA Approval, Water Act Approval, and Mine Pit License, a capping plan, including design and geotechnical assessment details, to the Director 3 months prior to commencing capping activities. The Mine does not anticipate more than 3 un-operational uncapped cells for a given period of time.

Table 6 provides the conceptual duration of operation for each cells. The Table outlines the approximate schedule in which each cell becomes active, dependent on the rate of volume being disposed of in a period of time. **Figures 7A - 7H** presents the conceptual monthly volume of tailings refuse deposited for each cell.

Table 6 – Conceptual Deposition Schedule					
Tailings Cell	**Expected Start Date**	**Expected Capacity Date**	**Expected Capping Date**	**Monthly Deposition Volume**	**Monthly Recovered Water Volume**
McPherson Tailings Cell 2	2020-10-01	2021-09-21	2024-03-09	267,000	326,400
McPherson Tailings Cell 3	2021-09-21	2022-03-03	2025-02-19	267,000	326,400
McPherson Tailings Cell 4	2022-09-03	2023-11-09	2026-04-27	267,000	326,400
McPherson Tailings Cell 5	2023-11-09	2025-01-14	2027-07-03	267,000	326,400
McPherson Tailings Cell 6	2025-01-14	2025-09-28	2028-03-16	267,000	326,400
McPherson Tailings Cell 7	2025-09-28	2026-06-13	2028-11-29	267,000	326,400
McPherson Tailings Cell 8	2026-06-13	2027-11-02	2030-04-20	267,000	326,400
McPherson Tailings Cell 9	2027-11-02	2029-06-05	2031-11-22	267,000	326,400

Assumptions and calculations are based upon an anticipated water recover of 70%. Assumptions and calculations are consistent with EPEA Application No. 007-00301345.

4.2 Dewatering and Recycling

Dewatering procedures for the McPherson Tailings Cells 2 to 9 will be consistent with the current dewatering procedure for McPherson Tailings Cell 1. Ponding of water within the uncapped Tailings Cells (active and inactive open cells) will be minimized by continuously operating a pumping system. The pumping system will dewater the open tailing cells and recycle the water back to the Freshwater Pond for re-use in the Coal Processing Plant. As per conditions outlined in the Water Act Approval, the pumping system is designed with the capacity to enable rapid removal of water from the tailings cells during and following design storm events, commensurate with the consequence classification of the tailings cells and the approved maximum operating level. The McPherson Tailings Cells pumping system details are provided in **Appendix B**. In the event of pumping system failure, diesel pumps will be placed within the uncapped cells (where required) and the dewatering procedure will remain the same (water will be pumped to the Freshwater Pond).

70% of water is anticipated to be recovered as sediment settle (**Table 6**). Water recovery assumption and calculation are consistent with the McPherson Tailings Cell 1. The Mine will utilize already approved chemical flocculants and coagulants to enhance settling rates, more specifically, AN2340. SDS documents are available in **Appendix C** for both products. The proposed dosing rate will be consistent with the approved dosing rate associated with the McPherson Tailings Cell 1 (**Table 7**).

Table 7 – Chemical Flocculants

Product Name	Description	Proposed Dosing Rates
AN 2340*	Dry Anionic Polyacrylamide	0.7 kg/t

*Residual or breakdown products which have the potential to accumulate within the recycled water or released to the environment at closure of the cells is not expected.

Due to the insufficient availability of water quality data associated with the tailings cells dewatering process, the Mine is requesting to amend the Freshwater Pond from a Major Pond (releasing to the environment) to a Pond that does not directly release to the environment, as defined in Subsection 4.2.8 of the EPEA Approval. An updated site water balance is provided in **Figure 8** and outlines the closed recycled water system associated with the Freshwater Pond, the tailings cells, and the Coal Processing Plant. The update water balance reflects water usage and losses associated with the operations of the McPherson Tailings Cells 1 – 9. The balance provides the flow calculations for the recycled and freshwater system to be contained within the identified onsite water storage ponds. The Balance also takes into consideration the water associated with the active operating cell and the non-operational not yet capped/reclaimed tailings cells for a given period of time. The updated Source Water Supply Plan is provided in **Appendix D**.

4.3 Surface Water Management

Surface water drainage surrounding the tailings cells will be controlled through a series of ditches and by utilizing the current network of settling ponds. As per the terms and conditions of Water Act Approval 00311969-00-00 (as amended), the Mine will provide detailed engineering plans and analysis reports for all Major Works associated with the Water Management Plan 90 days before the beginning of construction and will provide as-built reports within 90 days of completion. Berms and ditches will be constructed around the perimeter of the tailings cells. This will direct mine affected water to its associated settling pond and minimize the introduction of additional water to the tailings cells. This reconfiguration of the ditches within the McPherson Pit area to accommodate the Tailings Cells will not require design changes. The ditch designs will be in accordance to the current Mine Wastewater Management Plan. As mining progresses east in accordance with the mine plan, the "D" series of settling ponds associated with the McPherson Mine Pits are designed to effectively manage the entire mining footprint.

The conversion of the McPherson Pits into Tailings Cells is not anticipated to change the surface water flow path or water distribution. As such, no changes to the currently approved Mine Wastewater Management Plan and Streamflow Augmentation Plan will be required to accommodate the McPherson Tailings Cells. **Figures 9A – 9K** outlines the surface water flow path of the McPherson Tailings Cells area.

No surface water from the mining areas will be directed to the McPherson Tailings Cells. The tailings cells will only hold water associated with the refuse deposits and precipitation. Water within the tailings cells will be recycled via the Fresh Water Pond, as previously described in **Section 3**.

4.4 Groundwater Management

Coalspur engaged BARR to conduct a groundwater flow model and seepage analysis to determine the groundwater trajectory during the operational and post reclamation phase of the McPherson Tailings Cells. The objective is to understand flow paths and ensure proper mitigation plans are in place if contaminants of concern are expected to seep into the groundwater tables and flow off site. The Bighorn Mining McPherson Groundwater Model Report is available in **Appendix A-2**. The hydraulic impact of the tailings cells was evaluated based on the development of a three-dimensional MODFLOW groundwater model to assess local gradients and flow paths. The study concluded that the groundwater gradient is primarily north to south, toward the proposed tailings cells. The model indicated that significant south to north seepage is not expected through the McPherson coal seam or through the highwall mining excavations. Results of the flow model and seepage analysis confirm that the tailings cells will act as local groundwater sinks, with groundwater flowing towards the cells. As mining progresses east, the model and analysis concluded that water seepage would sequentially flow to the following McPherson Pit/Tailings Cell. Therefore, water from the Tailings Cells is not anticipated to seep into the groundwater to the surrounding environment. The model and seepage analysis takes into consideration the highwall mining activities. The model results conclude seepage is not expected to occur at a significant rate that would negatively impact the structure stability and operation of the cells as well as the Mine's current highwall mining design. Seepage and stability analysis also determined the in-situ plug designs will not be compromised by potential seepage.

5. Geotechnical Assessment

Coalspur intends to utilize the future McPherson Pits for tailings cells with an in-situ plug in between pits/cells. These Tailings Cells are labeled P1-P9 and are shown in **Figure 10A: Regional Geology Map**. The map also shows a cross section of the structure geology for this region. The Mine, with the assistance of BARR, has developed a process to conduct geotechnical testing and analysis on future tailings cells and their in-situ plug materials as mining progresses and tailings cells become readily available. This process will ensure that each tailings cell is adequate for the purpose of fine refuse disposal, settling, and capping and that each in-situ plug meets a factor of safety of 1.5 or higher with future designs. As discussed in **Section 1.2**, detailed designs and analysis will be provided to the Director as part of the authorization process. This Section provides details for the purpose of the authorization request to construct and operate the McPherson Tailings Cells 2 and 3. The process outlined in this Section will be consistent throughout the authorization process for all Tailings Cells.

BARR performed a geotechnical investigation and slope stability study to determine the necessary design criteria (e.g. width and slope geometry) for the McPherson Tailings Cell 2 and 3 and their associated in-situ plugs. The regional stratigraphic chart for this area is shown in **Figure 10B** for the Vista Project Area. The Study confirmed the material and design of the tailings cells 2 and 3 and their in situ plugs are stable and exceeds the minimum recommended safety factor value of 1.5.

See Appendix A-3 for a complete geotechnical design study of the McPherson Tailings Cell #2 and Cell #3

5.1 Geotechnical Design of McPherson Tailings Cell 2 and 3

The geotechnical work performed by Barr Engineering indicated that although specific lithology may locally vary, the general geology within the proposed native ground plugs are consistent in order to develop representative stability analysis models. In general, the native ground material is competent with strength to support proposed native ground plug geometry and exceed minimum recommended factor of safety value of 1.50. Global failures are not anticipated; however, smaller, localized, sloughing events may occur and are more likely in till material on top of the native ground plug and can be addressed through local flattening of slopes if needed.

5.1.1 McPherson Tailings Cell 2 Design

The proposed design for the McPherson Tailings Cell 2 is 590 m by 200 m and 36 m deep (**Figure 5A**). The maximum operating level (also final solids fill elevation) of the pond will be 1,192 masl or 2 meters below the rock till interface. The capacity of the pond at this elevation is 3,2000,000 m^3. The minimum maintained 2-meter freeboard equates to 300,000 cubic meters which will be maintained as a safety factor in the event of a pump malfunction or extreme weather event. A cross section of the geological formations is shown in **Figures 10C** and **Figure 10E** for the McPherson Tailings Cell #2.

5.1.2 McPherson Tailings Cell 3 Design

The proposed design for the McPherson Tailings Cell 2 is 777 m by 184 m and 30 m deep (**Figure 5B**). The maximum operating level (also final solids fill elevation) of the pond will be 1,186 masl or 2 meters below the rock till interface. The capacity of the pond at this elevation is 3,100,000 cubic meters. The minimum maintained 2-meter freeboard equates to 300,000 cubic meters which will be maintained as a safety factor in the event of a pump malfunction or extreme weather event. A cross section of the geological formations is shown in **Figures 10D** and **Figure 10F** for the McPherson Tailings Cell #3.

5.1.3 McPherson Tailings Cell 2 and 3 In-situ Plug Designs

As per the Alberta Dam and Canal Safety Directive, Part 2, Section 2.1 (a) (d) (iv), BARR completed a seepage analysis for the McPherson Tailings Cells 2 and 3 In-situ Plug Designs. Aspects of the seepage analysis, control and drainage are discussed in sections 6.2.1, 7.4, 8.2 and Appendices E and F of the *McPherson Tailing Cell #2 and Cell #3 Design Study (BARR, July 2020)* (**Appendix A-3**). The seepage model was developed utilizing boundary conditions established through the vibrating wire piezometer data and the Mine's planned final tailings deposition elevation. The analysis was completed assuming fresh water as opposed to fine coal refuse to represent a more conservative case. The analysis concluded that a native ground plug that has a minimum crest width of 8.5 meters and is excavated with a downstream slope geometry of 45 degrees, upstream slope of 55 degrees and completed with a toe buttress that covers a minimum of 5 meters above McPherson coal seam or 13 meters high will exceed the minimum recommended factor of safety of 1.50 for static conditions and 1.1 for pseudo-static condition. The toe buttress is recommended to have a crest width of 22 meters, and a 26 degrees slope. **Figures 5A** and **5B** provide the design details for the McPherson Tailings Cell 2 and the McPherson Tailings Cell 3 respectively.

6 Monitoring

6.1 Air Quality

Information and data regarding fugitive emissions, SGRS, GHG and NPRI are still in the collection and analysis phase for the baseline year 1 (2019). *"(p) "first year of commercial operation" in respect of a facility means the year in which the facility first produces a product; "*[1]

GHG and NPRI reporting for year 1 (2019) occurs in Q3 2020. Fugitive emissions data collection from the subject tailings' cells will be collected on an annual basis, as per the Specific Gas Reporting Standard and NPRI starting in Q3 2020. Information collected in 2020 will be compared with the 2019 baseline to predict the increase in potential fugitive emissions over life of mine. The fugitive emissions expected from the tailing's cells are: C02, CH4 and NOX.

Based on current progression timelines the proponent will reach the (potential) maximum fugitive emission threshold in 2022. The maximum number of tailings cells that will be open/uncapped/ active, at one time with the potential for fugitive emissions is 4 cells.

Between 2022 and 2031 it is projected that the fugitive emissions will remain stable or below 2022 values. In 2031 fugitive emissions from the tailing cells will be reduced as the mine moves to closure of the remaining 2 cells.

Coalspur commits to providing an update to the fugitive emissions recorded in cell 1 and projected maximum threshold within 90 days of completing the data collection. This process will be completed by a third party to ensure verification standards are met.

The factors contributing to the expected increases are in direct response to the establishment of the McPherson Tailings cells. The potential for the reduction in fugitive emissions through settling / capping materials will be investigated throughout life of mine.

The air model for the Coalspur Vista Mine is currently being updated to ensure all point source data and required information for SGRS, NPRI and GHG emissions are identified as required. The updated model is anticipated to be complete Q4 2020/ Q1 2021.

6.2 Surface Water

The current Mine Wastewater Management Plan directs mine wastewater within the McPherson Pit Mine Plan area to the "D" series settling pond designates. This series of ponds was designed to accommodate the runoff from the entire set of Val D'or and McPherson series of panels. **Figures 9A – 9K** outlines the surface water flow path throughout the progression of the McPherson Tailings Cells operation. The water from the "D" series settling ponds is monitored and sampled as per the conditions set out in EPEA Approval 00301345-00-00 (as amended). No additional monitoring is proposed for the management of mine wastewater associated with the conversion of the McPherson Pits to Tailings Cells. There are no new release points for the currently approved conceptual drainage configuration and all receiving water bodies are included as part of the Ambient Surface Water Monitoring Plan. The current monitoring and sampling regime will effectively mitigate the potential for negative environmental effects.

6.3 Tailings Water

Water from within the tailings cells will be pumped to the Freshwater Pond and will be re-used in the coal preparation process. The water from the Freshwater Pond is monitored and sampled as per the conditions of the Mine's EPEA Approval. Sampling results from the Freshwater Pond are provided in **Tables 8 - 10**. There will be no changes in material process for the purpose of refuse deposition as part of the proposed development of the following sequential McPherson Tailings Cell 2-9. Therefore, no alteration in the current water chemistry is anticipated.

Table 8 - Statistical Wastewater Monitoring Results Freshwater Pond		
Prior to McPherson Tailings Cell 1 operating (2019 & Q1 2020)		
Parameter	**No. of Samples**	**Average (mg/L)**
Turbidity (NTU)	120	45.72
TSS (mg/L)	62	84.01
pH	56	8.02
Nitrate-N (mg/L)	13	0.32
Nitrite (mg/L)	13	0.05
Nitrate-Nitrite (mg/L)	13	0.34
Ammonia (mg/L)	13	0.14
TKN (mg/L)	13	0.54
McPherson Tailings Cells 1 Operating (Q2 2020)		
Parameter	**No. of Samples**	**(mg/L)**
Turbidity (NTU)	0	N/A
TSS (mg/L)	1	5.3
pH	1	8.16
Nitrate-N (mg/L)	1	0.95
Nitrite (mg/L)	1	0.109
Nitrate-Nitrite (mg/L)	1	1.06
Ammonia (mg/L)	1	0.419
TKN (mg/L)	1	1.75

Table 9 - Toxicological Summary Freshwater Pond			
Prior to McPherson Tailing Cell 1 Operating (2019 & Q1 2020)			
Sample Date	**Rainbow Trout**	**Daphnia magna**	
	LC50	**LC50**	**EC50**
21-May-19	>100	>100	>100
21-Jul-19	>100	>100	>100
14-Oct-19	>100	>100	>100
McPherson Tailings Cell 1 Operating (Q3 2020)			
Sample Date	**Rainbow Trout**	**Daphnia magna**	
	LC50	**LC50**	**EC50**
04-Jul-20	>100%	>100%	>100%

Table 10 - Sampling Guideline Exceedance Summary Freshwater Pond								
Prior to McPherson Tailings Cell 1 Operating (2019 & Q1 2020)								
Sample Date	**Parameter**							
	Chloride (mg/L)			**Selenium – Total (mg/L)**				
2019	371			0.00573				
2019	284			0.00520				
McPherson Tailings Cell 1 Operating (Q2 2020)								
Sample Date	**Parameter**							
	Chloride (mg/L)	**Selenium – Total (mg/L)**		**Barium (mg/L)**		**Sodium (mg/L)**	**TDS (mg/L)**	**Alkalinity (mg/L)**
		Dissolved	Total	Diss.	Total		Calculated	Total
29-JUN-20	1,110	0.00552	0.00639	4.09	4.71	589	1,900	186

The McPherson Tailings Cells are not intended to function as settling ponds as defined in EPEA Approval 00301345-00-00 (as amended). Therefore, the tailings cells are not designed to release directly to the environment and will not be monitored as Major Ponds. The McPherson Tailings Cells will be visually inspected and will be monitored for stability and safety as per **Sections 6.5** and **6.6** below.

6.4 Groundwater

Coalspur engaged Barr engineering to do a seepage analysis study and groundwater flow model to determine the groundwater flow path during the operation of the Tailings Cells. The groundwater flow model and seepage analysis results confirmed that the tailings cells will act as local groundwater sinks, with groundwater flowing towards the cells. Therefore, no water from the tailings cells is anticipated to seep into the groundwater throughout the duration of the operational phase of the cells. Please refer to **Appendix A-2** for further details regarding the groundwater model and seepage analysis.

The material deposited in Tailings Cells 2-9 is the same material deposited in Tailings Cell 1 and formerly into the North Dump Refuse. As outlined in Section 4.0 of the EPEA Approval, the Mine will update and implement the Seepage Monitoring and Mitigation Plan for the McPherson Pit Settling Cell 1, as approved by the Director. For the purpose of comparison, **Tables 11** to **13** provides the groundwater monitoring results of the Groundwater Wells Associated with the McPherson Tailings Cell 1.

To mitigate the potential long-term effects of contaminants seeping into the groundwater and to prevent adverse affect to groundwater quality, Coalspur, with the guidance of Qualified Environmental Professionals (QEPs), has installed groundwater monitoring wells to the south of the McPherson pits and will progressively expand on the network as mining progresses east and tailings cells become available. **Figure 4** in the *Bighorn Mining McPherson Groundwater Model* Technical Memorandum (BARR, July 2020) provides the location of the current groundwater monitoring network installed for the monitoring of McPherson Tailings Cell 1. The expanded groundwater monitoring network will continue to be monitored on a quarterly basis for the parameters currently set for the wells associated with the McPherson Tailings Cell 1 (Table 4.4-A of the EPEA Approval) until an update Groundwater Monitoring Program and Seepage

Control System is approved by the Director. As per Section 4.4.4 of the EPEA Approval, installation and monitoring of this network of groundwater wells will be included and implemented as part of the Vista Coal Mine updated Groundwater Monitoring Program and Seepage Control System to be submitted to the Director on or before November 30, 2020. **Figure 11** provides the conceptual locations of the future groundwater monitoring wells associated with the Tailings Cells.

Table 11 - Q1 & Q2 Groundwater Monitoring Results - Routine Parameters

Routine Analysis		Alkalinity, Total (as $CACO^3$)	Bicarbonate (HCO3)	Carbonate (CO3)	Chloride (Cl)	Electrical Conductivity (EC)	Fluoride (F)	Hardness (as CaCO3)	Hydroxide (OH)	Ion Balance	Nitrate & Nitrite (as N)	Nitrate (as N)	Nitrite (as N)	pH	TDS (Calculated)	Sulfate (SO4)	Diss. Calcium (Ca)	Diss. Magnesium (Mg)	Diss. Potassium (k)	Diss. Sodium (Na)
Units		mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
AB Tier 1 Commercial/Industrial Coarse Grain Guideline		-	-	-	120	-	1.5	-	-	-	-	-	0.02-0.20	6.5-8.5	500	128-429	-	-	-	200
Well ID	Date																			
MP1	25-Feb-20	270	329	<5.0	<0.50	482	0.112	254	<5.0	102	<0.022	<0.020	<0.010	7.53	269	4.2	75.4	17.3	2.33	11
MP2	25-Feb-20	351	428	<5.0	<0.050	596	0.106	149	<5.0	96.7	<0.022	<0.020	<0.010	7.69	363	7.95	42	10.7	2.38	89.1
	17-Jun-20	335	409	<5.0	<0.050	587	0.089	139	<5.0	98.9	<0.022	<0.020	<0.010	7.87	349	5.85	39	10.1	3.07	89.6
MP3	25-Jan-20	1210	1470	<5.0	7.46	1890	1.22	19.7	<5.0	96.3	<0.022	<0.020	<0.010	8.3	**1290**	11.6	5.6	1.4	2.46	**534**
Freshwater Pond Well	24-Jan-20	279	340	<5.0	4.95	495	0.131	273	<5.0	96.2	<0.022	<0.020	<0.010	7.43	294	14.6	81.6	16.9	1.35	6.8

Red Highlighted Rows: MP1 & MP3 were damaged and/or destroyed prior to the Q2 sampling event. Re-installation is scheduled.
Bold Red Text: concentrations exceeding guidelines

Table 12- Q1 & Q2 Groundwater Monitoring Results - Dissolved Metals

Dissolved Metals		Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Cesium (Cs)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Lithium (Li)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Rubidium (Rb)	Selenium (Se)	Silicon (Si)	Silver (Ag)	Strontium (Sr)	Sulfur (S)	Tellurium (Te)	Thallium (Tl)	Thorium (Th)	Tin (Sn)	Titanium (Ti)	Tungsten (W)	Uranium (U)	Vanadium (V)	Zinc (Zn)	Zirconium (Zr)
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
AB Tier 1 Commercial/Industrial Coarse Grain Guideline		0.05	0.006	0.005	1	-	-	1.5	0.00004 - 0.000037	-	0.05	-	0.007	0.3	0.001-0.007	-	0.05	0.000005	-	0.001-0.17	-	-	0.002	-	0.0001	-	-	-	-	-	-	-	-	0.015	-	0.03	-
Well ID	Date																																				
MP1	25-Feb-20	0.0042	<0.00010	0.00067	0.471	<0.00010	<0.000050	0.036	<0.0000050	<0.000010	<0.00010	0.00055	0.00226	0.074	0.000091	0.0068	**0.24**	<0.0000050	0.00258	0.00085	<0.050	0.00137	<0.000050	6.8	<0.000010	0.815	1.33	<0.00020	<0.000010	<0.00010	0.00012	<0.00030	<0.00010	0.00028	<0.00050	0.0065	<0.00020
MP2	25-Feb-20	0.0018	0.00011	0.00072	0.316	<0.00010	<0.00005	0.057	<0.000005	0.000021	<0.00010	0.00015	0.00246	<0.010	0.000072	0.0154	**0.104**	<0.0000050	0.00382	0.00071	<0.050	0.00197	<0.000050	6.21	<0.000010	0.502	2.48	<0.00020	<0.000010	<0.00010	0.00011	<0.00030	<0.00010	0.000495	0.00053	0.0016	<0.00020
	17-Jun-20	0.0026	<0.00010	0.00069	0.308	<0.00010	<0.00005	0.062	<0.000005	0.000024	<0.00010	0.00012	0.00053	0.012	<0.00005	0.0172	**0.0920**	<0.0000050	0.00598	0.00053	<0.050	0.00245	<0.00050	6.16	<0.000010	0.454	2.34	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00030	0.000765	<0.00050	0.0017	<0.00020
MP3	25-Jan-20	0.0042	0.00015	0.00392	0.297	<0.00010	<0.00005	0.193	0.0000102	0.000036	<0.00010	0.00038	0.00589	0.01	0.000236	0.0572	0.0263	<0.0000050	0.0052	0.00145	0.084	0.00279	0.000077	4.1	<0.000010	0.223	4.5	<0.00020	0.000023	<0.00010	0.00063	<0.00030	0.00027	0.000587	0.00051	0.0105	0.00089
Freshwater Pond Well	24-Jan-20	0.0027	0.00011	0.00029	0.0978	<0.00010	0.000053	<0.01	<0.000005	<0.00001	0.00017	0.00059	0.00028	<0.010	<0.000050	0.0042	**0.133**	<0.0000050	0.00106	0.00137	<0.050	0.00032	0.000311	6.46	<0.000010	0.252	6.78	<0.00020	<0.000010	<0.00010	0.00065	<0.00030	<0.00010	0.00183	<0.00050	**0.0348**	<0.00020

Red Highlighted Rows: MP1 & MP3 were damaged and/or destroyed prior to the Q2 sampling event. Re-installation is scheduled.
Bold Red Text: concentrations exceeding guidelines

Table 13 - Q1 & Q2 Groundwater Monitoring Results - Total Metals

Dissolved Metals		Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)	Nickel (Ni)	Potassium (K)	Selenium (Se)	Silver (Ag)	Sodium (Na)	Uranium (U)	Zinc (Zn)
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
AB Tier 1 Commercial/Industrial Coarse Grain Guideline		-	0.006	0.005	1	1.5	0.00004 - 0.000037	-	0.05	0.007	0.3	0.001-0.007	-	0.05	0.000005	0.001-0.17	-	0.002	0.0001	200	0.015	0.03
Well ID	Date																					
MP1	25-Feb-20	1.08	<0.00010	0.00131	0.515	0.035	0.0000365	73.2	0.00144	0.00370	**1.37**	0.00201	17.4	**0.268**	<0.000005	0.00237	2.08	<0.000050	0.000014	10.1	0.000856	0.0127
MP2	25-Feb-20	86	0.00035	**0.0389**	**2.28**	0.077	**0.00265**	246	**0.176**	**0.345**	**201**	**0.0999**	74.3	**4.22**	**0.0000143**	**0.282**	11.2	0.00151	**0.00148**	89.4	0.00964	**0.623**
	17-Jun-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MP3	25-Jan-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Red Highlighted Rows: MP1 & MP3 were damaged and/or destroyed prior to the Q2 sampling event. Re-installation is scheduled.
Bold Red Text: concentrations exceeding guidelines
- Denotes not applicable/available

6.5 Stability

Monitoring of the McPherson Tailings Cells will consist of both visual inspections and analysis of pore pressure measurements. Daily visual inspections will be performed when filling activities are being performed. These general inspections will look for unusual conditions such as slumping, sluffing, and erosion. The deposition of solids and the placement of the inlet pipe will also be assessed at this time. Monthly recorded inspections will be performed by the Engineering Department for subsidence, erosion, or slumping. Vibrating Wire Piezometers have been installed to monitor pore pressures within the currently constructed in situ ground plug (plug 1) and within the future plug 2 and 3. **Figure 4** in the *Bighorn Mining McPherson Groundwater Model* Technical Memorandum (BARR, July 2020) provides the location of the current Vibrating Wire Piezometer network installed for the monitoring of McPherson Tailings Cell 1, 2, and 3. Piezometers will be installed to monitor the future sequential in-situ plugs prior to the construction of the following plugs.

Stability monitoring will be in accordance with the Water Approval conditions for Dam and Canal Safety and will follow the Operations, Maintenance and Surveillance Plan. Monitoring will also be in accordance to the Pit License (No. 2014-5C) conditions. The geotechnical performance of the tailings material within the Tailings Cells will be assessed and submitted on a quarterly basis to the Director. The Mine will notify the AER of any geotechnical instabilities associated with the McPherson Tailings Cells.

6.6 Safety

Coalspur and Barr have worked together to determine the initial consequence classification as Significant based on the matrix provided in the Safety Directive. Section 7.2 of the *McPherson Tailing Cell #2 and Cell #3 Design Study* (BARR, 2020) (**Appendix A-3**) summarizes the evaluation of the potential consequences of failing for the in-situ plugs. External slope movement of the downstream slope of the active cell will be monitored with the installation of a in place inclinometer that will measure, monitor, and alert the operations of any deformation (movement) of the in-situ plug. A comprehensive slope stability analysis examining material strengths, concluded that the native ground plug factor of safety for all the credible scenarios exceeds the minimum required factor of safety of 1.50.

Safety standards will be in accordance with the Water Act Approval conditions for Dam and Canal Safety and will follow the Emergency Management Plan and the Dam Safety Management Plan submitted to the AER for McPherson Tailings cell #1.

Access to the McPherson pits will be controlled by the installation of berms that meets the requirements of the Occupational Health and Safety Act 539(3)(a).

7 Reclamation

7.1 Tailings Cells Reclamation

Once refuse has been deposited to the maximum elevation and all water recycled, a geotechnical assessment of the settled solids will be commissioned. The purpose of the assessment will be to determine the capacity of the solids to support the earthen cap and material required to achieve the post mining reclamation profile. Slump test results and criteria established with guidance from a geotechnical consultant will be utilized to determine when the tailings are ready for capping. Expressed water will be pumped into the following active McPherson Tailings Cell. For the final McPherson Tailings Cell 9, expressed water will be pumped to the freshwater pond.

Suitable overburden, as defined in the EPEA Approval as amended, will be utilized as capping material. Capping depths of suitable overburden will adhere to current reclamation conditions of a minimum average depth of 1.0 m. It is expected that the fine coal refuse will perform differently with regards to long term settlement and consolidation. All material placed or relocated during the mining process, including spoil and tailings, will experience some degree of consolidation and settlement. This different behavior of the tailings, compared to the spoil, will need to be understood in order to properly meet reclamation objectives.

The degree to which the fine coal refuse tailings will consolidate is dependent upon the following factors:

- Grain-size distribution;
- Density;
- Water content; and
- Permeability.

Coalspur intends on performing consolidation testing in the McPherson tailings cell material to better understand the settlement and consolidation. To reduce the amount of settlement and help with the consolidation of material, Coalspur plans on utilizing the dense overburden rock from the Valdor on the initial lifts for capping the McPherson Tailings Cells.

Settlement Assessment

Since Coalspur has only recently implemented the tailings settlement approach to manage the fine coal refuse, the primary opportunity for understanding material behavior will be observation and testing of Cell #1. Additionally, Coalspur will build upon the knowledge base while operating and observing the performance of the subsequent cells during the life of the project. This will allow for the opportunity to ensure that an optimal reclamation landform is designed and implemented that will mitigate long term settlement. With an aim to ensure management of long term settlement, Coalspur will implement the following practices through various stages of McPherson Tailing Cell development:

- Consolidation Laboratory Test – fine coal refuse samples can be collected for testing to calculate the degree of consolidation due to an applied load. This test could be completed for varying initial water content and applied loads to try and understand the differential consolidation that can

occur as additional material is deposited within the cell and spoil is placed over the top the cell. Dependent upon the degree of accuracy to be obtained, similar testing could be conducted on planned capping and spoil material as well.

- Visual Observation – upon completion of Cell #1, it may be beneficial to allow the tailings to sit in place for a period of time prior to capping attempts. This will allow for additional solution to displace above the tailings, allowing for pump back collection (pump any settled water back to active cell). The timeframe will also allow Coalspur to observe if the tailings are visually consolidating with respect to the pit slopes.

- Quantitative Deformation Monitoring – in addition to continued visual observation, Coalspur will implement various monitoring methods to quantify the amount and rate of deformation. The challenge of each method will be in the timing of implementation and the understanding that the baseline condition will change over the life span of the facility through final reclamation following completion of Cell #9. A nearer term challenge will be determined when the surface is stable to the point that personnel and/or equipment can access the tailings surface.

    - GPS Survey – upon completion of the tail placement, at locations were personnel can safely access the edge of the tail, survey points could be collected at specific points.

    - Settlement Monument – depending on timing, these could be installed within the tailings when it is safe to access, or within and through the capping and spoil material in order to determine if there is settlement within the subsurface material.

    - UAV Survey – this approach can be completed in place of the first two items presuming accurate survey control for the UAV survey data. This would allow for the analysis of the elevation across the tailings and reclamation surface with subsequent flights over time.

    - Settlement Modeling – depending upon the degree of observed conditions, following collection of consolidation properties from a number of samples and observed settlement rates, a computer simulation(s) can be developed in order to conduct forward modeling of potential final landforms upon the tailings cells to assess predicted settlement magnitudes.

Settlement Mitigation and Management

Using the consolidation test results as initial guidance, the reclamation landforms can be designed and constructed with additional material that will account for consolidation of the underlying tailings. This is similar to providing settlement allowance associated with an embankment dam by over-constructing the crest elevation. Understanding that material consolidation will also occur within the overlying spoil, by over-placing material during the initial construction this will mitigate the potential need to complete additional earthwork in the future to re-construct the final topography.

As previously discussed, the ability to observe performance of the initial tailings cells will provide the capability for Coalspur to incorporate the lessons into the long-term reclamation plan. The observations will allow changes to be concurrently incorporated into the reclamation which should minimize the potential for substantial modifications upon completion of the final tailings cell.

The Mine's EPEA and Water Approval as well as the Pit License 2014-5C outlines terms and conditions for the reclamation of McPherson Tailings Cell 1. The Mine will apply these reclamation standards and conditions for all McPherson Tail Cells. Three months prior to commencing capping, a Capping Plan (including a backfill design and supporting geotechnical stability analysis) and Mine wastewater Management Program proposal will be submitted to the Director. The Mine will also submit to the Director a plan for decommissioning or for the closure and abandonment of the in-situ plugs in accordance with the *Alberta Dam and Canal Safety Directive and Manual 019: Decommissioning, Closure, and Abandonment of Dams at Energy Projects* 12 months before performing any decommissioning or closure activities and 12 months before beginning capping activities at any of the Tailings Cells.

Upon reaching the desired elevations and slopes, topsoil will be placed as described in the EPEA approval followed by revegetation. **Figure 12** provides the conceptual reclaimed ecosite design for the tailing cells and surrounding area. Details of the reclamation process and application is provided in the updated conceptual Progressive Reclamation Plan (**Appendix D**).

7.2 Surface Water Reclamation

As described in **Section 4.3,** surface water drainage surrounding the tailings cells will be controlled through a series of ditches and by utilizing the current network of settling ponds. The reclaimed surface water trajectory for the McPherson Tailings Cells area will be similar to the current reclamation plan, allowing surface water to flow within the watershed and towards its associated McPherson Creek (and tributaries). Figure 3 of the *Vista Mine Progressive Reclamation Plan (*Coalspur, 2020*)* (**Appendix D**).

During operations and closure of the Mine, the groundwater and surface water will be managed so that water draining from the reclaimed tailings cells area meets EPEA Approval standards. As such, it is anticipated that water quality conditions at closure for aquatic features within the tailings cells area will be similar to pre-project conditions. To ensure mitigation measures are effective however, a monitoring program is implemented throughout the duration of the Mine. At closure, a sustainable system of watercourses and wetlands will be developed to manage groundwater and surface water. Consequently, while the topographical characteristics of the final closure landscape are the result of the mine plan, the surface details will be configured to meet the requirements of a sustainable surface water drainage system.

7.3 Groundwater Reclamation

A post-reclamation groundwater flow model was complete by BARR to determine the expected groundwater trajectory and predicted elevation of re-established water table beneath the landform. Sections 3.2 and 3.3 of the *Bighorn Mining McPherson Groundwater Model* Report discusses the post reclamation modeling scenarios and Section 4.0 discusses post-mining groundwater flow path outcomes (**Appendix A-2)**. The post closure model predicts that the re-established groundwater flow direction will be from the reclaimed McPherson Tailings Cells towards the McPherson Creek. This is consistent with the baseline trajectory and end land use objectives.

As reclamation of the McPherson Tailings Cells progresses and the groundwater trajectory and elevations re-establish, the groundwater monitoring network and mitigation plan discussed in **Section 5.4** will capture data from the reclaimed landform and will assist in understanding of the potential long-term effects of contaminants associated with the McPherson Tailings Cells. At this time, groundwater quality is expected to be consistent with the current groundwater quality conditions of the Mine site. It is not anticipated to have an adverse effect to the receiving water bodies (McPherson Creek and McLeod River).

7.4 Progressive Reclamation Plan

The introduction of the McPherson Tailings cells will delay reclamation of the McPherson Pits as well as require planned out of pit dump space to be utilized early in the mine sequence. This will also result in more soil being placed in stockpile and less soil direct placed. A revised Progressive Reclamation Plan reflecting these changes is required as part of this Application.

The current conceptual Progressive Reclamation Plan was submitted as part of EPEA Application No. 004-00301345 (April 2018) and was approved as part of EPEA Approval Amendment 00301345-00-03 effective January 11, 2019. Due to the changes in mining operations and progress, the current reclamation outcomes (e.g. topography and closure drainage plan) as well as schedule and timeline have been adjusted and are not reflected in the current conceptual Progressive Reclamation Plan. An updated conceptual Progressive Reclamation Plan is provided in **Appendix D.**

Changes to the current conceptual Progressive Reclamation Plan includes:

- Increase in disturbance area due to infrastructure development;
- North Dump License boundary and design;
- Accelerated progression of the Centre Dump, accelerated soil conservation storage;
- The use of the McPherson Pits as tailings cells for mine refuse;
- Increase in soil stockpiles and decrease in direct placement;
- Increase in the End of Mine Suitable Spoil Stockpile volume
- Increase in wetland complexes within the Val D'Or pit and a decrease in reclaimed steep slope topography (a more gently post-reclamation topography)

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By email only

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Coalspur Mines (Operations) Ltd. (Coalspur) – McPherson Tailings Cell Amendment Application Nos. 1929395, 1929396, and 1929397 under the *Coal Conservation Act* (CCA); *Environmental Protection Enhancement Act* (EPEA) Application No. 010-00301345; *Water Act* (WA) Application Nos. 007-00311969 and 006-00311965

Dear Mr. Shaw,

The Alberta Energy Regulator (AER) has reviewed CCA Application No. 1929395, 1929396 and 1929397, EPEA Application No. 010-00301345, and WA Application No. 007-00311969 and 006-00311965 to construct McPherson Tailings Cells 2 to 9, and the associated modifications to the surface water and groundwater management infrastructure.

The AER hereby approves the construction and operation of McPherson Tailings Cells 2 and 3 only, and the modifications to the associated surface water and groundwater management infrastructure. This is reflected in the issued permit, licences, and approvals (referred as approvals herein) under the CCA, EPEA, and the WA. Enclosed are amended Coal Mine Permit No. C 2011-5G, Pit Licence No. C 2014-5D, Subcrop Dump Licence C 2014-6B, North Dump Licence C 2014-7E, Coal Processing Plant Approval C 2011-3F, EPEA Approval No. 00301345-00-10, WA Approval No. 00311969-00-08, WA Licence No. 00311965-00-03. The AER does not support the approval of tailings cell 4 to 9 at this time for the following reasons:

- The previously approved McPherson Tailings Cell 1 required Coalspur to assess and validate whether the operational tailings properties met the expected geotechnical, geochemical, and environmental reclamation criteria to support future applications of tailings cells 2 through 9. The data submissions lacked the field verification and evidence necessary to enable a fulsome consideration of the additional tailings cells (4 through 9).

- Coalspur provided supplemental information and lab data from samples taken from its thickener underflow to support Coalspur's claim that the required hydraulic barrier is sufficient to minimize seepage from their tailings cells. The AER requires further verification through field sampling and testing from Cell 1, and additionally Cell 2 and 3, in order to support Coalspur's claim that long-term seepage into McPherson Creek, and surrounding tributaries, will be effectively minimized as to have no adverse effect on the aquatic life.

In order to achieve the final reclamation outcome and to support future tailings cells application(s), the AER requires Coalspur to conduct further data and sample collection, field testing and verification, monitoring, and mitigation strategies. This is reflected in the issued approvals.

Further, the AER requires Coalspur to closely monitor water quality and quantity in the tailings recycle water system to inform the need for a treatment and release system to ensure protection of the receiving environment.

The AER notes that Coalspur has expressed a desire to utilize a combination of runoff water, groundwater, and fresh water to dilute the tailings recycle water to meet the regulatory limits for discharge to receiving streams. The AER does not support this approach for the following reasons:

- The tailings recycle water is a wastewater stream with inherently different properties from runoff water and groundwater. There is insufficient data currently available to determine if the regulatory limits for the discharge of runoff and groundwater would sufficiently address contaminants of concern present in the tailings recycle water stream.

- Coalspur's proposed approach is equivalent to a dilute and pollute-up to strategy. This is inconsistent with the principle of effective pollution prevention and control.

- Coalspur's proposed approach is inconsistent with existing provincial policy. Specifically, the *Industrial Release Limits Policy* (AEP 2000), which requires the consideration of the more stringent of technology based and water-quality based limits to be considered.
    - There is insufficient evidence to support a dilution strategy. More specifically, it is questionable if there would be sufficient "clean" water available to dilute tailings recycle water within a reasonable timeframe to meet current regulatory limits.

As a result, the AER is maintaining conditions requiring Coalspur to provide a plan for the treatment and release of tailings recycle water. The AER recognizes that it is Coalspur's intent to maintain water within the closed-loop circuit until the end of mining. However, in recognition of the potential need for the release of water at an earlier date, the previously mentioned plan must be submitted at an earlier stage to prepare for future releases. The construction and operation of a water treatment and release system for tailings recycle water would not be required until such time that the release of treated tailings recycle water is undertaken.

Note, additional closure requirements exist under the following AER legislations:

- **Consent for Abandonment of Mine** as per the *Coal Conservation Rules Section 12* (https://www.qp.alberta.ca/1266.cfm?page=1981_270.cfm&leg_type=Regs&isbncln=9780779781355), and
- **Project Closure** as per *the Mine Financial Security Program (https://static.aer.ca/prd/documents/liability/MFSP_Standard.pdf*).

If you have any questions contact Irene Chia at 403-297-7202 or Irene.Chia@aer.ca.

Regards,

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