Great Bear Gold Project -

Review of the Impact Statement (IS)

prepared for:

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Introduction

In 2026, Kinross Gold and Great Bear Resources submitted a large Impact Statement (IS) for mining of the Great Bear gold deposit. This Impact Statement consists of dozens of numbered sections and lettered appendices, cumulatively reaching tens of thousands of pages, with many different authors and completion dates.

Major Irrefutable Errors, Major Irreconcilable Contradictions, and Major Conflicting Misconceptions in the Great Bear Impact Statement

This MDAG document reviews relevant sections and appendices of the Impact Statement, showing that there are major irrefutable errors, major irreconcilable contradictions, and major conflicting misconceptions. These major problems invalidate this Great Bear Impact Statement to the point that it is not possible to understand how the Great Bear mining operation intends to reliably manage contamination and safely protect the surrounding environment including Dixie Creek and the Chukuni River. Put simply, the Great Bear Impact Statement is self-contradictory on major, primary issues, contains self-generated irrefutable errors that nullify and void the Impact Statement, and fails in its objectives to identify and mitigate serious adverse impacts.

Major Errors on Water Flows and Water Balance at Great Bear

Nevertheless, there is sufficient information to conclude that contamination at Great Bear will be much more serious than stated in the Impact Statement. This includes high-contaminant acid rock drainage (ARD) that will appear faster, likely within years of starting, than several portions of the Impact Statement believe. This also includes underestimations of water flows and water quality such as the seriously and erroneously underestimated mercury, methylation, and sulphate. Therefore, the Great Bear Impact Statement underestimates the numbers, extents, and severities of impacts that can be expected at the Great Bear Project.

Simulated Groundwater Flows in the Impact Statement are Contradictory and Nonsensical

The Great Bear Impact Statement is clear that groundwater is a critical part of the Great Bear water balance and associated water quality. However, simulations and estimates of groundwater flows and directions in the Impact Statement are contradictory and nonsensical. Thus, the mining-impacted water balance and associated water quality at Great Bear are unreliable and reasonable estimates remain unknown. This is consistent with other sections of this MDAG document explaining additional self-contradictory and irrefutable errors that render the Impact Statement useless for reasonably estimating impacts and the corresponding optimum mitigation measures to minimize impacts.

Mercury Predictions of Methylation and Concentrations are Based on Mutually Exclusive and Contradictory Mechanisms Not Typical of Most Waterbodies around the World That Yield the Lowest Possible Methylation

Grassy Narrows First Nation should be aware that the Mercury Study in Appendix T of the Impact Statement used geochemical and hydrogeologic methods that underestimated the severity of mercury, methylation, and sulphate issues at the Great Bear Project and in the Chukuni River system. Some methods in Appendix T literally contradict other portions of the Impact Statement and are not typical of most waterbodies around the world. Mercury concentrations and methylation can literally be orders of magnitude worse and higher than reported and predicted in Appendix T of the Great Bear Impact Statement.

Design of the Great Bear Site Creates High Probabilities of Extreme, Uncontrolled, Toxic Spills

Depending on the selected design and selected cost for environmental protection at the proposed Great Bear Project, extreme events like massive storms will lead to spillage and release of contaminated water from ponds, ditches, and mine wastes into the surrounding environment. The environmental receivers of the toxic water include Dixie Creek, other surrounding surface waterbodies, the Chukuni River, and subsurface groundwater.

Such spillages would include strongly toxic contact water including acid rock drainage (ARD). With all the major and irrefutable errors explained in this MDAG review, toxic releases and spillages may also occur more frequently and during more moderate events at Great Bear.

Therefore, the current Great Bear design criteria of the 20-year return period for construction and the 100-year return period for operation and closure, which Great Bear inaccurately says is “typical” in Canada, statistically means:

- There is a ~15% probability of at least one toxic release and spillage substantially damaging surrounding ecosystems and possibly the Chukuni River during ~3 years of construction, but this could be more frequent due to the major errors in the Great Bear water balance.
- There is a ~25% probability of at least one toxic release and spillage substantially damaging surrounding ecosystems and possibly the Chukuni River during ~26 years of operation, but this could be more frequent due to the major errors in the Great Bear water balance.
- Over each 100 years after the start of proposed mining, and continuing through likely centuries of water treatment, there is a 100% probability of one toxic release and spillage during each century that would substantially damage surrounding ecosystems and possibly the Chukuni River. This could be more frequent due to the major errors in the Great Bear water balance. However, the Impact Statement explains that, after ~26 years of mining and ~4 years of closure, all water-treatment infrastructure at Great Bear would be removed, allowing all contaminated water to flow passively and unabated to Dixie Creek, other waterbodies, and groundwater. Because all contaminated water at Great Bear is then flowing into the environment, there would no longer be a concern over a spill once a century. Such a long-term toxic scenario is not allowed at other Canadian mines with long-term toxic near-neutral water and ARD as predicted by Great Bear for Great Bear.

Therefore, the Great Bear Impact Statement is designed to allow repeating toxic releases and spillages with substantial environmental impact, while at the same time ignoring no long-term risks and major closure costs because toxic water will no longer be managed and will simply flow into the environment. The Great Bear site can be redesigned and re-costed to eliminate this nonsensical scenario.

Major, Self-Contradictory Errors That Grossly Underestimate Water-Quality Degradation, Contamination, and Metal Leaching and Acid Rock Drainage (ML-ARD) in the Great Bear Impact Statement

There are major, self-contradictory errors in the prediction of water quality, contamination, Metal Leaching and Acid Rock Drainage (ML-ARD) in the Great Bear Impact Statement. As a result, there are no reliable estimates of contamination and appropriate mitigation, but it is clear that the contamination and water-quality degradation would be substantially worse than stated in the Impact Statement.

Some of these errors include:

- Despite some parts of the Impact Statement saying prevention of ARD is an objective and that water treatment would be stopped about four years after Closure, several other parts of the Impact Statement show high-concentration, toxic ARD will drain from Great Bear mine wastes before Closure, likely within a few years accounting for errors, and thus continue for many decades to centuries after Closure. This inevitable ARD should trigger onerous provincial and federal regulations and long-term financial bonding of Great Bear likely for hundreds of millions of dollars.

- The estimation of water quality and resulting impacts at Great Bear is only half done because (1) only dissolved concentrations have been predicted for all on-site contaminated "contact" water and (2) suspended and total concentrations are needed for comparison to water-quality objectives as the Impact Statement emphasizes. The dissolved half that has been predicted already grossly underestimates reasonable full-scale contamination at the Great Bear site.

- Many standards and objectives for the receiving environment are intended for full-scale sites and conditions. For example, it is nonsensical to compare dissolved concentrations leached from 1 kg laboratory-based samples to full-scale total-concentration PWQOs (Water Quality Objectives), which the Impact Statement recognizes but then compares them anyway in hundreds of places in text, tables, and figures.

- There is a critical failure in the Great Bear Impact Statement to identify and assess all likely and expected toxic contaminants. As a result, the Great Bear Impact Statement does not fully identify important contamination and thus fails to safely protect the surrounding environment including Dixie Creek and the Chukuni River.

- It is alarming that Great Bear would calculate erroneous reaction rates of contamination and then state they are "very low" and "low" with no proof or verification. This gives the false impression that full-scale dissolved-water-quality degradation would be low and not always detectable from background levels at Great Bear. In reality, contaminant release at Great Bear will be "typical" based on the International Kinetic Database with 707 cells from 91 sites around the world, plus 93 columns. The typical rates can produce high and serious water contamination, like at the nearby Madsen and RLO Mines, with no corresponding planning at Great Bear to safely minimize and control the underestimated yet foreseeable degradation of water quality.

- Upon detailed inspection, the Great Bear Impact Statement shows there are significant amounts of additional data on contamination and ML-ARD that have not been released. This includes (1) important missing test results in 2025 and (2) revisions of years-old certified Certificates of Analyses by deleting unknown numbers of samples and analyses from review and inspection.

- Critical information that could likely confirm that Great Bear overburden is highly contaminating, like its rock and tailings counterparts, is missing because it is "under construction" and "in progress". This is an serious failure of the Great Bear Impact Statement because impacts and applicable mitigation cannot be assessed when the critical information to identify impacts is "in progress".

- The Great Bear Impact Statement should reliably scale-up small-scale information, like from 1 kg samples, to the full-scale of around 100,000,000,000 kg, and confirm the scaled-up results with intermediate-scale tests. The Impact Statement fails to do this in any reasonable and sensible way. Instead, the Impact Statement scales up by not following realistic common-sense approaches. Thus, all full-scale predictions of dissolved contamination and ML-ARD in the Impact Statement are grossly underestimated.

<u>Great Bear Chose to Only Partially Treat Its Contaminated Water to Take Advantage of Money-Saving Dilution in the Chukuni River, But Substantially Underestimated (1) the Contamination That the Three Treatment Systems Would Release to the Chukuni River and (2) the Contamination and Fatal Flaw Caused by Their Treatment Wastes</u>

The Great Bear Impact Statement proposes to only partially treat its contaminated water with three water-treatment systems and then take advantage of dilution in the Chukuni River to lower its still-contaminated concentrations in mg/L further by increasing contaminant loadings in kg/day in the River. Therefore, reliable estimated impacts on the Chukuni River by Great Bear's effluents are critical for safe environmental protection. However, the Great Bear Impact Statement fails greatly by underestimating its treated-effluent's impacts due to:

1) the release of additional but ignored contaminants causing additional but ignored impacts, and
2) the release of substantially higher levels of contaminants than the estimated impacts are currently based on.

As a result, impacts of the Great Bear Project after water treatment, including in the Chukuni River, would be substantially higher than given in its Impact Statement. In turn, there is no way to identify reliable mitigation for the higher unpredicted contamination or whether any sufficient mitigation is available at all.

As further evidence, the two single pages in the Impact Statement on which water treatment, and thus impacts to the Chukuni River, are based explain clearly that the stated predictions of treatment at Great Bear in the Impact Statement:

- "do not reflect actual conditions",
- require additional verification by Great Bear,
- are "preliminary" in places,
- are "based on experience" of someone somewhere with no confirmation of relevance to Great Bear,
- will worsen with increasing influent concentrations, and
- are missing critical input parameters like temperature.

Because Great Bear has chosen to depend on water treatment to protect the environment including the Chukuni River, these two pages show that estimated impacts in the Impact Statement based on treatment are very likely wrong and underestimated. Thus, the Great Bear Impact Statement fails to reliably identify impacts and mitigations that would occur at the Great Bear site and in the Chukuni River.

Additionally, the planned unsafe handling and disposal of hazardous water-treatment wastes at Great Bear ensure the treatment waste will further contaminate the surrounding environment beyond that estimated in the Impact Statement. For the treatment waste from Membrane Filtration, there is a fatal flaw that would preclude Great Bear from being built and operated as designed in the Impact Statement.

<u>Failure of the Great Bear Impact Statement to Reliably and Reasonably Estimate Water-Quality Impacts, including Mercury and Sulphate, by Fugitive Contaminated Dust and Air Emissions as Part of IAAC Condition 8.6.2 of the federal Tailored Impact Statement Guidelines</u>

The Great Bear Impact Statement fails to reliably meet IAAC Condition 8.6.2 in the federal Tailored Impact Statement Guidelines for water-quality impacts by fugitive contaminated dust. The Great Bear response to "potential changes in water quality" by fugitive dust were said to be presented in "Key Text" "S[ection] 7.7", "Ap[pendix] K-2", and "Ap[pendix] K-3" according to Appendix A-2.

Key Text Appendix K-2 fails to mention "dust" at all.

Key Text Section 7.7 contains a major error with air-quality emission rates of several contaminants like mercury and arsenic estimated to be <u>lower</u> during operation than during construction. This is not reasonable because Great Bear operation after construction would create hundreds of wind-exposed hectares with hundreds of millions of tonnes of mine waste including intentionally unsaturated fine-grained tailings, overburden, and blasted, reactive mine rock. Even at the current significantly underestimated rates in the Impact Statement, the Great Bear site would likely release much more than 0.47 kg of mercury/year and 1.5 tonnes of arsenic/year <u>due to fugitive air emissions</u>

alone.

The final Key Text of Appendix K-3 addresses water-quality impacts of fugitive air emissions by (1) not explaining the source of the primary deposition rate and (2) explaining the levels of the many contaminants in dust were determined by a laboratory analytical method not capable of measuring many of these contaminants. Thus, the air emissions used in the Key Text of Appendix K-3 are up to orders of magnitude lower (up to ~50,000 times lower) than the air emissions stated in Key Text of Section 7.7, which is another self-contradicting error in the Impact Statement. Furthermore, much higher emission rates are predicted for other contaminants like cyanide, SiO_2, and SO_2 with SO_2 capable of converting to acidity and sulphate deposited into waters and soil that might stimulate methylation. Realistic impacts of these contaminant loadings in air emissions on water quality and terrestrial toxicity remain grossly underestimated in the Impact Statement and could be orders of magnitude worse than currently estimated.

1. Introduction

For approximately two years, Dr. Kevin Morin of the Minesite Drainage Assessment Group (MDAG) has been asked by the Grassy Narrows Lands Protection Team of the Grassy Narrows First Nation to review and comment on issues related to environmental contamination, ML-ARD (metal leaching and acid rock drainage), and hydrogeology for the proposed Great Bear Gold Project. The Great Bear Project is owned by Kinross Gold (Kinross) through Great Bear Resources (Great Bear).

In 2026, Kinross and Great Bear submitted a large Impact Statement (IS) for mining of the Great Bear gold deposit. This Impact Statement consists of dozens of numbered sections and lettered appendices, cumulatively reaching tens of thousands of pages, with many different authors and completion dates.

This MDAG document reviews relevant sections and appendices of the IS, showing that there are major irrefutable errors, major irreconcilable contradictions, and major conflicting misconceptions. These major problems invalidate this Great Bear Impact Statement to the point that it is not possible to understand how the Great Bear mining operation intends to reliably manage contamination and protect the surrounding environment including Dixie Creek and the Chukuni River.

Nevertheless, there is sufficient information to conclude that contamination at Great Bear will be much more serious than stated in the Impact Statement. This includes high-contaminant acid rock drainage (ARD) that will appear faster, likely within years of starting, than several portions of the IS falsely believe. This ARD will likely continue at Great Bear for many decades to centuries after Closure, requiring long-term water treatment and secure financial bonding on the order of hundreds of millions of dollars. This also includes underestimations of water flows and water quality such as the seriously and erroneously underestimated mercury, methylation, and sulphate. Therefore, the Great Bear Impact Statement grossly underestimates the numbers, extents, and severities of impacts that can be expected at the Great Bear Project.

2. Major Irrefutable Errors Invalidating the Great Bear Impact Statement

2.1 The Nature and Likely Origin of the Major Irrefutable Errors in the Great Bear Impact Statement

For technical matters in an impact statement, there can be debatable disagreements and differing opinions that may represent one or more errors. For the Great Bear Impact Statement (IS), it is much worse.

The Great Bear IS contains major irrefutable errors among its own sections and appendices created by the authors of those sections and appendices. These self-contradicting errors are irrefutable because they are created by the IS authors themselves and are embedded in the IS by Great Bear itself. Such a failure often reflects the lack of a central authority to ensure that several tens of thousands of pages adhere to a central list of information, data, and assumptions consistently followed by all authors, appendices, and sections.

It is important to note that these major irrefutable errors are not necessarily errors within a certain section or appendix, although there are certainly these types of errors as shown in sections below of this MDAG review. Instead, these major irrefutable errors occur among multiple sections and appendices making differing, contradictory, and mutually incompatible statements and assumptions. These irrefutable errors are difficult to identify because many sections and appendices have to be compared "side by side". An identified impact in one section or appendix has to be traced through other sections and appendices to search for contradictions.

Because the Great Bear Impact Statement contradicts itself on major issues related to contamination and environmental impacts, this Impact Statement is unreliable, ambiguous, and unable to identify optimum mitigation for the contradictory impacts. Put simply, the Great Bear Impact Statement is self-contradictory on major, primary issues, contains self-generated irrefutable errors that nullify and void the Impact Statement, and fails in its objectives to identify and mitigate serious adverse impacts.

2.2 Major Irrefutable Errors in the Great Bear Water Balance Invalidates All Estimates of Water Flows and Associated Qualities

A large environmental focus of the IS is the water balance including flows of surface waters and groundwaters on and off the Great Bear property. By extension, this water balance affects the water qualities of the many surface, subsurface, natural, and managed flows. As a result, a significant error in the water balance, such as shown below, also invalidates estimates of water quality at Great Bear:

> "There is a pathway effect from groundwater quantity (Section 7.5) and surface water flows and levels (Section 7.6) to water quality. Changes in groundwater quantity, and surface water flows and levels may affect water quality." (Section 7.7.1.1 of the Impact Statement)

As a reviewer, my emphasis is on clarity and simplicity in my comments wherever possible. However, the following examples of irrefutable errors in the IS will be confusing and perplexing and mystifying, because that is how the information exists in the Great Bear Impact Statement. I cannot clarify or simplify or understand these errors despite my 48 years of studying water balances and water quality at minesites.

The Great Bear IS divides the surface watersheds during Operations Phase into 15 "project watershed areas" (Table 4-10, Appendix I-2, WSP 2025a), although subsurface groundwater does not match these surface watersheds and can flow unhindered among them. The largest surface watershed contains the Tailings Management Facility (TMF), given Watershed ID #101, with an area of 522 hectares (Figure 2-1). Across the approximately 26 years of mine operation, this TMF watershed #101 has the highest individual water inflows, water losses, and discharges (Appendix B, Detailed Annual Water Balance Result, of Appendix I-2). This watershed, combined with the smaller TMF Pond #102 at 121 hectares that captures and returns TMF water to the Process Plant, provides the largest surface area targeted for water treatment (Figure 2-2).

Due to planned repeated round-and-round recycle and reclaiming of water (Figures 2-3 and 2-4), there would be large amounts of water with rising contaminant concentrations passing through TMF #101 and into the TMF Pond #102 beyond the amount simply from precipitation. This recycle water is associated with slurried wet-tailings disposal of "desulphurized tailings" in the TMF using excess water.

The water quality in the TMF and TMF Pond is adversely affected by major contamination released by the desulphurized tailings and the recycling water, including among the highest predicted levels of aqueous sulphate at Great Bear. Excess water from the TMF and its Pond that cannot be reused in the process is sent for treatment to the special "Membrane Filtration" (Figures 2-3 and 2-4), which has its own major problems (see MDAG Section 7 below). After treatment, this membrane-treated water would be combined with additional still-contaminated water from the other Water Treatment Plant (WTP, Figures 2-3 and 2-4), and then pumped into the Chukuni River for disposal by dilution. The handling and management of the treatment wastes is even more alarming (Section 7 below).

Due to all the linkages in the water balance (Figures 2-3 and 2-4), errors in water flows in any major watershed like the TMF and its Pond lead to errors in flows throughout the Great Bear site. In turn, this also creates errors in water quality by changing the flow rates through the various contaminant sources like tailings.

Because so much excess water is sent to and recycled through the TMF, most of the slurried tailings would be relatively wet with a high internal water table that rises above the surrounding natural water table. This hydraulic gradient would drive contaminated tailings water downward through the tailings, throughout the lateral extent of the TMF, and into the surrounding natural groundwater system and environment. This situation is typical of many wet-slurry tailings impoundments around Canada.

Here is where the major irrefutable errors create irreconcilable confusion in the water balance in the Great Bear Impact Statement. The vertical seepage moving downward across hundreds of hectares of tailings should represent a major portion of the TMF water balance. But it does not in the Great Bear Impact Statement.

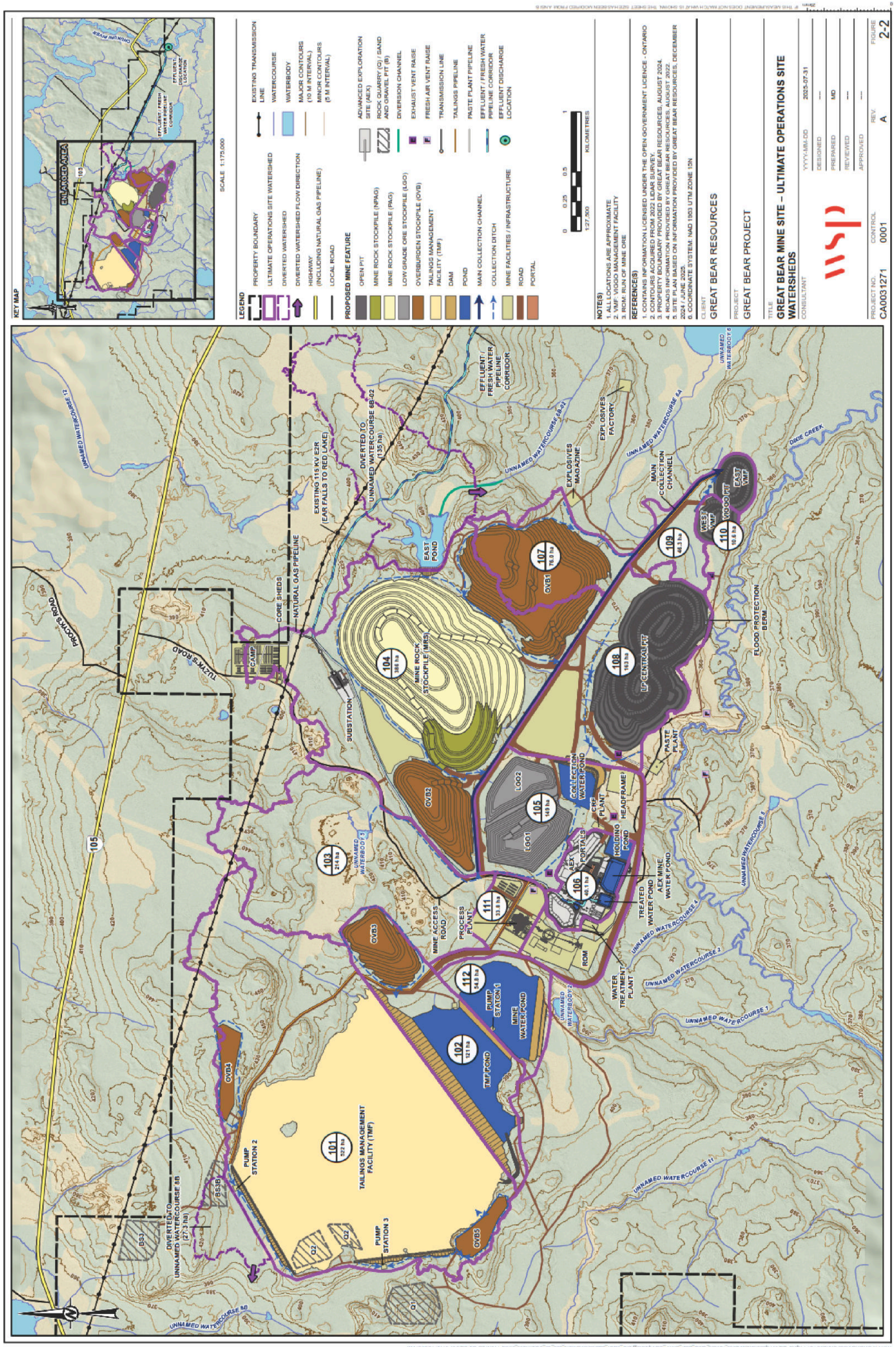


Figure 2-1. Map of Great Bear ultimate surface watersheds during operation with the large Tailings Management Facility (TMF) Watershed #101 and TMF Pond #102 on the right (copy of Figure 2-2 from Appendix I-2, WSP (2025a)).

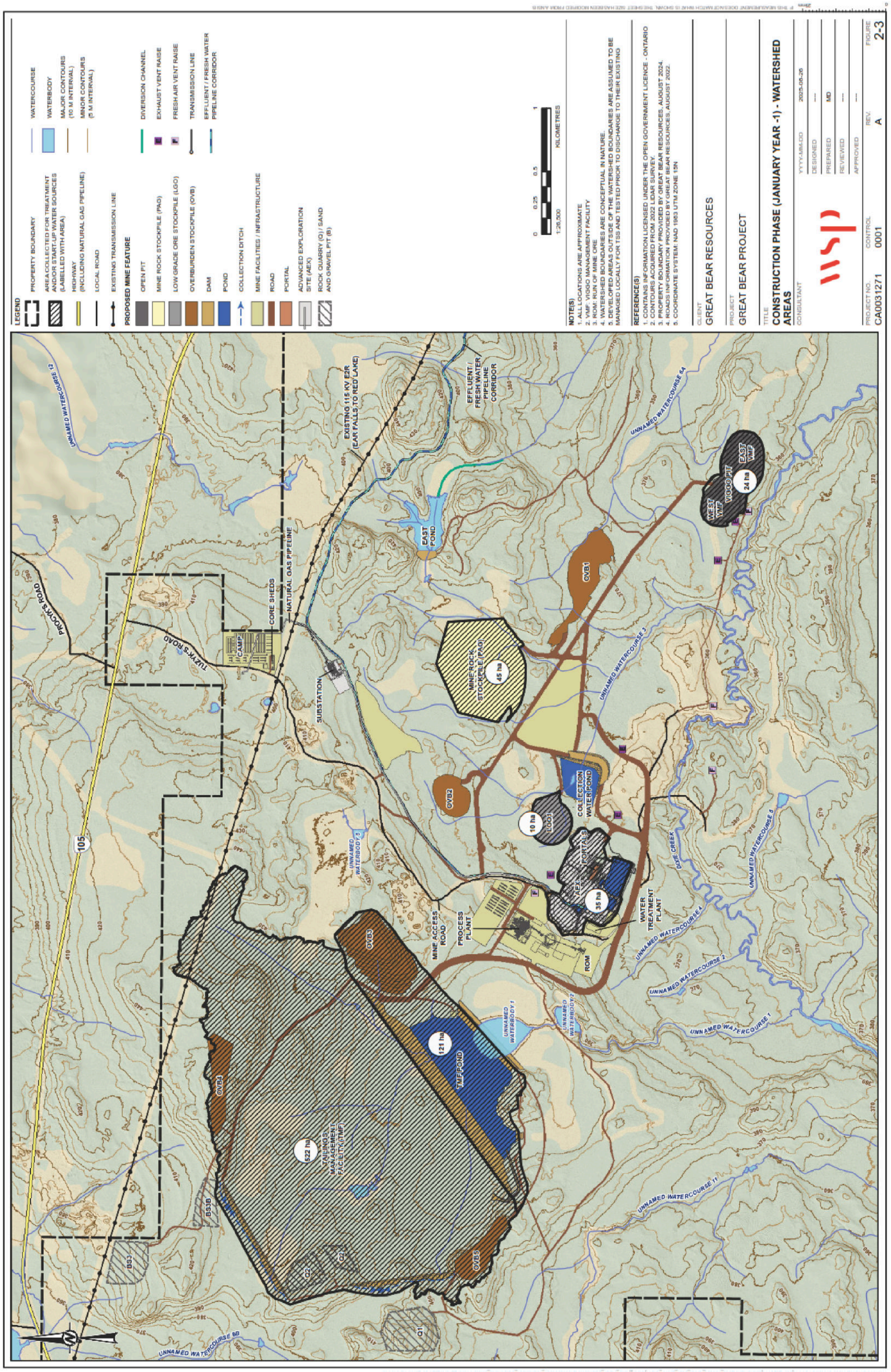


Figure 2-2. Map of Great Bear ultimate surface watersheds during operation with the watersheds targeted for treatment marked by diagonal lines (copy of Figure 2-3 from Appendix I-2, WSP (2025a)).

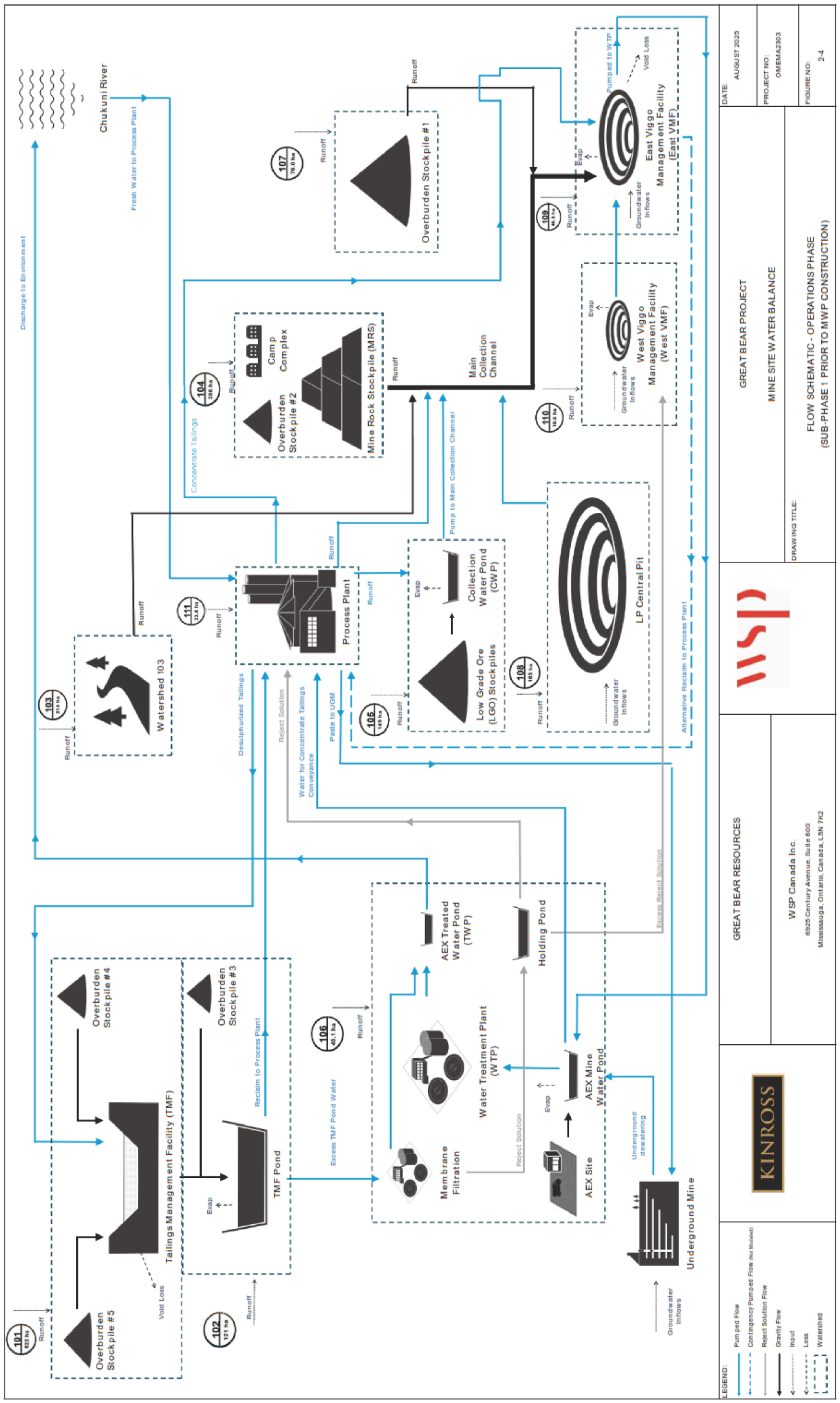


Figure 2-3. Schematic diagram of complex flow paths and interactions among the surface watersheds during Sub-Phase 1 of operation (copy of Figure 2-4 from Appendix I-2, WSP (2025a)).

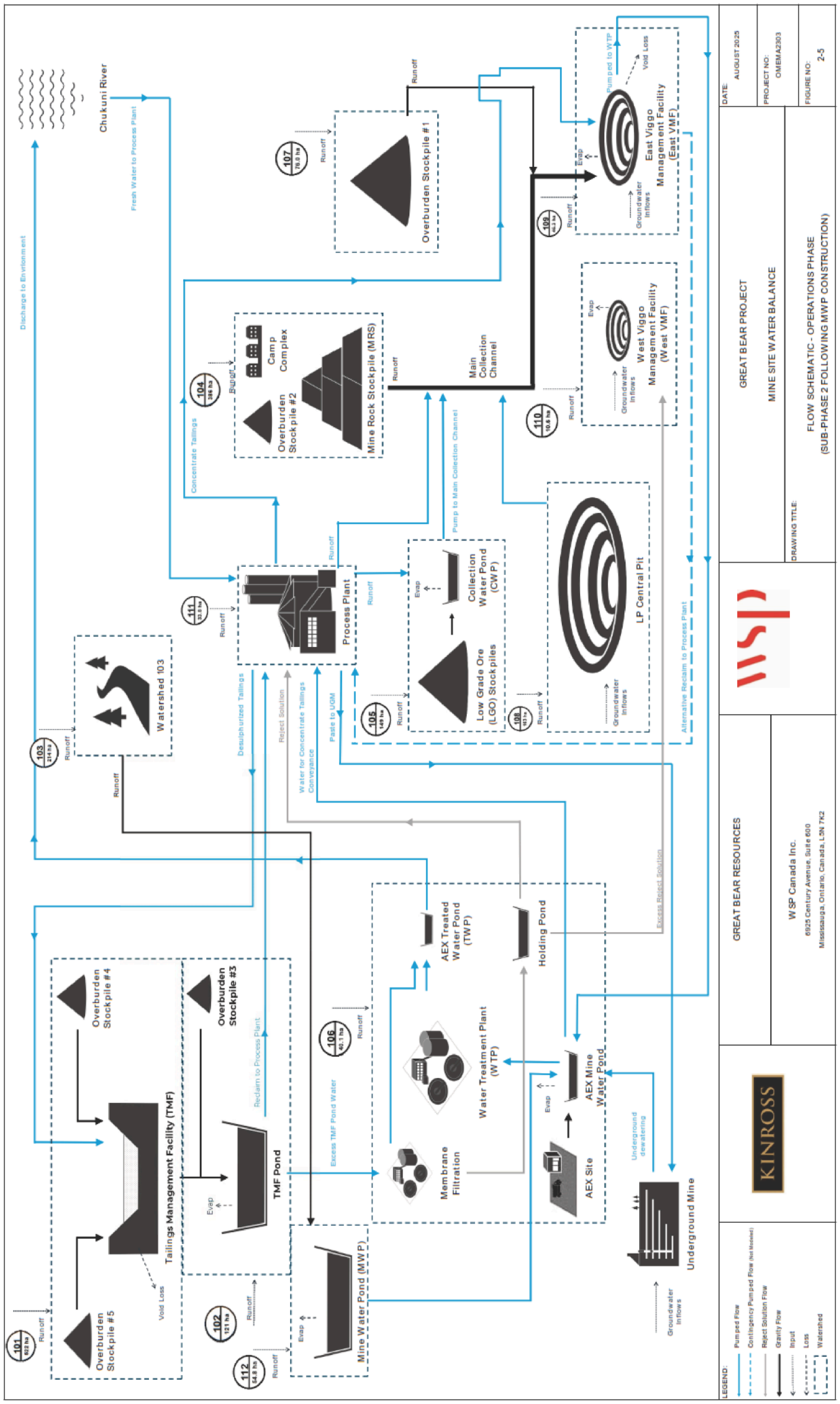


Figure 2-4. Schematic diagram of complex flow paths and interactions among the surface watersheds during Sub-Phase 2 of operation (copy of Figure 2-5 from Appendix I-2, WSP (2025a)).

Instead, various sections and appendices of the IS contradictorily say:

1) there is no seepage through the tailings except at the edges where shallow pumps and ditches will somehow capture seepage "to the extent feasible",
2) abundant water is "trapped" in the tailings during deposition and remains immobile and saturated (as "void losses") and thus the internal water table will be high and the water does not leave the TMF, and
3) the water table will be near and below the base of tailings meaning, there will be no trapped immobile water as "void losses" and the tailings would be free draining.

Each of these explanations in the IS significantly affects the water balance differently. Which, if any, is reasonable for Great Bear, and which ones must therefore be dismissed as contradictory errors in the IS? There is no way to know for sure but the IS contains many different explanations and justifications.

Table 4-2 of Appendix H-2 (Great Bear Project Groundwater Modelling Report, WSP (2025b), shows the saturated hydraulic conductivity used in Great Bear groundwater modelling is $2.4x10^{-6}$ m/s. Under a downward unit hydraulic conductivity across ~300 hectares of tailings, the seepage would be 622,000 m^3/day and 227,000,000 Mm/yr. This seepage is about 100,000,000 times (one hundred million times) higher than the total amount of water passing through the TMF and TMF Pond annually in Appendix B of Appendix I-2, which means that the TMF would have no significant amount of contaminated water left in it to recirculated and most of it would escape to the environment. Therefore, there are tremendous discrepancies and errors between the Great Bear general water balance of Appendix I-2 and the Great Bear groundwater model of Appendix H-2 (more are discussed below in Section 3 of this MDAG review).

This calculated major ongoing draining of the Great Bear tailings as seepage, and the corresponding major loss of water to the environment from the TMF, are compatible with the low water table depicted near and below the tailings in Appendix H-2 (Figure 2-5). However, this draining is not possible according to Appendix I-2. Appendix I-2 shows a significant amount of water in the TMF is trapped and held immobile within the deposited, fully saturated tailings, accumulating through time in the TMF as "void losses" and not "seepage":

> "As tailings are deposited in the TMF and east VMF, void space within them is anticipated to trap water, acting as a loss term to the water balance."

These void losses represent ongoing water that is not released as seepage to the environment and thus has no environmental impact. Appendix B of Appendix I-2 shows that void losses consume and render immobile up to approximately two-thirds of the total runoff in the TMF, and thus is the major "consumption" of TMF water that consequently has no impact.

Although Appendix I-2 considers tailings porewater "trapped" and immobile, Appendix H-2 calculates an average seepage rate from tailings of 1,290 m^3/day (Table 4-4 of Appendix H-2). This water will be highly contaminated including among the highest sulphate concentrations predicted in the Great Bear Impact Statement.

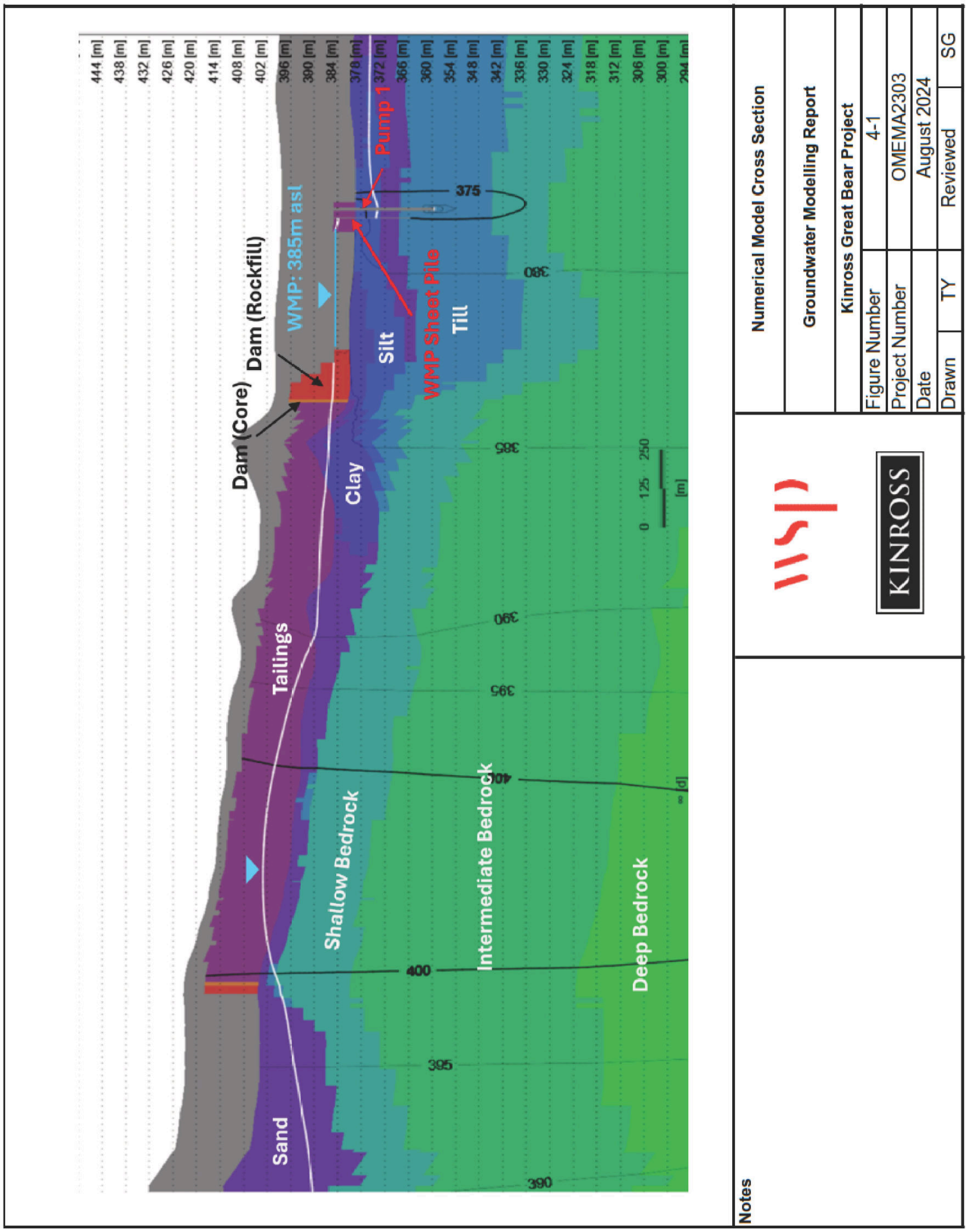


Figure 2-5. Vertical hydrogeologic cross-sections showing the water table near and below the base of the tailings indicating the tailings are mostly dewatered, contradicting other appendices explaining abundant water in the tailings porespaces (Figure 4-1 from Appendix H-2, WSP (2025b)).

Of the average of 1,290 m^3/day, most (~71%) during operation will supposedly be captured by Pump Station 1 only about 30 m deep because all the groundwater anomalously flows laterally to it with no vertical movement (see the right side of Figure 2-5). This is due to grave errors in the Great Bear groundwater modelling that overestimates the amount of contaminated water drawn into pumps, ditches, and the mine for many years to decades instead of the environment, as explained in Section 3 below of this MDAG review.

Nevertheless, even with this major incorrect underestimation, still 12.5% of this highly contaminated TMF seepage will reach Dixie Creek and other waterbodies during operation. In reality, we can reasonably expect nearly all contaminated water to reach Dixie Creek and other waterbodies for at least many years to decades, perhaps continuously, during mine operation. In any case, upon closure, Appendix H-2 predicts 100% this contaminated TMF seepage will indeed enter Dixie Creek and other waterbodies.

2.3 Summary

Because the Great Bear Impact Statement contradicts itself on major issues related to contamination and environmental impacts, this Impact Statement is unreliable, ambiguous, and unable to identify optimum mitigation for the contradictory impacts. Put simply, the Great Bear Impact Statement is self-contradictory on major, primary issues, contains self-generated irrefutable errors that nullify and void the Impact Statement, and fails in its objectives to identify and mitigate serious adverse impacts.

3. Many Grave and Major Errors in the Great Bear Groundwater Model That Grossly Underestimate Impacts on Dixie Creek and Other Waterbodies

3.1 Introduction

As explained in the previous section of this MDAG review, the Great Bear Impact Statement (IS) is self-contradictory on major, primary issues, contains self-generated irrefutable errors that nullify and void the Impact Statement, and fails in its objectives to identify and mitigate serious adverse impacts. This is caused by various appendices and sections using differing and contradictory information, data, and assumptions. For example, Appendix H-2 (WSP, 2025b) containing the Great Bear groundwater model shows significant flows of highly contaminated tailings seepage draining from the TMF, whereas some other IS documents do not, as explained above in Section 2. Additional major errors are found upon review of individual IS appendices and sections, as show here and in the following sections.

This section examines the estimated and modelled subsurface groundwater flows at and around Great Bear during mining as presented in Appendix H-2 (WSP, 2025b). Groundwater and the science of hydrogeology can sometimes be complex due to:

1) groundwater's movement in three dimensions, and
2) this movement varying dynamically through time, such as daily fluctuations during and after storms, seasonal fluctuations with changing temperatures and precipitation, and longer fluctuations due to climate change.

However, the major errors in Great Bear simulated groundwater are relatively easy to understand, helped by a bit of technical explanation. These have been pointed out for years to Great Bear (e.g., MDAG, 2024 and 2026a), but Great Bear continues to ignore them and thus grossly underestimates the impacts on groundwater, surface-water flows. and water quality. For example, simulated groundwater in the Great Bear IS assumes conditions like:

1) permanently steady and never changing water table and flows during operation,
2) water flows through hard, intact rock is just like water flows through sand and soil, and
3) the water pumped out of the Great Bear mine from the surface down to a depth of ~1500 m (~1.5 km) does not have significant impacts on shallower groundwater in the shallower rock.

3.2 Groundwater Flowing through Hundreds of Meters of Hard Intact Bedrock around Great Bear Is Simulated As If Groundwater Were Flowing Through Sand or Soil

Most people would understand that pouring a bucket of water onto the top of a large block of hard intact rock would produce different results than pouring a bucket of water onto a pile of sand or soil. Sand and soil are considered "porous media" with lots of individual grains and lots of porespaces between the grains. Hard intact bedrock is not a "porous medium" but instead has some cracks ("fractures") in it that may allow some water to pass through. The Great Bear Impact Statement has simulated and predicted groundwater movement under and around Great Bear, to depths of ~1500 m (1.5 km), as a porous medium (Appendix H-2, WSP, 2025b).

Great Bear considers all its rock to be an "equivalent" porous medium (EPM), although during mining it must blast and shatter this rock to remove it. Appendix H-2 states:

> "These numerical groundwater flow models consider 3D steady-state flow conditions and implement an Equivalent Porous Media (EPM) approach, which is deemed sufficient for characterizing the overall groundwater flow regime at the scale of this analysis."

First, while the groundwater flow models "consider" only steady-state conditions, they actually allow non-steady "transient" modelling that Great Bear has failed to do (see Section 3.4 below).

Second, Great Bear simply "deems sufficient" without proof, evidence, and testing that all Great Bear hard intact bedrock is an EPM. I would not "deem it sufficient" because I know hard intact bedrock is different than sand and soil.

Third, if such an approach is used to characterize "the overall flow regime at the scale of this analysis" at Great Bear as stated, then by definition smaller-scale estimates are not necessarily reliable. This unreliability and thus likely erroneous flows around Great Bear include:

1) the all-important amount of water lost from Dixie Creek and other waterbodies causing impacts (see MDAG Section 2 above), and
2) the critical pumped flow from the Tailings Management Facility (TMF) to water treatment and then into the Chukuni River.

The third point on the unreliability and inaccuracy of the Great Bear groundwater model to estimate flows at specific locations around the site was emphasized elsewhere by WSP (2025d), but not in the Impact Statement. WSP (2025d) carefully explained the significant limitations of the Great Bear groundwater model used for Advanced Exploration and then for mining in the IS:

> "The regional [groundwater] model used was designed to simulate drawdown and dewatering for the AEX Program underground over a large area and included several simplifications in terms of layering, parameter assignment and grid density to allow it to operate efficiently at a regional scale and was not intended for use to simulate relatively small shallow features as the AEX Program water management ponds... Furthermore, the model simulated dewatering of the ponds in a steady state condition, which will not capture higher inflows from the release of water from groundwater storage during initial dewatering, nor seasonal variations. As such, the model has a number of limitations, in addition to those described in WSP modelling report (2024), in terms of the accuracy of predictions for small scale features such as the ponds, and the predicted dewatering rates should be viewed as approximate values only."

Thus, the Great Bear IS confirms that all detailed location-specific (as opposed to "overall") groundwater balances and groundwater predictions can be unreliable and even erroneous, confirming the same conclusion reached in MDAG Section 2 above. Additional examples of these inaccuracies and errors in the model are discussed in Sections 3.3 and 3.4 below, summarized in Section 3.5.

3.3 Equivalent Porous Medium (EPM) As Assumed for Great Bear Rock Creates a Large "Drawdown Cone" During Mining to Depths of ~1500 m

As explained in Section 3.2 above, the Great Bear Impact Statement "deemed sufficient" that all rock was an equivalent porous medium (EPM). In addition to the errors linked to this in Section 3.2, this assumption created another grave error in the IS.

When water is being pumped from the Great Bear underground workings to depths of ~1500m, this dewatering down to 1500 m will create an EPM "drawdown cone" that would grow to many kilometers in lateral radius near the surface and will dewater rock to depth of 1500. This concept of drawdown cones is illustrated in Figures 3-1 to 3-5 taken from hydrogeologic literature.

Despite this common knowledge of drawdown cones to the bottom elevation in EPMs, which would be up to 1500 m deep for Great Bear, the Great Bear Impact Statement ignores this. Instead, Appendix H-2 of the IS discusses only ~32 m of maximum drawdown and only in the shallowest upper layer of mine wastes, overburden, and bedrock to ~100 m depth (Figure 3-6).

This is a major error in the Great Bear IS. As diagrams like Figures 3-1 to 3-5 show, the EPM drawdown cone at Great Bear would be up to 1500 m deep and would eventually grow to many kilometers in radius extending outward in all directions from the nearest underground workings (Figures 3-6 and 3-7). This would strongly draw water downward from the water table including the TMF and from Dixie Creek and other waterbodies much more than currently predicted. This also would substantially increase the water pumped from the workings, increase the amount of treated water sent to the Chukuni River, and increase the water required for sufficient flow supplementation in creeks and waterbodies.

Due to the extent of the Great Bear underground workings (Figure 3-7):

1) The EPM drawdown cone at Great Bear would initially be small with little effect so that contaminated seepage would flow to Dixie Creek and other waterbodies, possibly for many years to decades if at all but no one can say (see the next Section 3.4 about steady-state modelling) which is opposite of predictions in the Impact Statement saying only 12.5% of contaminated TMF seepage will reach Dixie Creek and other waterbodies.

2) The EPM drawdown cone at Great Bear could eventually extend under the entire TMF and to Genessee and Gullrock Lakes depending on transient conditions that remain undefined (see Section 3.4 below), pulling water downward deep into the ground contrary to Great Bear modelling that strictly shows relatively minor lateral flow as depicted in Figure 3-6 copied from the IS.

3) The EPM drawdown cone may never develop fully, or much at all, during the 26 years of mining depending on transient conditions ignored and not modelled by Great Bear (see the next Section 3.4). This would allow 100% of contaminated water such as from the TMF to continuously reach Dixie Creek and other waterbodies, which is predicted by the Impact Statement after closure and underground pumping ceases.

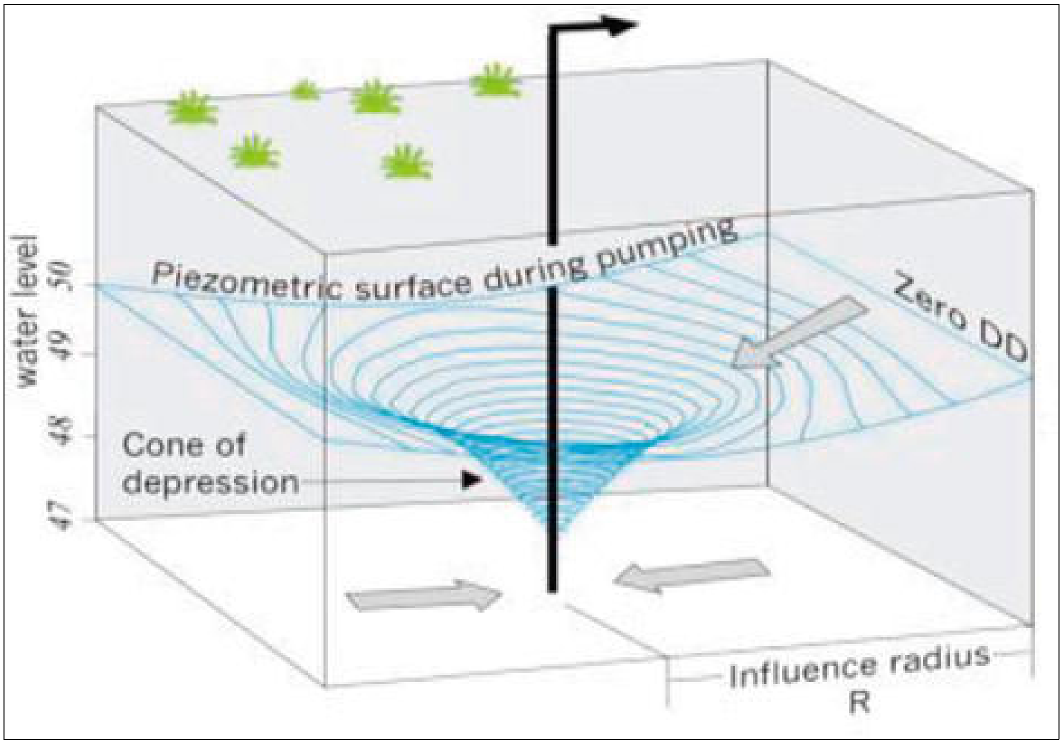


Figure 3-1. An example of a drawdown cone in a porous medium caused by deeper pumping (from Kumar Soni, 2019).

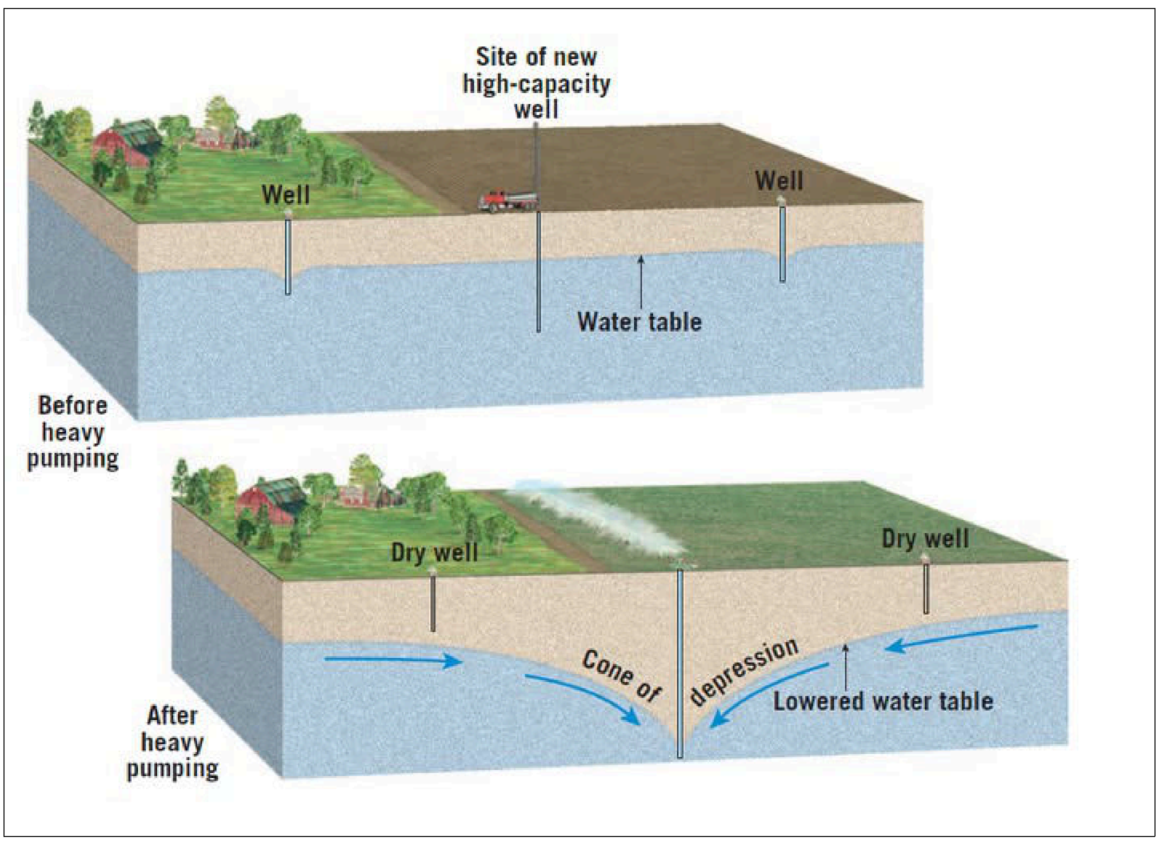


Figure 3-2. An example of a drawdown cone forming after pumping of deeper water begins (from Engineering Geology Facebook Page).

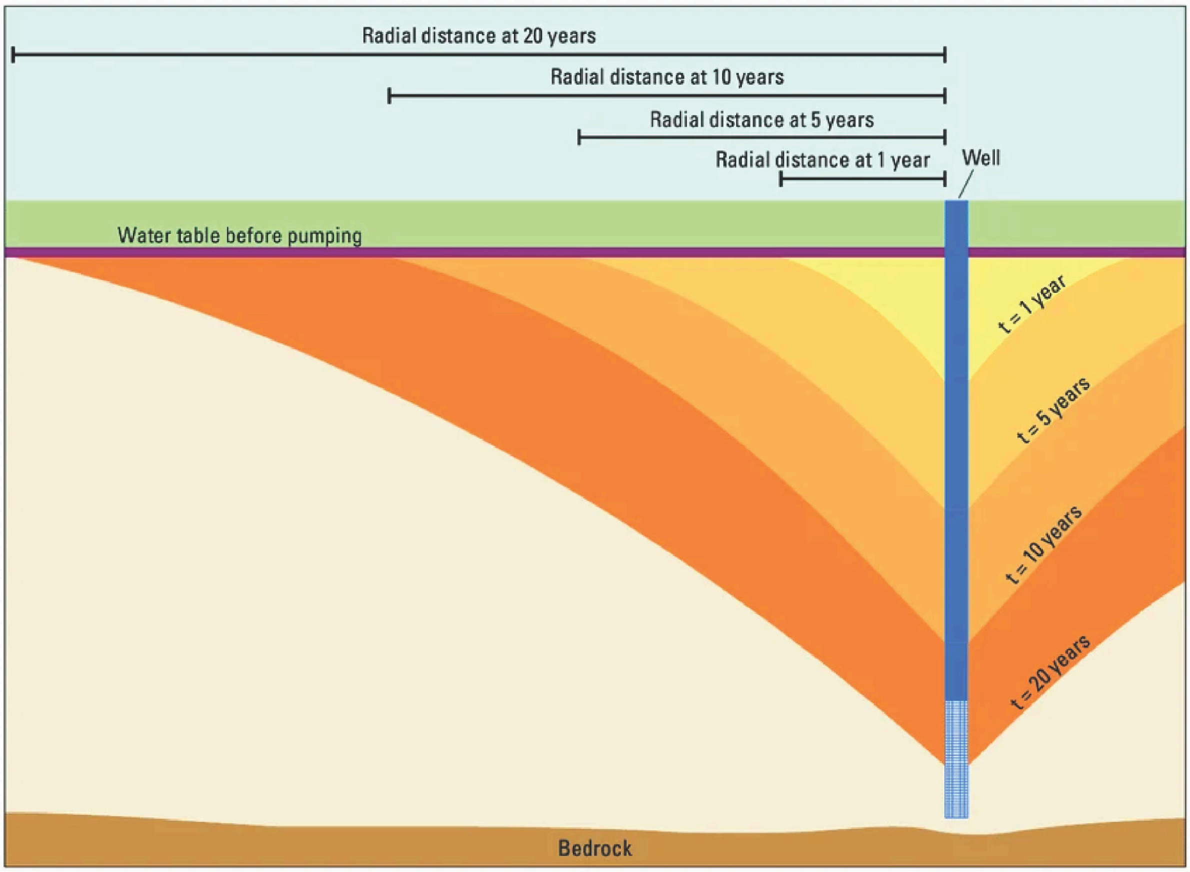


Figure 3-3. An example of a vertical cross-section through a drawdown cone as it grows with time as pumping continues (from Adkins and Bartolino, 2012); the Great Bear Impact Statement should show the huge Great Bear drawdown cone forms immediately to a depth of ~1500 m and to its undefined maximum lateral extent based on steady-state modelling, but the Impact Statement ignores this huge drawdown by erroneously showing only ~32 m of drawdown in shallow rock, overburden, and mine waste (see Figure 3-6).

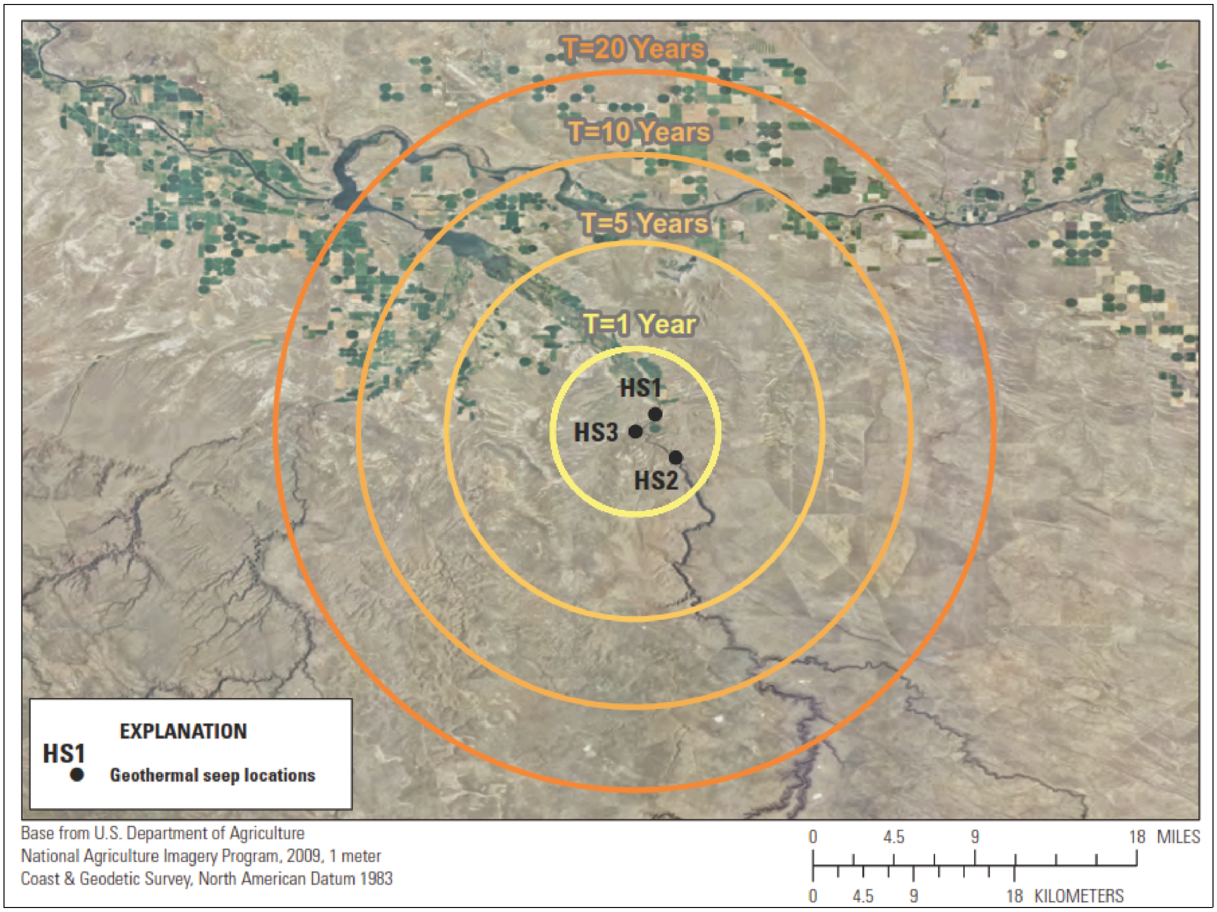


Figure 3-4. An example of the shallow lateral area of a drawdown cone increasing through time as long as pumping continues (from Adkins and Bartolino, 2012); the Great Bear Impact Statement assumes the Great Bear drawdown cone forms immediately to a depth of ~1500 m and to its undefined maximum lateral extent based on steady-state modelling as if pumping of the mine continued forever instead of only ~26 years; however, the Great Bear Impact Statement ignores this huge drawdown by erroneously showing only ~32 m of drawdown in shallow rock, overburden, and mine waste (see Figure 3-6).

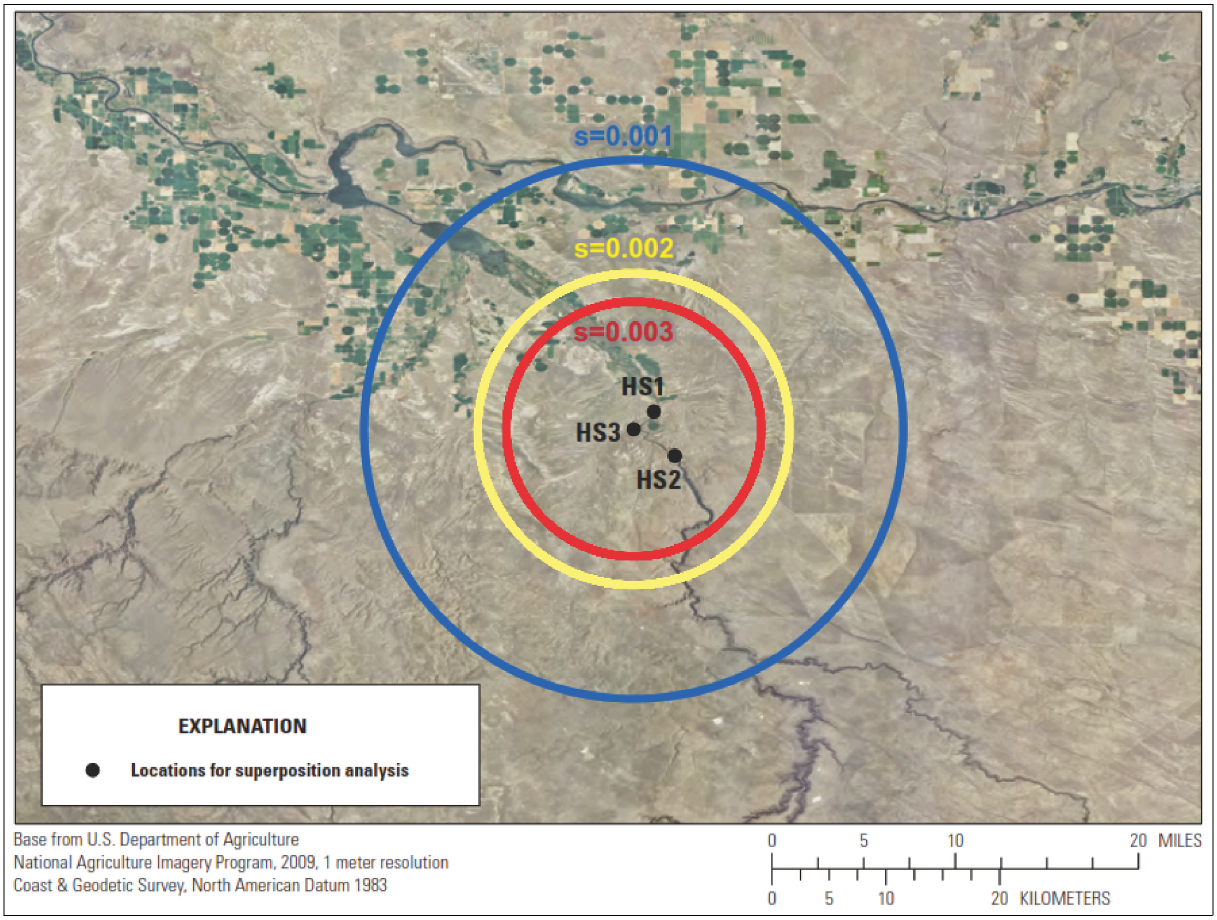


Figure 3-5. An example of how the shallow lateral extent of a drawdown cone at one point in time can be substantially different based on transient parameters like storativity (s = 0.001 to 0.003) (from Adkins and Bartolino, 2012); Great Bear did not measure transient-important parameters like storativity and thus cannot simulate the critically important transient conditions, and incorrectly assumes the Great Bear drawdown cone forms immediately to a depth of ~1500 m and to its undefined maximum lateral extent based on steady-state modelling but incorrectly shows only ~32 m of drawdown (see Figure 3-6).

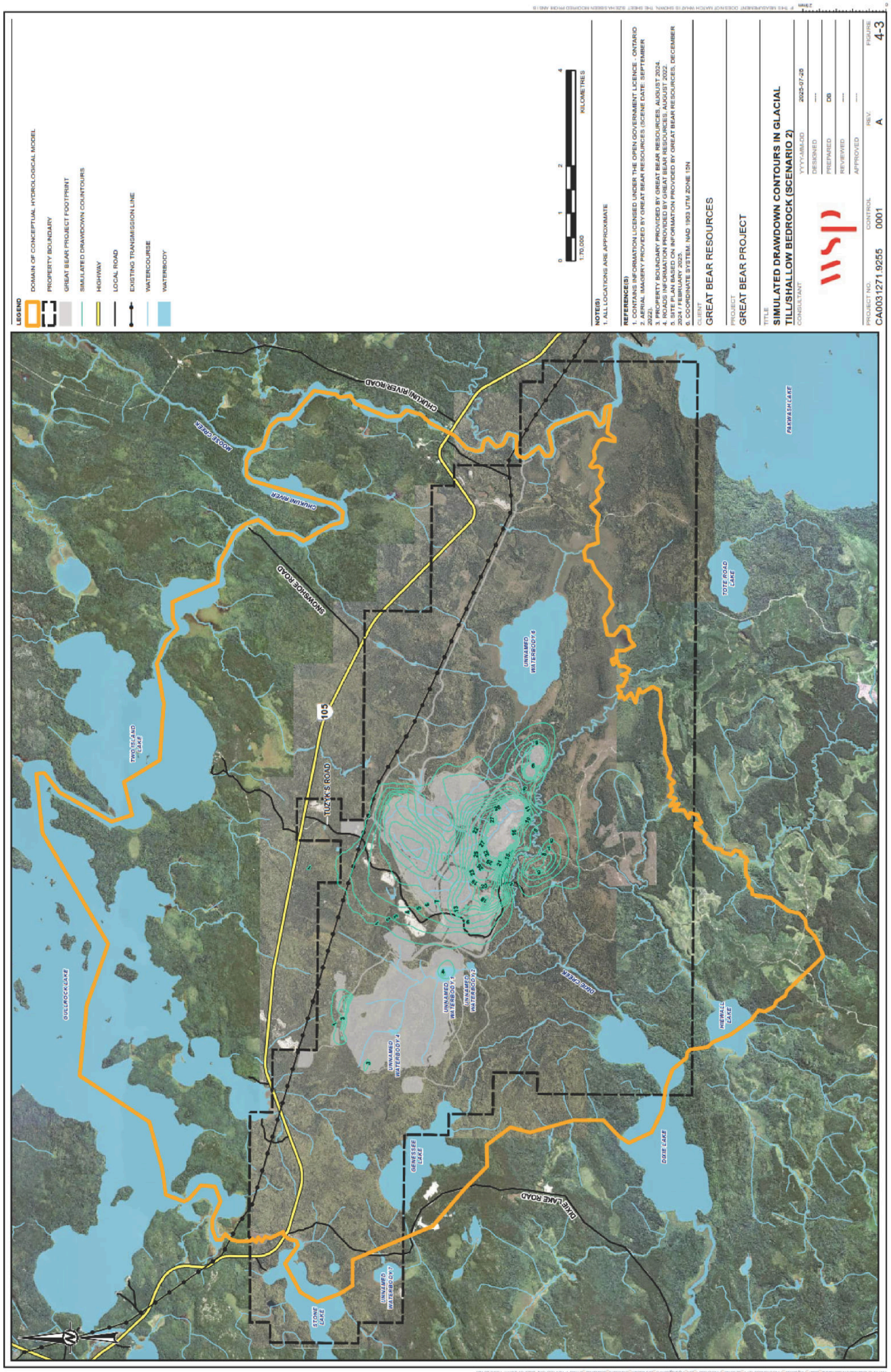


Figure 3-6. Shallow-groundwater drawdown map highlighting many errors in the groundwater modelling that have been reported for years and discussed in the text (Figure 4-3 from Appendix H-2, WSP (2025b) of the Great Bear Impact Statement); no other detailed drawdown maps are presented in the Impact Statement.

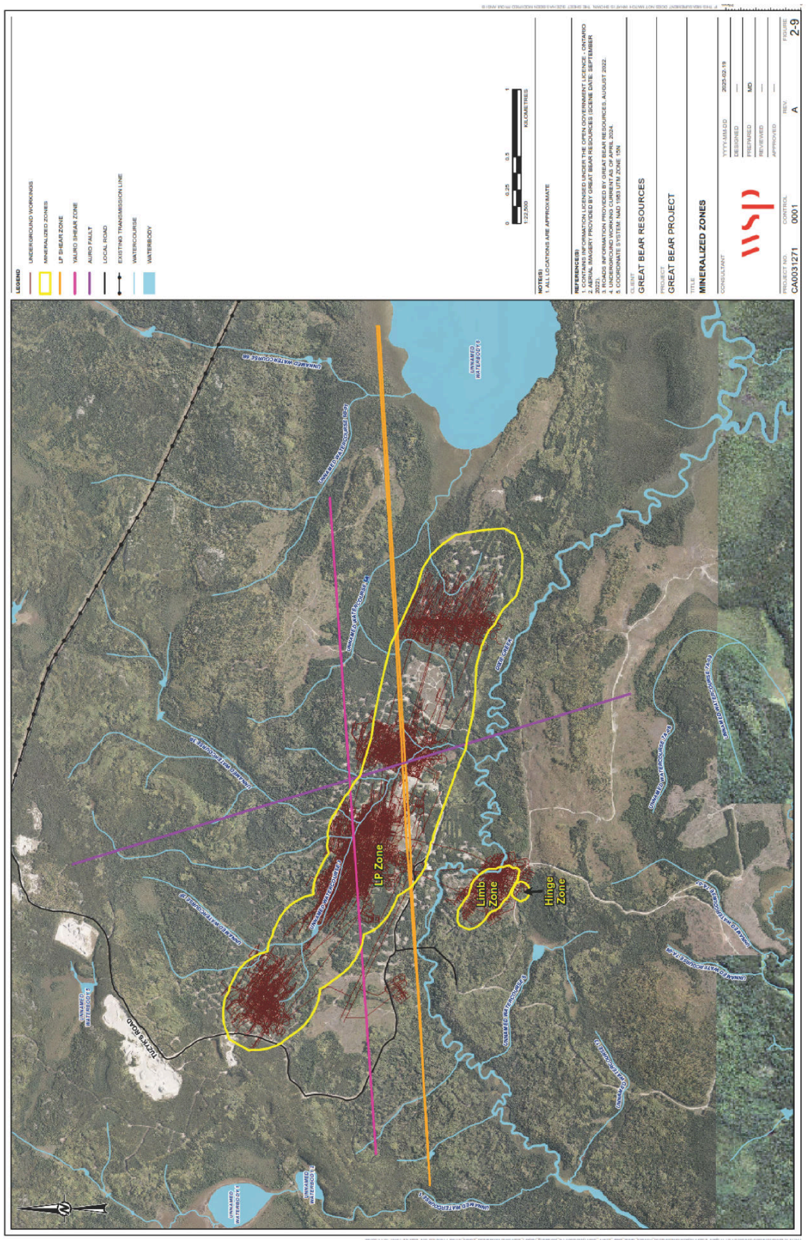


Figure 3-7. Map of Great Bear underground workings drawn as dark-red lines, stretching (1) from near Unnamed Waterbody 1 and the proposed Tailings Management Facility (TMF) to the west (2) to near Unnamed Waterbody 6 downstream of the site to the east, and within a few hundred meters of Dixie Creek (Figure 2-9 from Appendix H-2, WSP (2025b)); the equivalent-porous-medium (EPM) drawdown cone caused by these workings up to ~1500 m deep will create vertical downward flow of groundwater across and beyond the Great Bear site and lead to strong draining of creeks and waterbodies not recognized, simulated, or predicted reliably by the Great Bear Impact Statement; however, the Great Bear Impact Statement ignores this huge drawdown by erroneously only showing ~32 m of drawdown in shallow rock, overburden, and mine waste (see Figure 3-6).

Enhancing and accelerating the near-vertical flow of water to greater depths at Great Bear are the more than 2,500 near-vertical drillholes that drain water down quickly and also allow rapid lateral movement between drillholes. This means that downward groundwater movement is not limited by the rock as Appendix H-2 erroneously states and simulates. Great Bear emphasized this major effect of drillholes on vertical and lateral groundwater flow during Advanced Exploration (WSP, 2025d; MDAG, 2025c), but did not do so in the Impact Statement with Appendix H-2.

In fact, Appendix H-2 of the IS actually removed these thousands of near-vertical permeable pathways from the Great Bear groundwater model by stating that Great Bear would fill and grout the 2,500 drillholes without mentioning a schedule, how long this would take, or whether all could be successfully grouted:

> "Any of the remaining ungrouted boreholes in the area of the proposed underground mine has the potential to act as conduits for groundwater inflow into the eventual pit and underground mine workings. As it is Great Bear Resources' intention to grout these boreholes, they are not included in the model."

Again, the flow of groundwater at Great Bear has been artificially reduced even further based on a huge and difficult task that may or may not be completed someday.

There are even more major errors in the Great Bear groundwater model.

The Great Bear groundwater model indicates there will be a free-standing mound of water, about 3 m high, sticking up into the air above the land surface near the site and Dixie Creek. This artificial and obviously wrong groundwater modelling thus incorrectly restricts groundwater with mercury, sulphate, and other elements from traveling off the Great Bear site and into the surrounding environment around Dixie Creek due to an erroneously high water table up in the air protecting Dixie Creek.

Such an error is not surprising since Figure 3-3 of Appendix H-2 of the IS shows that errors in simulated groundwater levels of 5 m are not unusual in the model. However, this error of ±5 m in the water table next to Dixie Creek and other waterbodies can (1) substantially miscalculate the rate of flow and (2) even miscalculate the estimated direction of flow between groundwater and surface water around Great Bear. In other words, the Great Bear groundwater model cannot reliably tell (1) whether water will flow into or out of Dixie Creek and other waterbodies, (2) the rate of any flow, and thus (3) how much flow supplementation would be needed to avoid aquatic-life impacts.

Notably, the Great Bear model can be easily adjusted to eliminate this error and obtain likely higher rates of dewatering of Dixie Creek. However, the Impact Statement ignores this issue, yet this source of major error that has been pointed out to Great Bear for years. Great Bear has been clear that "No additional comment will be provided on this matter" (MDAG, 2026a).

As another major error, it is important to note that the Impact Statement modelled groundwater from the surface all the way down to the base of the proposed mine about 1500 m (1.5 km) below the surface. However, the results of the model are shown only for about the upper 100 m (only 7% of the entire thickness), such as copied in Figures 3-6 and 3-7 above. Where are the results of the rest of the other 93% of the model, such as the equivalent-porous-medium (EPM) drawdown cone like

Figures 3-1 to 3-5? The discussion above already explained why Figures 3-6 and 3-7 from the IS are wrong, so is the remaining 93% wrong too?

Yes, the other 93% of the model is likely wrong too because it used the same approach, but no one can tell from the limited information in the Impact Statement. After more than a year of requesting graphical output plots for the remaining 93% of the model, Great Bear provided some plots that showed additional errors in the model (MDAG, 2025c) to which Great Bear has not responded in any detail.

I have repeatedly pointed out the piezometric/hydraulic head contour lines in the Great Bear groundwater-model cross-sections pass directly through the underground workings (Figure 3-8). Figure 3-8 shows a vertical cross-section through the subsurface hydrogeologic layers of overburden and rock at Great Bear. The leftmost near-vertical band of yellow to red represents the initial underground workings, and the solid black lines represent the modelled and predicted groundwater head contours.

Figure 3-8 shows a situation that is impossible during active mining with dewatering. Some reasons for this impossibility include:

- The 300 m head contour along the top is at an elevation of ~330 m which means the intermediate bedrock, shallow bedrock, and overburden are unsaturated, but Kinross did not report any unsaturated modelling at Great Bear with their saturated model, so there is a contradiction.
- The 250 m contour crosses the underground workings at the top at approximately elevation 250 m, meaning the mine is flooded to that elevation and no deeper active exploration is possible without scuba equipment.
- While at the same time, the 0 m contour (sea level) crosses the underground workings at elevation around -30 m meaning (1) the groundwater is pressurized at that flooded depth of -30 m and (2) the water level is at sea level in the underground workings.
- While at the same time, the -150 m contour crosses the underground workings around elevation -170 m which means the groundwater is pressurized at that flooded depth of -170 m and the water level is around -150 m or about 20 m above this vertical location in the workings.

Additionally, this Great Bear groundwater model says that groundwater is not drained vertically downward through the surrounding rock into the base of the dewatered underground workings, as would typically be expected. Instead, the model says that groundwater at most depths is predominantly drained laterally into the workings across a range of depth beyond a few hundred lateral meters, apparently through artificially isolated lateral layers with no vertical connection including drillholes.

This artificially and incorrectly reduces (1) drawdown and (2) downward vertical hydraulic gradients near the surface. This is the explanation for the error of simulated lateral flow discussed above in Section 2 of this MDAG review for Figure 2-5 copied from the Impact Statement. As a result, more water should be expected to be drawn out of creeks like Dixie Creek and other waterbodies than is currently predicted with this incorrect Great Bear groundwater model.

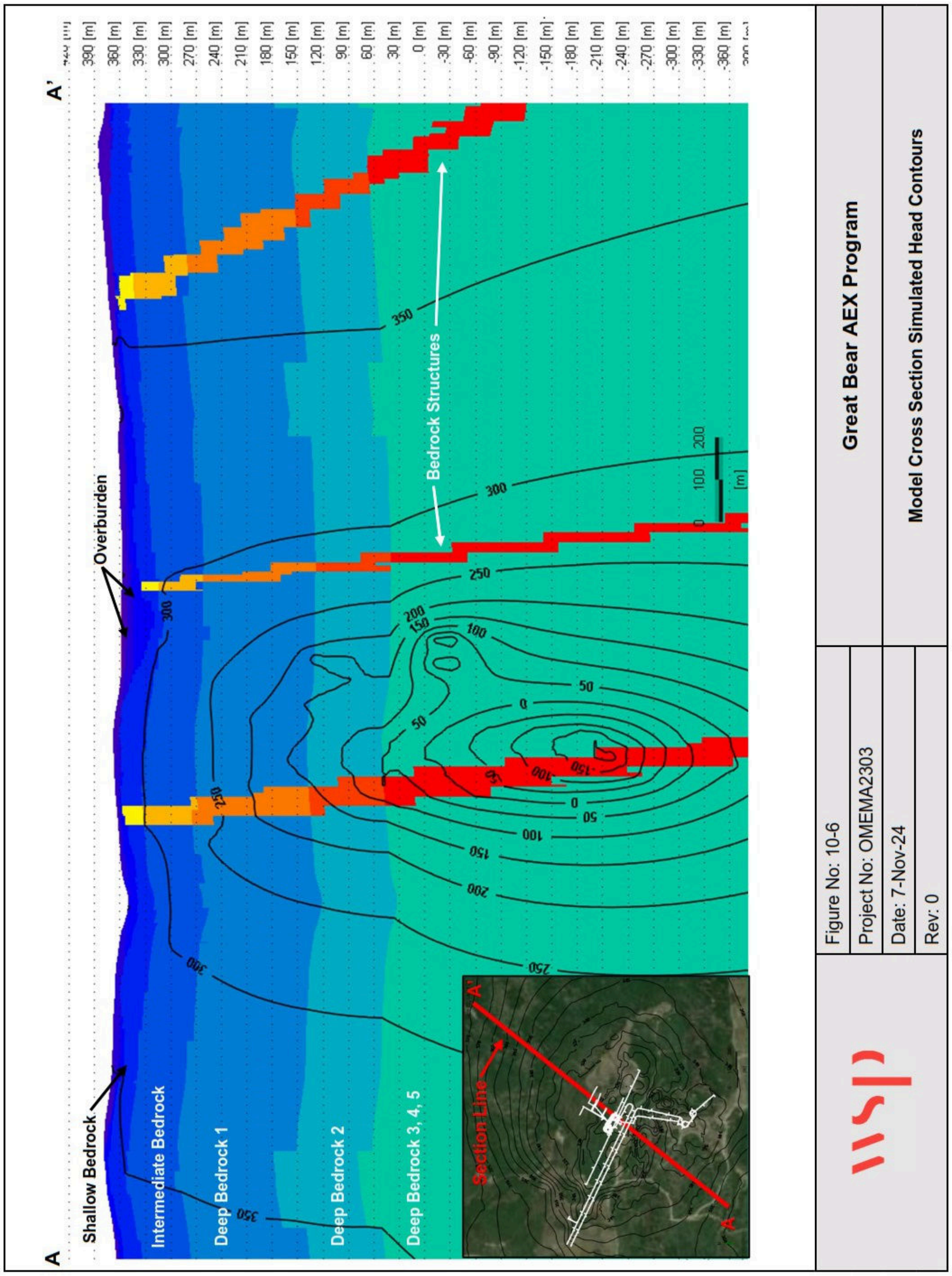


Figure 3-8. "Model Cross Section Simulated Head Contours" not included in the Impact Statement showing a vertical cross-section through Great Bear rock with the proposed underground workings simulated with the near-vertical red-orange-yellow band along the left side (from Appendix B of WSP, 2025d); many hydraulic-head/piezometric contour lines pass smoothly through the workings, showing the nonsensical error that many different water levels will exist in the mine at the same time that miners are working.

According to basic groundwater theory, the presence of these contour lines through the open workings in Figure 3-8 indicates there will be various water levels all at the same time in the underground workings as miners are working. This has been pointed out to Great Bear in the past (e.g., MDAG, 2026a). Great Bear has failed to respond in any detail with these numerical explanations of errors in the Great Bear groundwater model.

Great Bear did respond about the piezometric/hydraulic head contour lines passing through the underground workings (Figure 3-8) by essentially saying the contour lines do not pass through the workings despite Figure 3-8 (MDAG, 2026a):

> "The mathematical boundary conditions used in the model were developed to specifically simulate the interface between the saturated rock interface with the underground workings..."

The facts that groundwater contour lines pass linearly through saturated rock on both sides and then smoothly through the open underground workings prove there were no mathematical boundary conditions between the saturated rock and the workings as Great Bear has stated. This contradicts yet again statements that its Great Bear groundwater model accurately simulates reality.

This groundwater modelling for active dewatering at Great Bear is contradictory and nonsensical. It shows that active mining would occur in the dewatered underground workings as they are also flooded and pressurized with water and not dewatered.

3.4 Great Bear Steady-State Groundwater Modelling Producing Major Errors

As explained in sections above in this MDAG document, major transient fluctuations and changes in water flows, directions, and thus quality can reasonably be expected through time at, under, and around the Great Bear site. In response to these typical dynamic and transient conditions, Great Bear's and WSP's response in the Impact Statement was to assume one set of steady-state conditions existed everywhere and always for all time during operation, and then all conditions rapidly reverted to steady-state pre-mining conditions after operation with all flows then reporting to Dixie Creek and other waterbodies (WSP, 2025b).

Similar to surface water and many other environmental processes like temperature and rainfall, subsurface groundwater flow can shift and change daily, seasonally, yearly, over decades, and even longer due to climate change. Thus, the earth's environment is inherently "transient" through time, which can be important for reliably estimating flows and loadings of contaminants like mercury, sulphate, metals, and other elements. This importance of time-varying, transient conditions is shown graphically above in Figures 3-1 to 3-5.

Despite this commonsense knowledge about transient environmental conditions, the Great Bear Impact Statement only simulates groundwater at Great Bear with steady-state conditions, where groundwater flows and loadings are steady state all the time, every day, every season, every year, every decade, etc. Even if steady-state impacted conditions could be eventually reached, this could occur only after many decades, if at all in the future because pumping will stop at closure after ~26 years.

Here is how Section 3.3 (Model Limitation) of Appendix H-2 (WSP, 2025b) justifies steady-state modelling while pointing out its serious limitations:

> "Steady-state conditions: The groundwater was simulated assuming steady-state (i.e., long-term, constant) conditions, which represents the long-term dewatering rate after the initial drawdown period. It is expected that short-term dewatering rates during the initial drawdown period and seasonal inflows following the spring freshet will be greater than the long-term rate as storage is released from the surrounding overburden."

MDAG Note: Note that there is no definition of "long-term" and "short-term" (years, decades, centuries?) because steady-state modelling provides no idea of time frames and changing conditions.

"- Key Assumptions: Several assumptions were made during model construction:

> - EPM: the EPM approach was implemented which is deemed sufficient for characterizing the overall groundwater flow regime at the scale of this analysis..."

MDAG Note: The errors associated with this EPM approach were explained above in Section 3.3

> "- Average annual conditions: the model simulates average annual conditions, and not seasonal conditions. Seasonal variations in stream flows, which may result in small tributaries being dry during late summer and late winter conditions will not be captured by the model."

MDAG Note: While there is a mention here of transient dry conditions, there is no mention of critical wet conditions resulting in significantly greater flows, impacts, uncontrolled fugitive contaminant releases to Dixie Creek and other waterbodies, and partially treated contaminant discharges to the Chukuni River.

> "- Limited baseflow calibration: The model only roughly calibrated to the baseflows due to the beaver activities, limited stream flow data, abnormal dry year of 2023 and measurement challenges which making it difficult to estimate baseflow conditions at the time of this report preparation..."

MDAG Note: MDAG (2026b) explains the critical importance of reliably estimating transient and seasonal impacts on baseflow to avoid major ecosystem destruction, which this Impact Statement fails to do by its own admission in the above quotation. The elimination of most of Dixie Creek's cool and nutrient-rich baseflow during low flows and during warm seasons would likely result in substantial adverse biological impacts on aquatic and benthic life in the Great Bear reach of Dixie Creek. During winter months, the elimination of much of Dixie Creek's non-frozen baseflow would also likely result in substantial adverse biological impacts on aquatic and benthic life in the Great Bear reach of Dixie Creek. This adverse biological impact of reduced baseflow, along with many persisting errors in groundwater modelling, have still not been assessed, not corrected, and not mitigated in this Impact Statement by Great Bear which offers "no additional comment" on them.

Again, it is important to ask and estimate how far in the future will steady-state conditions apply, if they could occur at all? No one can say, not even Great Bear and WSP with its steady-state groundwater model. Despite years of notifications about the errors arising from steady-state modelling, Great Bear continues to refuse realistic transient modelling and will only conduct steady-state modelling.

In past documents, WSP's groundwater modellers for Great Bear have stated that transient modelling is not needed despite having no transient data, no transient measurements, and no transient modelling. A reasonable explanation for this refusal is that transient groundwater modelling requires additional site measurements and parameters apparently not measured at the Great Bear Project. For example, a parameter called "storativity" is critical to transient modelling and its simulated impacts and can substantially determine the size and extent of the groundwater drawdown cone at a particular time (e.g., Figure 3-5 above).

Transient groundwater modelling at the Great Bear Project is desperately needed to estimate better the impacts and effects on the water balance (e.g., Figures 2-1 to 2-4 above) and associated linked water quality (Section 7.7.1 of the Impact Statement).

Moreover, the Impact Statement (Appendix H-2) incorrectly indicates significant amounts of shallow contaminated groundwater with elevated sulphate and metals from various mine wastes and ponds will not escape to the environment like Dixie Creek, but would be drawn into shallow pumps and into the pumped-down underground mine. This is false at early times and may only become reasonable after unknown longer times as steady-state conditions are approached (see MDAG Section 3.4 above). Until then, Dixie Creek and other waterbodies will receive higher-than-estimated loadings of contamination than given in the Impact Statement. The lack of transient modelling prevents anyone from estimating how long, if ever, for the Great Bear site to reach steady-state conditions and only then minimize fugitive contaminated water escaping to the environment around Great Bear.

3.5 Summary

An important part of the Great Bear water balance, and thus of associated water quality, during and after operation, is the subsurface groundwater system. The proposed Great Bear operation would drain and pump significant amounts of groundwater daily, which causes other surrounding groundwater to be drawn in and for surface water to be drawn down into the ground. The underground workings would reach a depth of ~1500 m (1.5 km) below the land surface and thus draw in large amounts of water throughout most of that depth. The proposed open pits would also draw in water.

Despite past warnings of the errors and misrepresentations, Great Bear has chosen to simulate and estimate the impacts on water flows and thus their quality by simply "deeming sufficient" the equivalent porous medium (EPM). This means that hard intact bedrock with fractures, extending to depths of 1.5 km, was simulated as if it transmitted water like sand and soil. Great Bear also chose to simulate impacts using non-varying, always constant steady state conditions. Such steady-state conditions could take years or decades, or may never be reached after pumping stops after roughly 26 years. Until that time the groundwater model and its predicted impacts are wrong and underestimate impacts like fugitive contaminated seepage reaching the environment. This also means that the estimated water balance and water quality in the Impact Statement are not reliably estimated, which is a major error.

Steady-state EPM modelling should show a huge "drawdown cone" where groundwater drains down 1500 m into the dewatered mine in a "funnel" shape, extending laterally out for many kilometers at the water table near the surface. Remarkably, there is no sign of this large drawdown cone in Great Bear's EPM modelling. Part of the problem is that the Impact Statement does not show drawdown and groundwater flow patterns for 93% of the impacted thickness. Instead, only a shallow layer is shown where groundwater anomalously flows laterally toward a smaller central point that does not reflect the extent of the underground workings. This is another major error in the Great Bear Impact Statement.

Although most of the critical information to understand and validate the model are erroneously not in the Impact Statement, previous documents and information requested by Grassy Narrow First Nation do contain additional information. This additional information missing from the Impact Statement shows more major errors. These errors have been pointed out repeatedly to Great Bear but are consistently ignored and now not revealed in the Impact Statement where critical information for review should be included.

For example, the model shows a free-standing mound of groundwater would stand about 3 m high up into the air near the site and Dixie Creek, reducing flow drawn out of Dixie Creek. Numerically, the typical error of ±5 m in the Great Bear groundwater model means that this model cannot reliably tell (1) whether water will flow into or out of Dixie Creek and other waterbodies, (2) the rate of any flow, and (3) how much flow supplementation from elsewhere would be needed to avoid aquatic-life impacts.

As another example, the Great Bear groundwater model nonsensically shows various levels of standing water all at the same time in the dewatered underground workings as miners are working. This contradicts Great Bear's response that the model does not do this, but all information provided to date and the lack of details in the Impact Statement indicate this error persists.

The Great Bear Impact Statement is clear that groundwater is a critical part of the Great Bear water balance and associated water quality. However, simulations and estimates of groundwater flows and directions in the Impact Statement are contradictory and nonsensical. Thus, the mining-impacted water balance and associated water quality at Great Bear are unreliable and reasonable estimates remain unknown. This is consistent with other sections of this MDAG document explaining additional self-contradictory and irrefutable errors that render the Impact Statement useless for reasonably estimating impacts and the corresponding optimum mitigation measures to minimize impacts.

4. Review of "Appendix T - Mercury Bioaccumulation Study for Downstream English River to Wabigoon System Waterbodies" Dated March 2026

4.1 Introduction

Mercury is a serious concern for Grassy Narrows First Nation. Therefore, Appendix T of the Great Bear Impact Statement (IS) is reviewed here.

MDAG has already reviewed the preceding Mercury Study Plan and an interim update (MDAG, 2025a and 2025b), finding that the stated approach would lead to incorrect and misleading results by underestimating mercury concentrations in the solids and in water. MDAG (2025 and 2025b) concluded:

> "As explained above, the proposed methods and models in the subsections ... of the Mercury Study Plan are incorrect, misleading, and/or unacceptably ambiguous for assessing and predicting mercury and sulphate on, beneath, and around the Great Bear Project. I expect the general effect of the proposed methods and models for the Mercury Study Plan will be to underestimate the leaching and transport of mercury, sulphate, and other metals and elements at the Great Bear Project."
>
> "As explained below, this proposed methylation model will simulate environmental conditions that do not apply to most waterbodies around the world. Additionally, this model is designed to calculate virtually the lowest sulphate fluxes, and thus the lowest methylation rates, that would not apply to most waterbodies around the world. The proposed sensitivity study would not help with this because the proposed model is fundamentally flawed and because realistic methylation rates could be several orders of magnitude higher."

Appendix T of the Great Bear Impact Statement implemented all these errors anyway. Therefore, predictions in Appendix T are unrealistic, should not be relied on, and underestimate mercury concentrations and methylation including during non-annual-average conditions.

4.2 The Reality of the Chukuni River System Ignored in the Mercury Assessment

An interim update of the methylmercury study (Hutchinson Environmental Services [Hutchinson], 2025) identified 23 "surface waterbodies and watercourses (hereafter referred to collectively as waterbodies) downstream of the effluent-discharge location on the Chukuni River". These lakes and rivers are shown in Hutchinson's Figure 1 copied on the next page as Figure 4-1, showing #23 English River and "Grassy Narrows" near that.

Appendix T of the Impact Statement revised that number (copied here as Figure 4-2), showing only 20 rather than 23, and deleting the labeled locations of "Grassy Narrows" and the "English River" connections between the lakes and waterbodies.

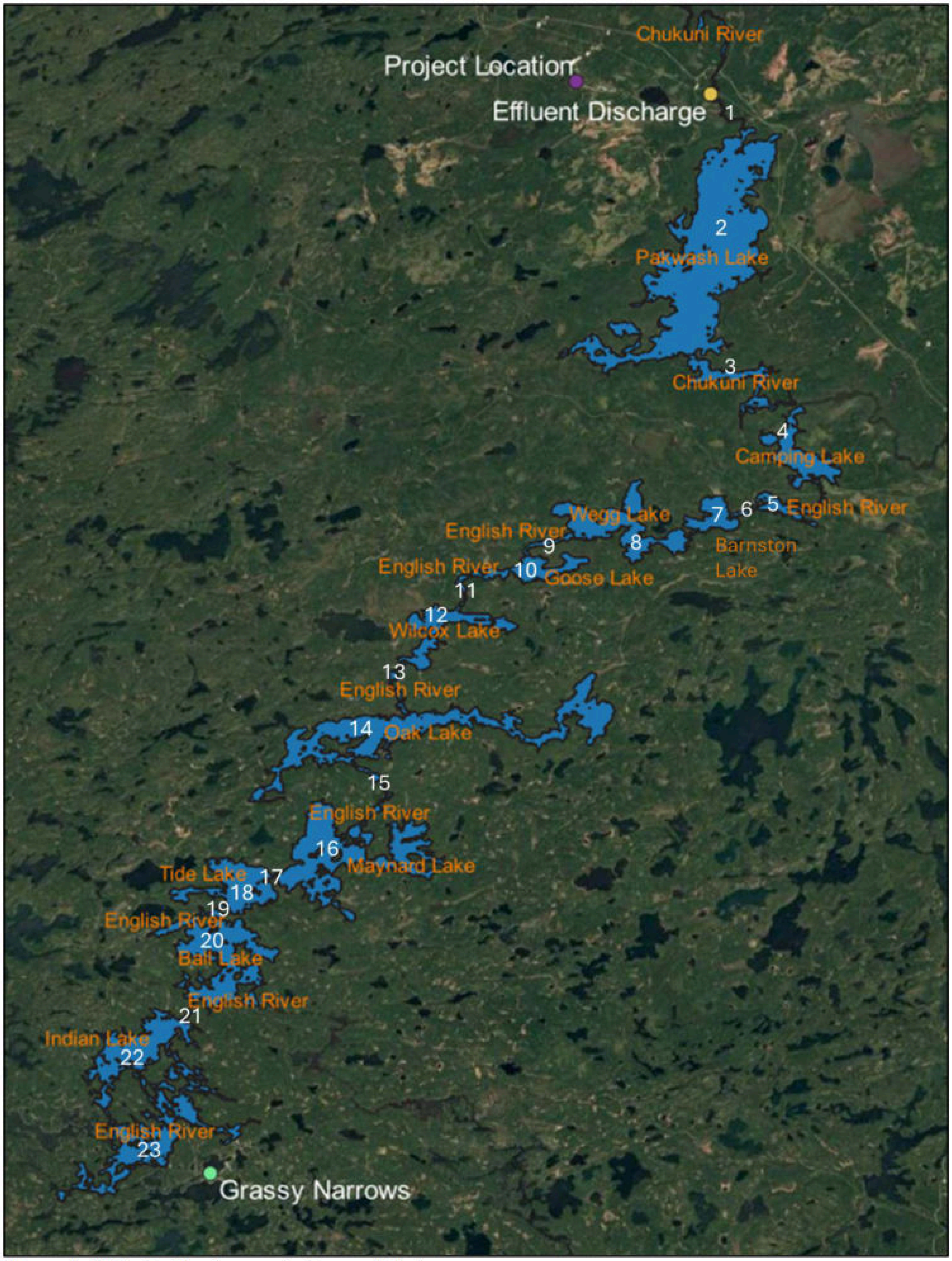
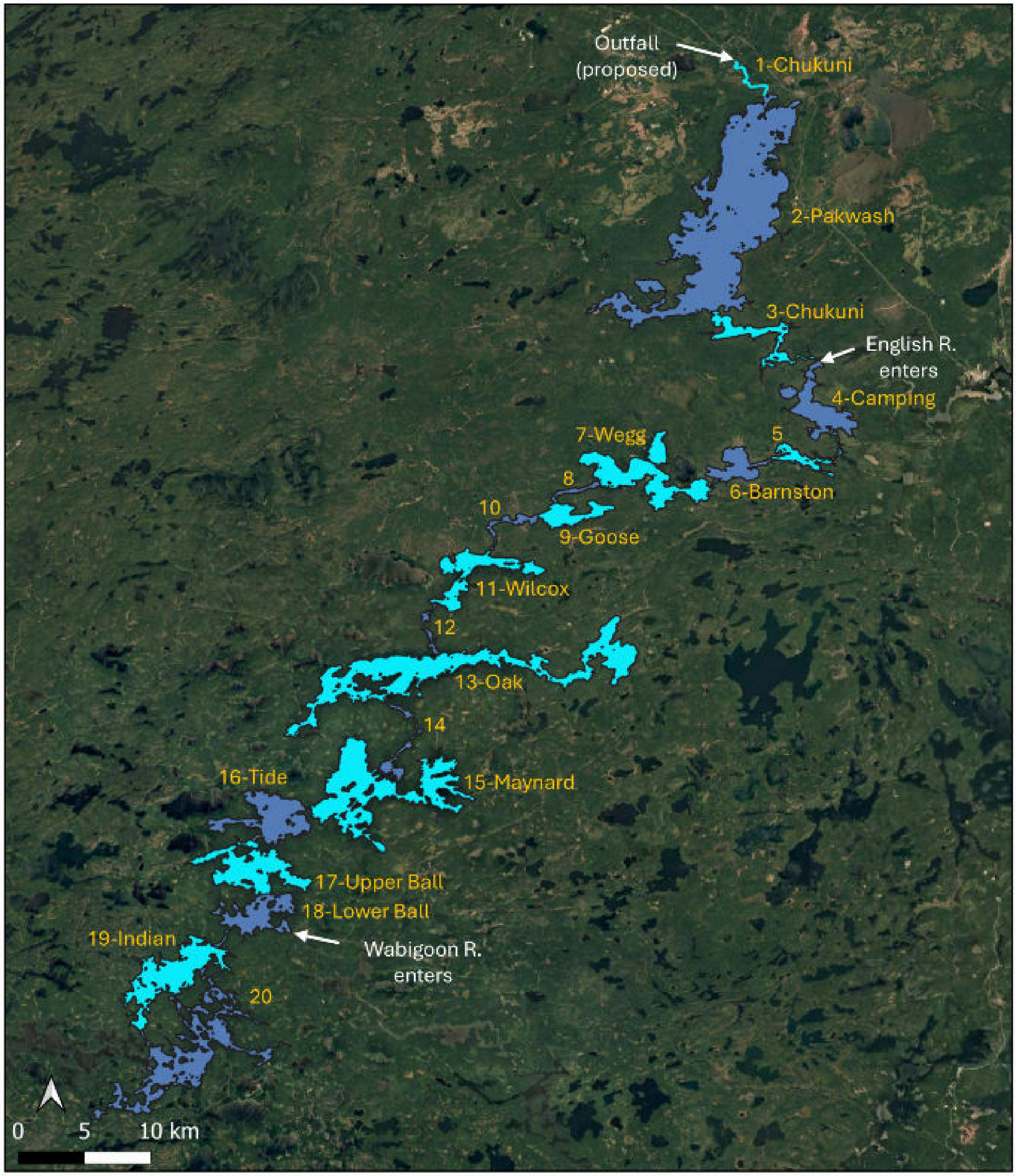


Figure 1. Waterbodies in area to be modelled.

Figure 4-1. The 23 "waterbodies" in the Chukuni River system identified by Hutchinson Environmental Services (2025) (a copy of their Figure 1).

Figure 4-4: Modelled Waterbodies



Notes:
Adjacent waterbodies are distinguished by coloration. Numbers without names represent reaches of the English River.

Figure 4-2. The 20 waterbodies in Appendix T of the Impact Statement (a copy of Figure 4-4 of Appendix T).

Hutchinson (2025) explained that each of the 23 waterbodies in Figure 4-1 will be simulated for water flows and loadings of sulphate and mercury. Although no scale is given, the simulated distance in Figure 4-1 is relatively large at approximately 100 km. This figure shows only surface water, but subsurface groundwaters are also entering and leaving various reaches at various times along this 100 km surface-water route (discussed in subsections below).

Despite Hutchinson (2025) stating that all 23 waterbodies would be simulated, Appendix T discusses a greatly reduced study. First, 20 waterbodies are shown in Appendix T (Figure 4-2). Second, water-quality modelling was made only at three "nodes", with Section 4.4 below explaining the rudimentary and unreliable approach using these water-quality "nodes" no farther downstream than the outlet of Pakwash Lake. Third, only seven lakes were monitored and studied in Appendix T, with the other 13 lakes calculated (e.g., Table 4-11 of Appendix T).

4.3 Some Points on the Reality of Limnology and Highly Dynamic Changes in Water Flows and Qualities

As summarized by Wikipedia.org, limnology is:

> "the study of inland aquatic ecosystems.... It includes aspects of the biological, chemical, physical, and geological characteristics of fresh and saline, natural and man-made bodies of water. This includes the study of lakes, reservoirs, ponds, rivers, springs, streams, wetlands, and groundwater..."

Figure 4-3 below shows some of the complex and interactive physical, chemical, and biological processes likely operating in the 23 waterbodies to be simulated according to the Hutchinson Update. This includes groundwater inflows and outflows that can change their rates and directions spatially within a single waterbody and temporally during short-term storms and during seasonal to annual variations.

People who have swam in lakes and other waterbodies have likely encountered variations in temperature. This includes the upper water being warmer or colder than the deeper water, one side being warmer or colder, and water during one season being warmer or colder than another season. Temperature is one parameter included in water quality. Therefore, many swimmers can attest to water quality in waterbodies varying significantly with location and through time.

How have these dynamic processes and changes been incorporated into the Chukuni River mercury model to obtain reasonable results? They were not. Appendix T uses "average annual monthly" conditions. Hutchison (2025) put it succinctly:

> "The modelling assumes that steady-state, annual-average conditions apply."

This was applied to approximately 100 km of simulated surface water shown in Figures 4-1 and 4-2 above.

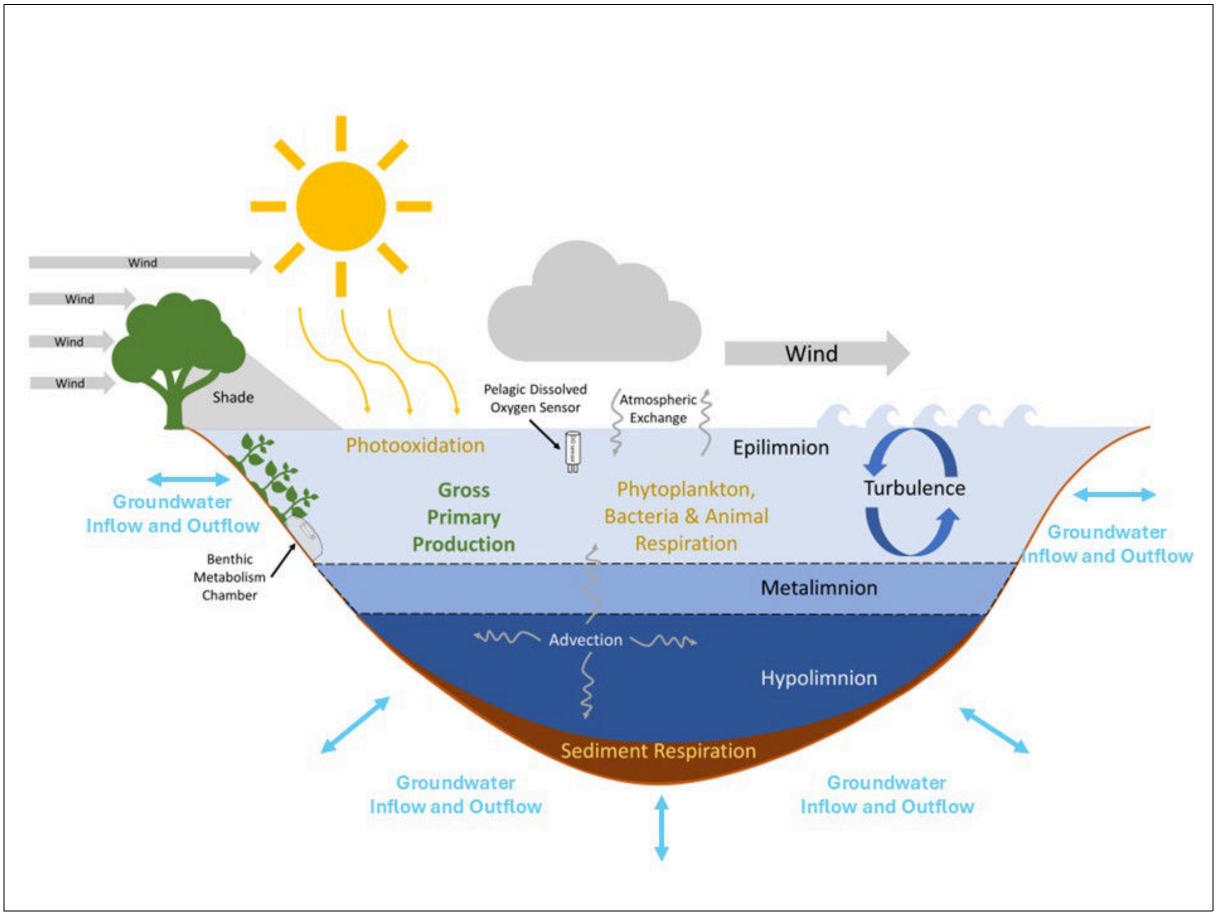


Figure 4-3. Some of the many complex, variable, and interactive physical, chemical, and biological processes likely operating in the waterbodies of the Chukuni River system, with many ignored and the remainder simulated by Great Bear as steady-state values throughout an entire lake under average-annual conditions (figure adapted from Wikipedia.org).

Explained in more detail next in Section 4.4 below, each of the 20 waterbodies was considered always fully and instantaneously mixed throughout everywhere and steady during each time step. This contradicts another portion of the Great Bear Impact Statement that says, “The lack of natural mixing in lakes can potentially be mitigated using additional engineering measures” (Alternatives Assessment, Section 4.4.6, PDF Page 26). Sulphate concentrations with depth and along the shallow perimeter of each waterbody (where methylation was simulated) was identical in each lake and remained so through each time step.

As the previous discussion of limnology and Figure 4-3 show, full and complete mixed conditions at steady state through time are conditions rarely expected in waterbodies and even violate the experiences of swimmers on water quality.

Thus, the Great Bear water-quality model for mercury methylation provided predictions not representative and relevant to most waterbodies around the world, including those around Great Bear according to its Impact Statement.. Nevertheless, the Great Bear simulations deviate even further from reality by using “nodes” as explained next.

4.4 Overly Simplified and Unreliable Modelling and Prediction of Mercury using the Mass-Balance “GoldSim” Model with “Average Annual Monthly Water Balance”

A critical chapter of Appendix T is Chapter 4, “Water Quality Modelling”, by WSP. Section 4.3, “Mass Balance Approach” contains the first error, by incorrectly using the “mass balance” model called Goldsim. Section 4.3 states:

> “The mass balance water quality model was developed in GoldSim to stimulate the volume and flow of water and the concentrations and transport of chemical species over the life of the Project. GoldSim was selected as the modelling platform to develop source terms for the subsequent methylmercury production models (Section 4.4) as it represents a well-established mass-balance modelling tool that is specifically suited to integrating water quantity, water quality, and geochemical loading information over complex project life cycles. Its use provides a transparent, internally consistent framework for estimating mercury loads that could be reliably transferred to subsequent mercury fate, methylation, and bioaccumulation models described in Section 4.4 and 5. Complete details of modelling for the mine site and surface water receiving environment are provided in WSP (2024b) and WSP (2024d)..... Water quality predictions for the mine site were built upon the average annual monthly water balance for the Project, along with currently available mine planning information and geochemical data.”

It is not clear from these statements that GoldSim is not like models that simulate the movement and chemistry of waters along flowpaths (1) across a site-wide grid of model elements or (2) along a grid of model elements for a lake or a creek like Dixie Creek where water can alternately enter and exit the surface waterbodies over short distances.

Instead, GoldSim uses user-defined fully-mixed “compartments” or “conceptual boxes” such as one for the western portion of Dixie Creek near the Great Bear site and another for the eastern portion near the site (see Appendix K-3 of the IS, WSP (2025c)). The human modellers then conceptually connect these two boxes and any other selected boxes in the GoldSim model to create "nodes". Next, the modellers choose the inputs, outputs, and internal conditions and processes that they think apply to each fully-mixed box and node. This should include variable and transient conditions that exist at the Great Bear site over days, seasons, years, and decades, but Appendix T uses well mixed, steady state, and average-annual monthly conditions that are far from reality as explained above in Section 4.3. This contradicts another portion of the Great Bear Impact Statement that says, "The lack of natural mixing in lakes can potentially be mitigated using additional engineering measures" (Alternatives Assessment, Section 4.4.6, PDF Page 26).

Now it is clearer what Appendix T means by explaining water-quality predictions for three nodes only:

> "Results for nodes CHK-1 (Chukuni River, Project effluent discharge location), PAK-L (Pakwash Lake) and PAK-OUT (outlet of Pakwash Lake), which inform this Mercury Study, are summarized in Table 4 1. These results were used to inform the methylmercury production modelling (Section 4.4), bioaccumulation modelling (Section 5) and HHRA modelling (Section 6)."

Table 4-1 of Appendix T lists the three fully-mixed "nodes" at which mass-balance predictions of mercury were made. Thus, predictions for mercury and sulphate were generated only at three "nodes" that do not literally simulate waterbodies in their environmental complexity (see MDAG Sections 4.2 and 4.3 above). The predictions simply represent the averaged and steady-state "boxes" and "nodes" and internal conditions that WSP chose to assume, estimate, and simulate using "average annual monthly water balance".

As another example of the gross simplicity of the Goldsim model applied to Great Bear, the Chukuni River was modelled at Node CHK-1 immediately above the property boundary and at the "Project effluent discharge location". However, in contradiction, Appendix K-3 of the IS on the Goldsim nodes states, "Treated effluent discharge occurs immediately upstream of node CHK-1". Therefore, according to the Great Bear IS, the single node of predictions for the Chukuni River at CHK-1 does and does not include the contaminated site discharge that requires a mixing or dilution zone (more about this zone below).

Therefore, everything above CHK-1 Node in the Chukuni River is simulated by this single "node" or "box" for which the modellers had to define all the upstream physical, geochemical, and water-quality properties, plus cumulative effects, likely with many unstated oversimplifications and/or assumptions including average annual monthly values excluding short-term storms and wet-year/dry-year variations. How realistic can such average-annual simplifications be of naturally dynamic water flows and chemistries?

The GoldSim model for the Great Bear Project can be easily adjusted by the modellers but this is not apparent upon external inspection. For example, the modellers can apply a condition where aqueous concentrations of mercury, sulphate, and other elements are allowed to decrease but are not allowed to increase as water "flows" through the boxes and nodes.

The Great Bear Mercury Study Plan promised to "[p]rovide a clear description and rationale for model input parameters and assumptions". Therefore, to understand how the GoldSim water-quality model for the Great Bear Project has been designed and used through all of its boxes and nodes, and thus whether its results and predictions are reasonable, a relatively large amount of information on the GoldSim model is needed from Great Bear. Where is all the information needed to justify, calibrate, and validate Great Bear's water mode using GoldSim?

Appendix T under Section 1.3.1 (Asubpeeschoseewagong Netum Anishinabek) states:

> "Additionally, data inputs, assumptions, and calculations are explicitly documented in the model reporting for the GoldSim water quality model (WSP 2024b,d).

Section 4.3.1 of Appendix T adds:

> "Complete details of modelling for the mine site and surface water receiving environment are provided in WSP (2024b) and WSP (2024d)."

However, WSP(2024b) and WSP (2024d) do not exist according to Appendix T's list of References. Therefore, "complete details" as promised are missing.

Is it possible Appendix T is wrong and meant its references of WSP (2025b) and WSP (2025d), which are Appendices K-1 and K-3 of the Impact Statement? If so, they are also missing "complete details" of the GoldSim model for the Great Bear Project.

Although not specifically explained in Appendix T, the physical and chemical contributions from Dixie Creek Node DIX-5 (see Appendix K-3) are fully mixed with Node CHK-1 to obtain predicted average-annual monthly flows and concentrations at downstream Node CHK-2. Because of this "node" approach, important details like an initial dilution zone (a mixing zone) in the Chukuni River between Nodes CHK-1 and downstream CHK-2 cannot be simulated in sufficient detail. Also, the important additional loading of aqueous sulphate above 1000 mg/L from the Viggo Management Facility via Dixie Creek (Appendix H-2, Table 4-8) cannot be confirmed as included in this node approach. This gives us some idea how the mass-balance GoldSim model cannot reliably simulate water flow and water quality at, beneath, and around the Great Bear site and the Chukuni River. Even worse, as explained in the following subsections, other errors show the contaminated-discharge effects on mercury in the Chukuni River are likely severely underestimated.

4.5 Groundwater Monitoring and Modelling for the Great Bear Mercury Study

Appendix T emphasizes the importance of groundwater, which Section 4.6 below shows contradicts the method used to predict methylation. Groundwater around Great Bear and the Chukuni River is substantially dynamic (e.g., see MDAG Section 3 above). It includes non-steady interactions with surface water reflected in (1) variable flows entering and leaving the Chukuni River system and (2) variable water quality as explained above and shown in Figure 4-3.

Appendix T fails to recognize the many grave and major errors in groundwater studies and simulations for impacts by Great Bear, as explained in detail above in MDAG Section 3 above. Appendix T fails to state that Great Bear has been notified of these errors for years, which result in substantially lower impacts than are reasonable, but Great Bear has not corrected them. For example, steady-state groundwater modelling at the Great Bear Project shows a high mound of free-standing groundwater, standing meters above the land surface, between the mine and Dixie Creek. This groundwater modelling thus incorrectly restricts contaminated groundwater with mercury, sulphate, and other elements, such as from the Tailings Management Facility (see Section 2 above), from traveling off the Great Bear site and into the surrounding environment including Dixie Creek and other waterbodies.

Perhaps the easiest error to understand with Great Bear's groundwater modelling for the Mercury Study is the difference between "transient" and "steady state" groundwater modelling, which is a major error also explained in detail above in MDAG Section 3.4. Similar to surface water and many other environmental processes like temperature and rainfall, subsurface groundwater flow can shift and change daily, seasonally, yearly, over decades, and even longer due to climate change. Thus, the earth's environment is inherently "transient" through time, which can be important for defining flows and loadings of mercury, sulphate, and other elements.

Kinross and Great Bear do not model groundwater (or surface water or water quality) at and around the Great Bear Project using naturally variable and transient conditions. Instead, Great Bear only simulates groundwater at Great Bear with "steady state" conditions, where groundwater flows and loadings are steady state all the time, every day, every season, every year, every decade, etc. Despite years of notifications about these errors, Kinross and Great Bear continue to refuse realistic transient modelling and will only conduct steady-state modelling.

Groundwater modellers for Great Bear have stated that transient modelling is not needed despite having no transient data, no transient measurements, and no transient modelling. Transient groundwater modelling would require additional site measurements and parameters that do not appear to have been measured by Great Bear at the site nor around the Chukuni River.

Transient groundwater modelling at the Great Bear Project is seriously needed to understand better the impacts and effects on mercury concentrations and methylation. A major error is that, even with the rudimentary understanding of steady-state averaged groundwater flow, Appendix T further grossly underestimates methylation by using an approach that in most cases is not possible in the presence of any significant groundwater movement (see Section 4.6 below).

4.6 Major Irrefutable Error and Contradiction by Invoking Two Typically Mutually Exclusive Processes to Predict Mercury Methylation Incorrectly

As limnology, Figure 4-3, and Section 4.5 above show, groundwater can flow into surface waterbodies, shifting the local surface-water quality toward its own quality. Also, groundwater can flow out of surface waterbodies, shifting the local groundwater quality toward the surface-water quality. Groundwater can alternatively flow in or out, varying with spatial location and with time such as during high water levels vs. low water levels and day vs. night.

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The all-important methylation of mercury is simulated in Appendix T of the IS based on the sulphate that reaches the shallow sediments and its porewaters on the perimeter of each surface waterbody. How does the Appendix T of the Impact Statement simulate the spatially and temporally varying quality and interchanges of surface waters and groundwaters in these shallow, methylating sediments? How does the IS account for this variable and repetitive "pumping" that draws sulphate-bearing surface water and groundwater into these sediments and then drives the methylated mercury back out?

Appendix T ignores these dynamic processes that determine realistic real methylation and realistic flux of methylated mercury. Appendix T ignores them and assumes they do not occur, and thus grossly underestimate mercury methylation and its flux. Instead, for methylmercury only, Appendix T invokes the slowest possible generating mechanism based on "diffusion" based on "Fick's Law". This diffusion is negligible where groundwater is flowing at typical rates such as around Great Bear, and thus Fick's diffusion and typical groundwater flow are mutually exclusive and incompatible.

For example, Porewater Quality in Section 4.4.3.4 of Appendix T states:

> "Sulphate was higher in porewater than epilimnetic and hypolimnetic waters, indicating no net gradient of sulphate into porewater. This is an important dynamic to identify, because it indicates that during some of the year no additional sulphate from surface water migrates to porewater and sulphate-related methylmercury stimulation occurs based on the sulphate sink in sediment, rather than from surface water inputs."

This is an error because it assumes a stagnant water system and ignores sulphate carried in groundwater which Appendix T confirms in fact does exist (see Section 4.5 above of this review).

Also, Model Input from Sep 2025 Dataset of Section 4.4.4.3 states:

> "Porewater concentrations in most waterbodies did not exhibit the expected relationship with water-column concentrations: porewater sulphate was often higher than it was in the water column and porewater methylmercury was often lower than it was in the water column. These gradients ... indicated that no methylmercury may egress from sediment to surface water during some parts of the year. The data do not yet have the resolution to quantify which portions of the year that no methylmercury egress to surface water occurs..."

This is nonsense because groundwater entering the lakes can carry additional methylmercury into the lakes no matter even if the surface water contained higher or lower methylmercury. Again, Appendix T assumes some kind of stagnant system in the lakes and sediments that Appendix T also confirms does not exist due to groundwater flow, which is self-contradiction.

Also, Methylmercury Efflux To Water Column in Section 4.4.4.8 states:

> "The areal methylmercury efflux from sediment porewater ($g/m^2/d$) was estimated in the same fashion as sulphate influx into porewater, using a diffusion coefficient for methylmercury in water..."

Again, when groundwater is flowing into a lake, the porewater concentration of methylmercury multiplied by the groundwater flow rate defines a much higher "efflux", not a virtually stagnant diffusion coefficient.

These errors originate in Appendix T's usage of "Fick's First Law" to simulate sulphate flux to the sediments that would then methylate some of the mercury, arsenic, etc. Fick's First Law is based on molecular diffusion which essentially means the movement caused by molecules repelling off each other during molecular collisions. The diffusion equations used in Appendix T are discussed in its Sections 4.4.4.5 and 4.4.4.7.

For such diffusion to play a significant and dominant role in methylation, there must be virtually stagnant conditions with no significant net movement of water in, out, and through the sediments. In reality, if groundwater is entering the surface waterbody, then the sulphate flux (flow multiplied by concentration) in the porewater and shallow sediments will be the driver of methylation. If surface water is flowing through the shallow sediments and entering the groundwater system, then the sulphate flux from the varying surface water will be the main driver of methylation. Realistically, both inflow and outflow would produce substantially more sulphate flux, and thus more methylation, by repeated "pumping" of methylated mercury than extremely slow diffusion solely by molecular collisions under relatively stagnant conditions.

As a result, significant groundwater flow as discussed in Appendix T is mutually exclusive and self-contradictory with extremely slow molecular diffusion used to calculate methylation in Appendix T. As both processes are invoked in Appendix T, Appendix T contains a major irrefutable error that underestimated mercury methylation and flux.

Therefore, the Great Bear Impact Statement invoked virtually the slowest possible methylation scenario that would not apply to most waterbodies around the world. Such a slow diffusive process cannot occur where significant groundwater is actively flowing into and/or from surface water through the shallow sediments as Appendix T confirmed. Thus, realistic methylation rates in the Chukuni River system would likely be several orders of magnitude higher. As a result, the currently predicted discharge-impacted methylmercury rates and concentrations for the Chukuni River, in Section 4.4.5 and its tables of Appendix T, are up to orders of magnitude too low.

4.7 Geochemical Characterization

Appendix T has no mention that this mercury study used the wrong analytical methods for sediments, soils, and rock. Past Great Bear documents included analytical details like (MDAG, 2025a and 2025b):

> "Solid phase elemental content analysis by aqua regia digestion and inductively coupled plasma-mass spectrometry scan"

However, Appendix T fails to explain, or even mention, to non-technical readers that the chosen method underestimates the amount of mercury in sediments, soils, walls of underground workings and pits, waste rock, overburden, and tailings.

This is because "aqua regia digestion" dissolves and analyzes only part of the mercury and only part of many other elements, leaving behind an undetected and unknown amount of additional mercury and other elements. This error is sometimes justified with false and unreliable implications that this single method reflects bioavailability and/or the amount that could be expected to dissolve under natural conditions. This is wrong. In reality, mercury predictions at the Great Bear Project and in the Chukuni River should not be based on partial information and thus should stop underestimating full mercury concentrations.

4.8 Summary of This Review of the Mercury Study in Appendix T

Grassy Narrows First Nation should be aware that this Mercury Study in Appendix T of the Impact Statement used geochemical and hydrogeologic methods that underestimated the severity of mercury, methylation, and sulphate issues at the Great Bear Project and in the Chukuni River system. Some methods in Appendix T literally contradict other portions of the Impact Statement and are not typical of most waterbodies around the world. Mercury concentrations and methylation can literally be orders of magnitude worse and higher than reported and predicted in Appendix T of the Great Bear Impact Statement.

5. How Many Repeating, Uncontrolled Releases and Spills of Highly Toxic and Contaminated Water Are Acceptable around the Great Bear Project, Such As Into Dixie Creek and the Chukuni River?

Depending on the selected design and selected cost for environmental protection at the proposed Great Bear Project, extreme events like massive storms will lead to spillage and release of contaminated water from ponds, ditches, and mine wastes into the surrounding environment. The environmental receivers of the toxic water include Dixie Creek, other surrounding surface waterbodies, the Chukuni River, and subsurface groundwater. Such spillages would include strongly toxic contact water including acid rock drainage (ARD) as discussed in Sections 6 and 7 below. With all the major and irrefutable errors explained in this review, spillages may also occur more frequently and during more moderate events at Great Bear.

These spillages at Great Bear can be expected due to normal transient conditions in the environment, which the Impact Statement instead unreliably simulates as never-varying steady state or averaged (e.g., see Section 3.4 above and other sections of this MDAG document). As an example of the likely underestimated variations of partially-treated contaminated flows into the Chukuni River, WSP (2025b) states:

> "Discharge of treated effluent to the Chukuni River increases during the construction phase (Years -3 to -1) from 0.31 to 0.78 Mm^3 per year (35 to 89 m^3/hr) as the Project site develops. Average annual discharge during the operations phase (Years 1 to 26) will increase from 4.6 to 7.2 Mm^3 per year (530 to 820 m^3/hr). During extreme 1:100 dry year conditions, effluent discharge may be reduced to 0.06 M m^3 per year (7 m^3/hr) and during extreme 1:100 wet year conditions effluent discharge may reach 8.8 Mm^3 per year (1,000 m^3/hr)."

MDAG Note: It is anomalous and a possible error that the flow of treated water to the Chukuni River during the 1:100 dry year is ~1/100th of the average year, whereas the flow to the River during the opposite 1:100 wet year is less than 2 times the average year.

As an example of variable annually averaged precipitation, WSP (2025a) says:

> "Annual precipitation for the average year, 1:100 wet year and 1:100 dry years are 633.0 mm, 1026.9 mm, and 343.8 mm, respectively (Table 4-1). Annual precipitation for 1:20 wet year and 1:20 dry year are 874.9 mm and 403.6 mm, respectively (Table 4-1)."

Despite some options like diversion and storage of some contaminated water into the underground mine and the LP Central Pit after they are safely cleared following many hours to days, some toxic spillage events into the environment will still likely occur at Great Bear. These occasional events can degrade and devastate the aquatic and terrestrial ecosystems around Great Bear for years to decades, as seen at the nearby mines of Madsen and the Red Lake Operation.

What is an acceptable average time period for Great Bear to allow toxic spillage events into the environment that could take years or decades to recover? Once a decade, once a century, never? The Great Bear Impact Statement has the answer because it is the basis for costly site design and construction like the sizes of ponds and ditches and the chosen capacities of pumps.

Sections 5 and 17 of the Impact Statement include statements like:

> "The contact water management system is designed to collect, store, convey and treat contact water for an Environmental Design Flood, defined as the 100-year return period events during the operations and closure phases. The 20-year Environmental Design Flood was applied to the construction phase. A 1:20 or 1:100 return period refers to a flooding event with a likelihood of being exceeded occurring once in a 20- or 100- year period. These are typical water management design criteria in the mining industry."

MDAG Note: The 100-year return period for operation and closure is not "typical" in the Canadian mining industry and is environmentally unsafe.

For the Tailings Management Facility (TMF), Section 5 adds:

> "There will be limited to no ponding within the TMF, with runoff from the TMF being managed in the TMF pond located south of the TMF. The TMF pond will contain the Environmental Design Flood corresponding to a 100 year 24-hour storm event and 1 in 1,000 year wind wave at the maximum operating water level for both the TMF and TMF pond facilities. Emergency spillways will be provided as required, for each stage of the TMF dams that will be able to pass the Inflow Design Flood. All spillways will be suitably armoured to withstand potential erosional effects of the flows (WSP 2024). "

Section 4.9 of Appendix I-2 (WSP, 2025a) adds:

> "The primary contact water storage facilities present on the Project are the AEX mine water pond, TMF pond, MWP, CWP, east VMF, and LP Central pit once pit filling commences. Storage and pump capacities (Table 4-15) for each pond were assumed based on previous engineering studies and meet the 100-year frequency of bypass EDF design criteria. Reject solution will be stored in the holding pond and west VMF."

Therefore, the Great Bear site is carefully designed to repeatedly "pass" substantial toxic spillages into the surrounding environment.

Contaminated water at minesites including the predicted ARD at Great Bear (see Section 6 below) typically continues for hundreds to thousands of years. However, the Great Bear Impact Statement has the false belief that all toxic seepage and runoff will end about four years after closure as the "Final closure period". This is when Great Bear envisions all water-treatment infrastructure at Great Bear would be removed, which does not happen for Canadian mines with long-term toxic near-neutral water and ARD as expected at Great Bear. Section 17.5.2 of the Impact Statement elaborates:

> "After closure, the site will be fully reclaimed and site runoff will flow by gravity passively to the environment. The LP Central pit lake will overflow by gravity through a channel to a small tributary of Dixie Creek. The VMF pit lake is projected to remain an isolated pit lake, that does not discharge to the environment. An assessment of the potential effects of climate change including extreme weather events, will be completed nearer the end of the mine life, to assess if overtopping of the pit walls has become a credible scenario in the long term. If appropriate, a channel will be constructed to connect the VMF pit lake to the LP Central pit lake."

Section 7.7.2.2 adds:

> "Year 31 is the final close out period when water treatment infrastructure is removed, after the LP Central pit is filled with water, and site waters are acceptable for passive release to the environment. Gravity runoff from the reclaimed site will occur to watercourses within the Dixie Creek watershed, and LP Central pit will passively discharge to Dixie Creek."

In 2026, it is incredible to find a mining company like Kinross Gold that believes in a "walk away" scenario after a few years for a minesite like Great Bear with long-term contaminated drainage including ARD. This means there is currently no need of a long-term financial bond and long-term commitments that would otherwise sharply impair project economics and investments at Great Bear, but costly reality degrading profits would likely become obvious if mining occurs.

Therefore, the current Great Bear design criteria of the 20-year return period for construction and the 100-year return period for operation and closure, which Great Bear falsely says is "typical" in Canada, statistically means:

- There is a 15% probability of at least one toxic release and spillage substantially damaging surrounding ecosystems and possibly the Chukuni River during ~3 years of construction, but this could be more frequent due to the major errors in the Great Bear water balance.
- There is a ~25% probability of at least one toxic release and spillage substantially damaging surrounding ecosystems and possibly the Chukuni River during ~26 years of operation, but this could be more frequent due to the major errors in the Great Bear water balance.
- Over each 100 years after the start of proposed mining and continuing through likely centuries of water treatment, there is a 100% probability of one toxic release and spillage during each century substantially damaging surrounding ecosystems and possibly the Chukuni River, but this could be more frequent due to the major errors in the Great Bear water balance. However, the Impact Statement explains that, after ~26 years of mining and ~4 years of closure, all water-treatment infrastructure at Great Bear would be removed, allowing all contaminated water to flow passively and unabated to Dixie Creek, other waterbodies, and groundwater. Because all contaminated water at Great Bear is then flowing into the environment, there would no longer be a concern over a spill once a century. Such a long-term toxic scenario is not allowed at other Canadian mines with long-term toxic near-neutral water and ARD as expected at Great Bear.

In light of this, Section 17 of the Impact Statement concluded that such spillages "are not considered" to damage infrastructure or components, or as an afterthought the environment:

> "With implementation of design standards and codes, combined with engineering best practices as proposed, major precipitation events are not considered to have the potential to substantively damage Project infrastructure or components during all phases of the Project, or result in major environmental effects. There are no anticipated generational effects associated with the effects of a flood on the Project."

Therefore, the Great Bear Impact Statement is designed to allow repeating toxic releases and spillages with substantial environmental impact, while ensuring no long-term concerns because the toxic water will no longer be managed and will simply flow into the environment. The Great Bear site can be redesigned and re-costed to eliminate this nonsensical scenario.

6. Major, Self-Contradictory Errors in the Prediction of Water Quality, Contamination, Metal Leaching and Acid Rock Drainage (ML-ARD) in the Great Bear Impact Statement

6.1 Introduction

The primary issue for water quality is the contaminated "contact" water that would be generated on and beneath the Great Bear site, during Construction, Operation, and long after Closure, by many minesite components like rock, tailings, overburden, and underground mine walls. The contamination of Great Bear waters before release to the surrounding environment is often referred to as Metal Leaching and Acid Rock Drainage (ML-ARD). Nevertheless, ML-ARD includes other contaminants that are not metals (see MDAG Section 6.5 below) and includes near-neutral and alkaline pH waters that can cost more to treat than ARD.

Due to large long-term costs over decades to centuries, the federal government has issued, through its MEND Program, an ML-ARD Prediction Manual (Price, 2009) for more reliable prediction and management of ML-ARD in Canada. For years, Great Bear has said it is following the guidance in this Manual, and for years it has been shown that Great Bear does not follow and even acts contrary to this Manual (e.g., MDAG, 2024 and 2026a). The violations of this Manual by Great Bear go as far as to assume that the absence of ARD means water quality would be acceptable, which is far from the truth at many Canadian minesites.

As explained in all the subsections below, the Great Bear Impact Statement fails massively to reliably evaluate and predict ML-ARD. ML-ARD and water quality would very likely be substantially worse, by up to orders of magnitude, than estimated in the Impact Statement, which includes high-contaminant ARD likely within years of starting Operation. The water-treatment plants discussed in the Impact Statement (see MDAG Section 7 below) could not successfully treat this worse ML-ARD with higher contaminant levels. The Impact Statement states in several places that higher-than-predicted contaminant concentrations in the inflow (feed) water will lead to higher-than-predicted contaminant concentrations in the treated effluent. As a minimum, this means the Chukuni River would become contaminated far worse than indicated in the Impact Statement.

6.2 Inevitable Acid Rock Drainage (ARD) with Highly Toxic Aqueous Concentrations during Proposed Operation and for Decades to Centuries through Closure at the Great Bear Site

Several portions of the Great Bear Impact Statement state that toxic and environmentally dangerous ARD will appear on site during Operation, and thus with a "lag time" of less than 26 years. Quotations from the Impact Statement confirming this are given below.

Before these quotations confirming ARD at Great Bear starting during Operation, it is critical to understand that (1) ARD cannot usually be prevented except with complete submergence under water of all ARD-generating mine waste, which Great Bear does not propose, and (2) ARD often continues for many decades to centuries after closure, with relatively high ongoing costs to collect and treat it. Because of this, there are major, self-contradicting, irrefutable errors in the Impact

Statement where it says ARD will be prevented at Great Bear:

> "The potential alternatives were considered with the application of standard mitigation for potential adverse environmental effects... design for prevention of acid rock drainage..." (Section 4, Alternatives Assessment)

and, after four years of Closure, there is a "walk-away" condition where Great Bear will allow all site water, which would include ARD, to run directly into nearby waterbodies like Dixie Creek:

> "Year 31 is the final close out period when water treatment infrastructure is removed, after the LP Central pit is filled with water, and site waters are acceptable for passive release to the environment. Gravity runoff from the reclaimed site will occur to watercourses within the Dixie Creek watershed, and LP Central pit will passively discharge to Dixie Creek." (Section 7.7.2.2)

In this way, the Great Bear Impact Statement avoids regulatory and financial commitments for many decades to centuries of water treatment and environmental protection, while also saying water treatment and environmental protection will be needed during Operation and long after Closure.

In self-contradiction, the Impact Statement is clear that ARD will appear during Operation with lag times as short as several years and is expected to continue into Closure, and thus require additional long-term treatment capacity. For example, Section 5.4.4.4 of Section 5 (Project Description and Activities) states:

> "Overall, sulphide oxidation rates in the humidity cell tests were low. The data suggest that Project rock may have a range of lag times, including: low sulphide oxidation rates in typical pyrite and pyrrhotite bearing materials leading to long lag times (10 years or longer)..."

The so-called "low" rates leading to a lag time of "10 years or longer"are an error in the Impact Statement. In reality, Great Bear oxidation rates in fact are "typical" of other ARD-generating mine waste around the world (see MDAG Section 6.6 below). Therefore, lag times to ARD would be shorter than "10 years or longer".

Lag times to ARD are also provided elsewhere like Table 4-3 of Appendix K-2. This table shows that "PAG" mine rock from the LP Central Pit and Underground would start releasing ARD within 22 years and thus before Closure.

Even then, Table 5.4-4 of Appendix J shows these 22 years are an overestimation of the lag time, because one laboratory test released ARD immediately and several more within ~1.5 years. However, Appendix J contains many errors that show the lag times to ARD of centuries to millennia at Great Bear have been grossly overestimated and would likely be around a few years as observed. These errors in Appendix J and its grossly overestimated lag times include:

1) usage of equations for lag times that erroneously predict several samples already releasing ARD would not release ARD for many more months and years,
2) predicting lag times as if each 1 kg sample remained isolated from all others, whereas in reality once one internal zone of mine waste in a full-scale pile becomes acidic, it quickly causes much of the mine waste below and around to also become acidic and start releasing ARD (see MDAG Section 6.9 below for details),
3) erroneously extending the calculated lag time based on cool external air temperature whereas ARD experts know that instead the internal temperatures are often much hotter than air thus decreasing lag times even further, and

4) the erroneous belief that lag times at Great Bear will be long because sulphide-oxidation rates are "low" and "very low", when in reality Great Bear rates are typical (see MDAG Section 6.6 below) and thus lag times would be shorter.

For longer-term environmental management and longer-term costs for ML-ARD after closure at Great Bear, Appendix R of the Impact Statement provides statements like:

> "At closure, the TMF [Tailings Management Facility] footprint will be contoured and vegetated, where possible and in accordance with the Closure Plan requirements. Closure will require management for the potential generation of ML / ARD which varies for the alternatives. Alternatives with lower reclamation costs are preferred."
>
> "At closure, the MRS [Mine Rock Stockpile] will require management for the potential generation of ML/ARD which varies for the alternatives. Alternatives with lower reclamation costs are preferred."
>
> "At closure, the LGO [Low Grade Ore] will require management for the potential generation of ML/ARD which varies for the alternatives. Alternatives with lower reclamation costs are preferred."
>
> "At closure, the OVB [Overburden Stockpiles] will require management for the potential generation of ML/ARD which varies for the alternatives. Alternatives with lower reclamation costs are preferred."

These quotations are at direct odds with, and contradict, Section 7 that says:

> "Year 31 is the final close out period when water treatment infrastructure is removed..."

Therefore, ARD will likely appear at Great Bear long before Closure and long before proposed covers and other mitigations are ready which do not prevent ARD anyway. This earlier-than-expected ARD would further degrade on-site water quality and likely render the existing water treatment for non-acidic water obsolete and insufficient. In turn, this would allow substantially contaminated, partially-treated on-site water with ARD to escape into the environment and into the Chukuni River. This is because there would be relatively little on-site storage capacity to hold this contaminated water for a half year or year needed to design, build, and commission a new treatment plant. These problems would likely continue for many decades to centuries after Closure of the Great Bear site.

6.3 Failure to Measure and Predict Total Aqueous Concentrations for Comparisons to Water-Quality Objectives and Guidelines

Most water-quality objectives and guidelines are based on total aqueous concentrations. Total concentrations are the sums of dissolved and suspended concentrations, where the dividing line between the two is typically based on filtration around a size of 0.45 um.

Great Bear expects its waters to contain significant amounts of suspended particles because a major focus of its water treatment for years has been on the settlement of suspended particles (e.g., see

MDAG Section 7.3.3 below). This expectation makes sense in light of substantial suspended particles at Great Bear from sources like underground pumping after rock blasting, and water from Great Bear stockpiles of blasted rock and soil-bearing overburden.

Section 5 of Appendix K-3 (Receiver Water Quality Model) states:

> "Unless explicitly stated otherwise, all results discussed in the following sections represent total concentrations."

While this is true of receiving waters like Dixie Creek and the Chukuni River, this is wrong about all on-site generated contaminated water. The Great Bear Impact Statement is about impacts that would be caused by contaminated waters during construction, operation, and at least many decades after closure. All predictions of on-site water contamination are dissolved only, with even the Field Leach Barrels being analyzed only for dissolved contaminants (Section 4.5.1 of Appendix J, Geochemistry Summary for Impact Statement). Thus, all predictions of impacts in the Impact Statement including Appendix K-3 are based only on dissolved concentrations. Because Appendix K-3 emphasized the usage of total concentrations, but did not use them for site contact water, the Impact Statement automatically underestimates impacts to some unknown extent, perhaps orders of magnitude for some contaminants.

The estimation of water quality and resulting impacts at Great Bear is only half done because suspended and total concentrations are needed for comparison to water-quality objectives as Appendix K-3 (Receiver Water Quality Model) emphasizes. The half that has been predicted, based solely on dissolved concentrations, already grossly underestimates reasonable full-scale contamination at the Great Bear site as all the sections in this MDAG document show.

6.4 Failure to Apply Standards and Objectives Properly to Small-Scale Testwork at Great Bear

Many standards and objectives for the receiving environment are intended for full-scale sites and conditions. For example, it is nonsensical to compare dissolved concentrations leached from 1 kg laboratory-based samples to full-scale PWQOs (Water Quality Objectives), which the Impact Statement recognizes. If compared, the PWQO values should be divided by a huge number to match the enormously smaller scale of the 1 kg samples, which would show that Great Bear mine wastes would release unacceptably large amounts of contamination.

Nevertheless, the 7,955-page Appendix J (Geochemistry Summary for Impact Statement) does, in fact, directly compare the small-scale 1kg and 100 kg test results with dissolved concentrations to full-scale total-concentration PWQOs in hundreds of places in text, tables, and figures.

In fact, Appendix J of the Impact Statement highlights its own error:

> "However, it is recognized that leachate concentrations produced by empirical laboratory tests like the SFE and NAG test do not simulate actual drainage conditions. This comparison is strictly for reference purposes and implies neither compliance nor non-compliance with the specified standard or objective." (PDF Page 30 of Appendix J)

Therefore, the comparison of dissolved results from 1 kg and 100 kg Great Bear tests to full-scale total-concentration standards and objectives throughout the Impact Statement is technical nonsense.

6.5 Failure to Assess All Likely Contaminants at Great Bear

After approximately four years of ML-ARD studies and tests, it seems reasonable that all likely contaminants at Great Bear have been thoroughly identified and quantified. This is wrong.

For example, manganese and barium are likely contaminants that have not been reasonably assessed in detail. Dissolved manganese in a few Great Bear laboratory tests that were not humidity cells reached well above 1 mg/L, highlighting it as a significant contaminant even at the scale of 1 kg and thus also at full scale. Dissolved barium reached above 0.2 mg/L in some Great Bear tests, highlighting it as another significant contaminant at the 1 kg scale and thus also at full scale.

All Great Bear predictions are scaled up to 100,000,000,000 kg used ~1 kg humidity cells in the Impact Statement, but should also consider and rely on the other types of tests like the intermediate-scale 100 kg on-site barrels (see MDAG Section 6.9 below). However, several dozens of humidity cells with several dozens of weekly analyses, and dozens of barrel samples, have few to no manganese or barium analyses at all. Therefore, there is currently no way to scale up manganese and barium concentrations to the full scale at Great Bear as done for other contaminants, but if done so realistically they would likely be high and toxic.

Remarkably, despite the missing analyses of manganese from the 1 kg humidity cells, somehow there are scaled-up manganese estimates in Appendix K-2 (Mine Site Water Quality Model), although grossly underestimated (see Section 6.9 below). In contrast, no scaled-up predictions for barium could be found at all in Appendix K-2 despite some analyses of it in other types of Great Bear tests.

Additionally, there are no reliable estimates in the Impact Statement for the elevated and potentially toxic concentrations of ammonia, nitrite, and nitrate. These nitrogen contaminants would come from undetonated explosive residue that would be distributed throughout the Great Bear site like the underground workings, mine rock, tailings, overburden, and recirculated water (see MDAG Figures 2-3 and 2-4 above). Ammonia, nitrite, and nitrate can reach tens to hundreds of mg/L in underground water and stockpile drainages due to the blasting residue. This could severely degrade water quality including the Chukuni River since proposed water treatment does not target these nitrogen species.

For example, Table 5-2 of Appendix U-1 lists “Water Quality Guidelines for the Protection of Aquatic Life”, presumably for mostly total concentrations, that includes ammonia, nitrite, and nitrate. The previous page with Table 5-1 lists “Predicted TMF Water Quality in Operations” for the ~300-hectare TMF at Great Bear (see MDAG Section 2 and 3 above). Remarkably, there are no TMF predictions of ammonia, nitrite, and nitrate to compare with the Guidelines on the next page!

Other problems with these estimates of nitrogen species, which makes the Great Bear estimates even more ambiguous and unreliable, include:

- Appendix K-2 explains the approach used in the Impact Statement for estimating nitrogen species:

  > "For the purpose of estimating water quality, the nitrogen species distribution established by Ferguson and Leask (1988), along with proportional nitrogen loading observed in analogue data, were used to model concentrations of ammonia, nitrate, and nitrite in mine dewatering waters." (Appendix K-2, PDF Page 122)

  The problems here are: "Ferguson and Leask (1988)" (1) applies only to open-pit mines, and underground mines can have 10 times more leaching and a more even distribution of nitrogen species, (2) applies only to coal mines where the presence of organic carbon (coal) can affect nitrogen distributions, (3) applies only to relatively dry conditions and thus not to Great Bear underground workings, and (4) substantially underestimates nitrogen species and their distributions as many Canadian studies since 1988 have shown but Great Bear has ignored.

- Appendix K-2 uses completely anonymous "Mine A", "Mine B", "Mine C, and "Mine D" somewhere in the world for comparisons to Great Bear (e.g., Tables 1, 2a, and 2b of Appendix A of Appendix K-2). Without additional details on relevance and similarities, such comparisons are meaningless.

Again, other significant contaminants could be present, and are likely present such as from the proposed three treatment systems (see MDAG Section 7.3 below). Again, there are insufficient to no analyses in the Great Bear Impact Statement to know.

In summary, there is a critical failure in the Great Bear Impact Statement to identify and assess all likely and expected toxic contaminants. As a result, the Great Bear Impact Statement does not fully identify important contamination and thus fails to safely protect the surrounding environment including Dixie Creek and the Chukuni River.

6.6 Failure to Recognize Great Bear Reaction Rates as Typical of Mine Waste and Instead Mislabeling Them as "Low" and "Very Low" to Minimize Concerns

Here are some quotations from the Great Bear Impact Statement:

> "Sulphide oxidation rates for this cell were very low..."
>
> "Overall, cells with a more typical S content generally showed low rates of sulphide oxidation in the humidity cell tests..."
>
> "Trace metal substitution in pyrite/ pyrrhotite may play a role in the observed low rates of sulphide (pyrite / pyrrhotite) oxidation."
>
> "Comparison of humidity cell release rates to release rates obtained from 15 field kinetic tests (FLBs) suggests that sulphide oxidation rates under field conditions may be up to 10 times slower than those observed in the laboratory."
>
> "Overall, sulphide oxidation rates in the humidity cell tests were low. The data suggest that Project rock may have a range of lag times, including: low sulphide oxidation rates in typical pyrite and pyrrhotite bearing materials leading to long lag times (10 years

or longer)..."

These quotations give the impression that mine waste from proposed mining at Great Bear would not be a serious environmental threat for degrading water quality because reaction rates are "very low" and "low".

Sadly, this is wrong and another failure with the Great Bear Impact Statement, for three primary reasons.

First, in order to prove "very low" and "low", Great Bear rates have to be compared with something else. There are no comparisons at all, only Great Bear's statement of "very low" and "low".

Second, the Great Bear rates were erroneously calculated as $mg/m^2/week$, and the real, corrected Great Bear rates appear to be around 3 to 5 times higher or perhaps even higher.

Third, a comparison to the International Kinetic Database with 707 cells from 91 sites around the world, plus 93 columns, shows that Great Bear rates, based solely on measured rather than incorrectly calculated data, are in fact "typical" of other minesites around the world within their pH ranges.

It is alarming that Great Bear would calculate erroneous reaction rates of contamination and then state the rates are "very low" and "low" with no proof or verification. This gives the false impression that full-scale dissolved-water-quality degradation would be low and not always detectable from background levels at Great Bear, including the nonsensical water quality predicted for Great Bear ARD (MDAG Section 6.2 above). In reality, contaminant release at Great Bear will be high and serious (see MDAG Section 6.9 below) like the nearby Madsen and RLO Mines (MDAG Section 7.1 below), with no corresponding planning at Great Bear to safely minimize and control the underestimated yet foreseeable degradation of water quality.

6.7 Failure to Provide All Available ML-ARD Analytical Data

The 7,955-page Appendix J (Geochemistry Summary for Impact Statement) is dated November 2025 and contains thousands of pages of ML-ARD analyses. These are for ongoing ~1 kg laboratory tests and ongoing ~100 kg on-site tests for rock, but not for overburden (see Section 6.8 next). Since this report is dated November of 2025, it is notable that much of the analytical data ends by August 2024 and most data ends by December 2024, about a year before this Appendix.

Has the 2025 test data for the 100 kg Field Leach Barrels, which provide critical larger-scale dissolved water quality, worsened beyond that in 2024? There is no way to know, but it is important to know. This general lack of 2025 analyses of important ongoing water-quality testwork is a failure in the Great Bear Impact Statement.

Additionally, in Appendix J of the Impact Statement, more than one hundred legally stamped and certified Certificates of Analyses, mostly issued around 2022 and 2023, were revised about two years later, in 2025, as this Appendix J was being written. However, the original dates of the Certificates in 2022 and 2023 are left in place in spite of the 2025 revisions.

The revisions were done under the instructions of the "client", Great Bear Resources Ltd., to remove some samples and some analyses from these legal Certificates so that these samples and analyses would no longer be seen. As one of dozens of examples, some Certificates state they are a "Revised report with selected samples and analysis as per client request - 21-Sep-25 LT". What samples and which analyses were deleted under the instructions of Great Bear? Were these deletions done under the stamped authority of the original Chartered Chemist from 2022 and 2023? There is no way to know, but it is important to know. This is a failure in the Great Bear ML-ARD work.

In summary, the Geochemistry Summary (Appendix J) of the Great Bear Impact Statement dated November 2025 shows that there are significant amounts of additional data on contamination and ML-ARD that have not been released. This includes (1) important missing test results in 2025 and (2) revisions of years-old certified Certificates of Analyses by deleting unknown numbers of samples and analyses from review and inspection.

6.8 Failure to Provide Sufficient ML-ARD Information from Critically Important Testwork Because It Is Still "Under Construction" and "In Progress"

Scaling of ML-ARD predictions and contaminant concentrations for Great Bear involves mathematically adjusting the tests results of ~1 kg tested under steady, controlled laboratory conditions, up to the full scale of ~100,000,000,000 kg under highly variable conditions. A critical step in doing this reliably is interim scaling from 1 kg laboratory tests to ~100 kg on-site tests. If scaling from 1 kg cannot match the results from ~100 kg, then scaling should go no further, and predictions should start again.

As explained below in Section 6.9, Great Bear did not check this interim step or it would have proven the massive failure that grossly underestimates dissolved contaminant concentrations even from the ~100 kg on-site tests.

It is likely that the same major error occurs for overburden that represents a significant amount of proposed mine waste at Great Bear (~25 million tonnes in five site piles). To confirm this, the on-site tests with overburden are sorely needed. However, they are not yet available because as of November 2025, Appendix J of the Impact Statement says they were "under construction" and "in progress".

Therefore, critically important on-site testing, which has confirmed the existing upscaling of dissolved contamination caused by Great Bear rock is grossly underestimated, is not available for a significant portion of total mine waste composed of overburden.

In summary, critical information that could likely confirm that Great Bear overburden is highly contaminating, like its rock and tailings counterparts, is missing because it is "under construction" and "in progress". This is an serious failure of the Great Bear Impact Statement because impacts and applicable mitigation cannot be assessed when the critical information to identify impacts is "in progress".

6.9 Massive Failure to Properly Scale Up Contaminant Concentrations in the Great Bear Impact Statement to Reliable Full-Scale Conditions, Resulting in Gross Underestimation of Dissolved Contamination in the Impact Statement

Many previous subsections refer to this subsection. The preceding failures, errors, and misconceptions in water-quality estimates and predictions have been repeatedly ignored by Kinross Gold and Great Bear Resources, with a response of "no additional comment" (e.g., MDAG 2026a). All these ignored problems come together here to cumulatively create a massive failure in the Impact Statement that grossly underestimates full-scale contamination during proposed Construction, Operation, and many decades of Closure.

A relatively simple way to understand the major error in the Impact Statement of grossly underestimating contaminant concentrations is shown in Figure 6-1. During full-scale mining, many layers of mine waste, such as rock, tailings, and overburden, are sequentially placed on top of previous layers. Each layer has its own trend through time of contaminant release. As infiltration of water moves downward through each layer, it accumulates higher and higher levels of contamination (shown at the top of Figure 6-1). In contrast, the Impact Statement assumed only one layer is placed so it has only one contaminant profile through time (bottom of Figure 6-1). Moreover, instead of using the higher contaminate rate at shorter times, shortly after initial disturbance when rates are typically high, the Impact Statement used a rate after a long period when the rates were much lower. This major error in the Impact Statement that grossly underestimates contaminant levels is shown in brown in the upper left side of Figure 6-1 for three layers.

Another way to understand how the Impact Statement grossly underestimated water contamination at Great Bear is through a flowpath analysis. At minesites, water flowing through or over the surface of mine wastes is commonly analyzed and evaluated using "flowpath analysis". A definition of flowpath analysis is:

> A flowpath analysis is a technique used to trace and understand the route something travels like water from a source to a destination. This helps to understand how water quality changes with distance and time.

This is sometimes more elaborately called "reaction-path modelling"; e.g.:

> A reaction-path model is a computational tool, especially in geochemistry, that simulates the step-by-step chemical changes, like mineral dissolution/precipitation, as reactants like rocks and minerals interact with a fluid like water over time, predicting the final composition of the fluid and new solid phases.

Simplistically, the aqueous concentration of a contaminant in mg/L increases as properties like scale, weight, height, volume, and pathway increase, as depicted in Figure 6-2.

At the Great Bear site, the proposed piles of waste rock, overburden and tailings will be at least tens of meters high or thick (Figure 6-3). Infiltration at the top of each pile will trickle downward along flowpaths. Each liter of downward-flowing water will contact more and more reactive rock or overburden as it flows deeper along reaction flowpaths (Figure 6-4). Figure 6-5 illustrates how the Great Bear kinetic tests in a laboratory and on-site, which stood about 0.1-0.3 m high, should be connected "in series" and summed for reliable full-scale water-quality predictions. Thus, the Great Bear Impact Statement failed and grossly underestimated contaminant concentrations based its predictions simply using individual 1 kg tests.

6.10 Summary

In summary, there are major, self-contradictory errors in the prediction of water quality, contamination, Metal Leaching and Acid Rock Drainage (ML-ARD) in the Great Bear Impact Statement. As a result, there are no reliable estimates of contamination and appropriate mitigation, except it is clear that the contamination and water-quality degradation would be substantially worse than stated in the Impact Statement.

Some of these errors include:

- Despite the Impact Statement saying prevention of ARD is an objective and water treatment would be stopped about four years after Closure, several parts of the Impact Statement show high-concentration, toxic ARD will drain from Great Bear mine wastes before Closure, likely within a few years accounting for errors, and thus continue for many decades to centuries after Closure.

- The estimation of water quality and resulting impacts at Great Bear is only half done because (1) only dissolved concentrations have been predicted for all on-site contaminated "contact" water and (2) suspended and total concentrations are needed for comparison to water-quality objectives as the Impact Statement emphasizes. The dissolved half that has been predicted already grossly underestimates reasonable full-scale contamination at the Great Bear site.

- Many standards and objectives for the receiving environment are intended for full-scale sites and conditions. For example, it is nonsensical to compare dissolved concentrations leached from 1 kg laboratory-based samples to full-scale total-concentration PWQOs (Water Quality Objectives), which the Impact Statement recognizes but then compares them anyway in hundreds of places in text, tables, and figures. In this case, the full-scale PWQO values should be divided by a huge number to match the enormously smaller scale of the 1 kg samples, which would show that Great Bear mine wastes will release unacceptably large amounts of contamination.

- There is a critical failure in Great Bear Impact Statement to identify and assess all likely and expected toxic contaminants. As a result, the Great Bear Impact Statement does not fully identify important contamination and thus fails to safely protect the surrounding environment including Dixie Creek and the Chukuni River.

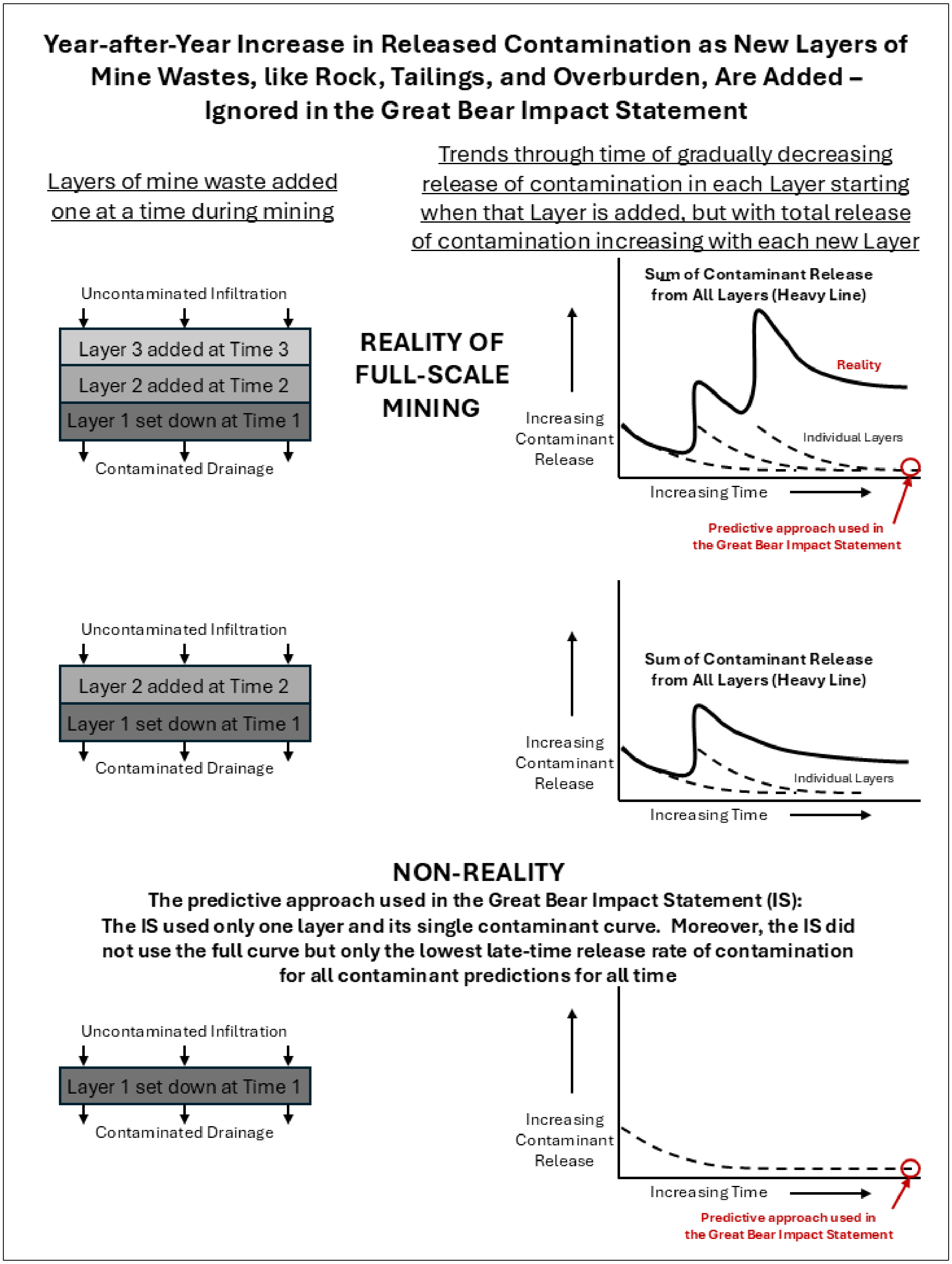

Figure 6-1. A graphical explanation of how the Great Bear Impact Statement grossly underestimated contamination and water-quality degradation; a more detailed explanation is given in the next figures.

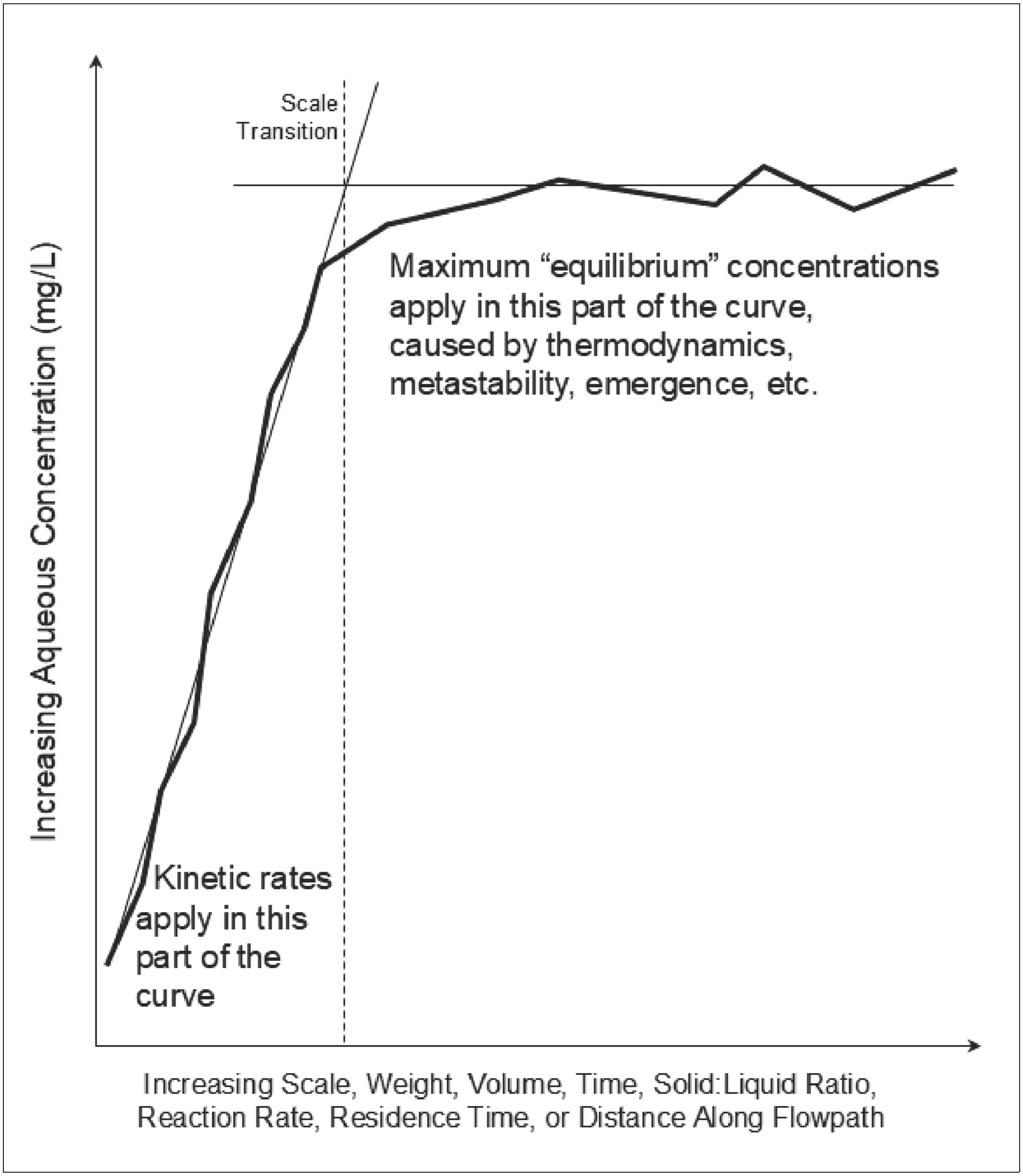

Figure 6-2. A simplified diagram showing the typical increase in the concentration of an aqueous contaminant in mg/L to a maximum level (y-axis) as scale, weight, height, volume, pathway, etc. of the mine waste increase (left to right on the x-axis).

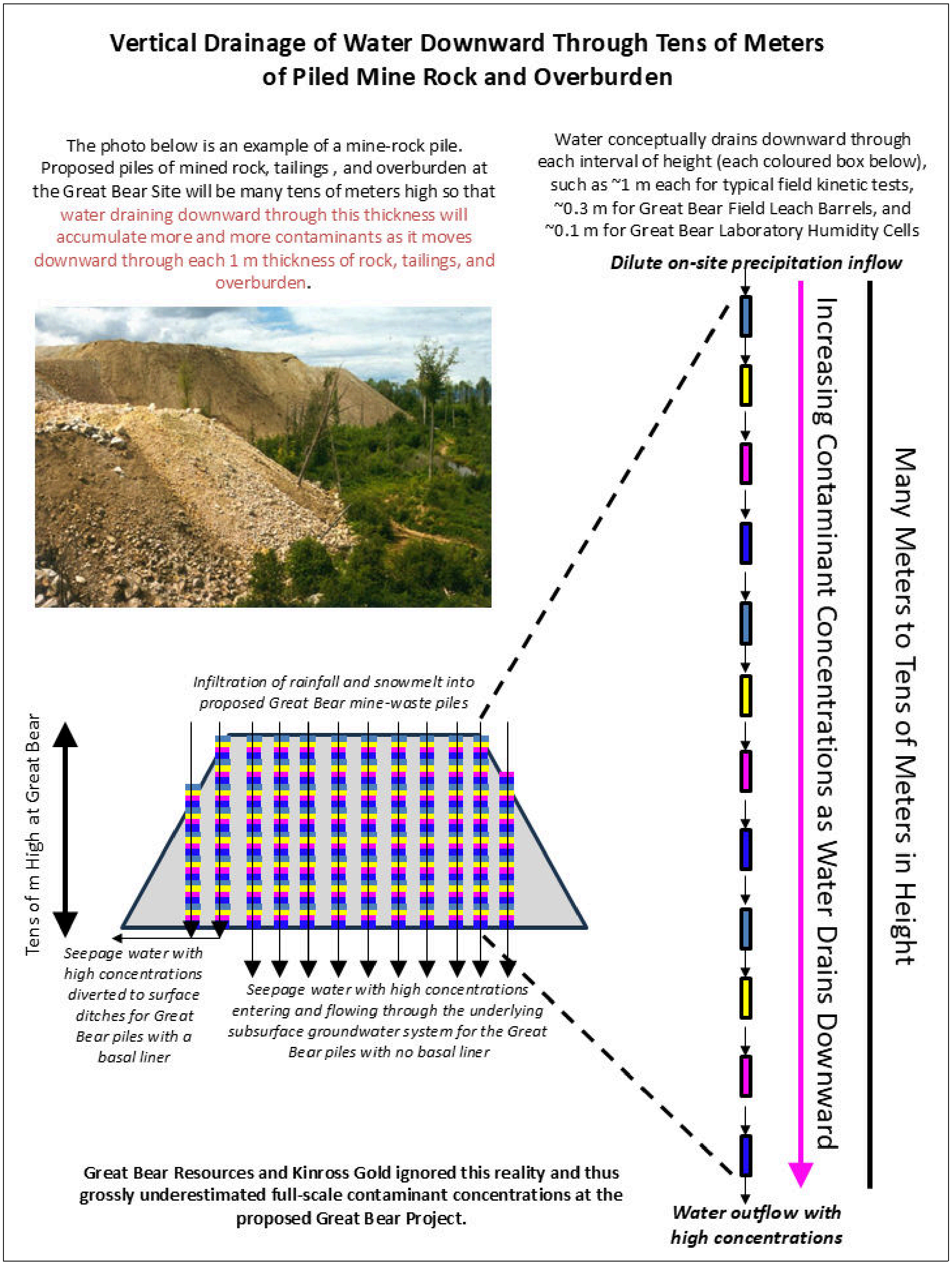

Figure 6-3. Vertical drainage of water downward through tens of meters of piled mine rock and overburden, with individual reactive layers shown in different colours.

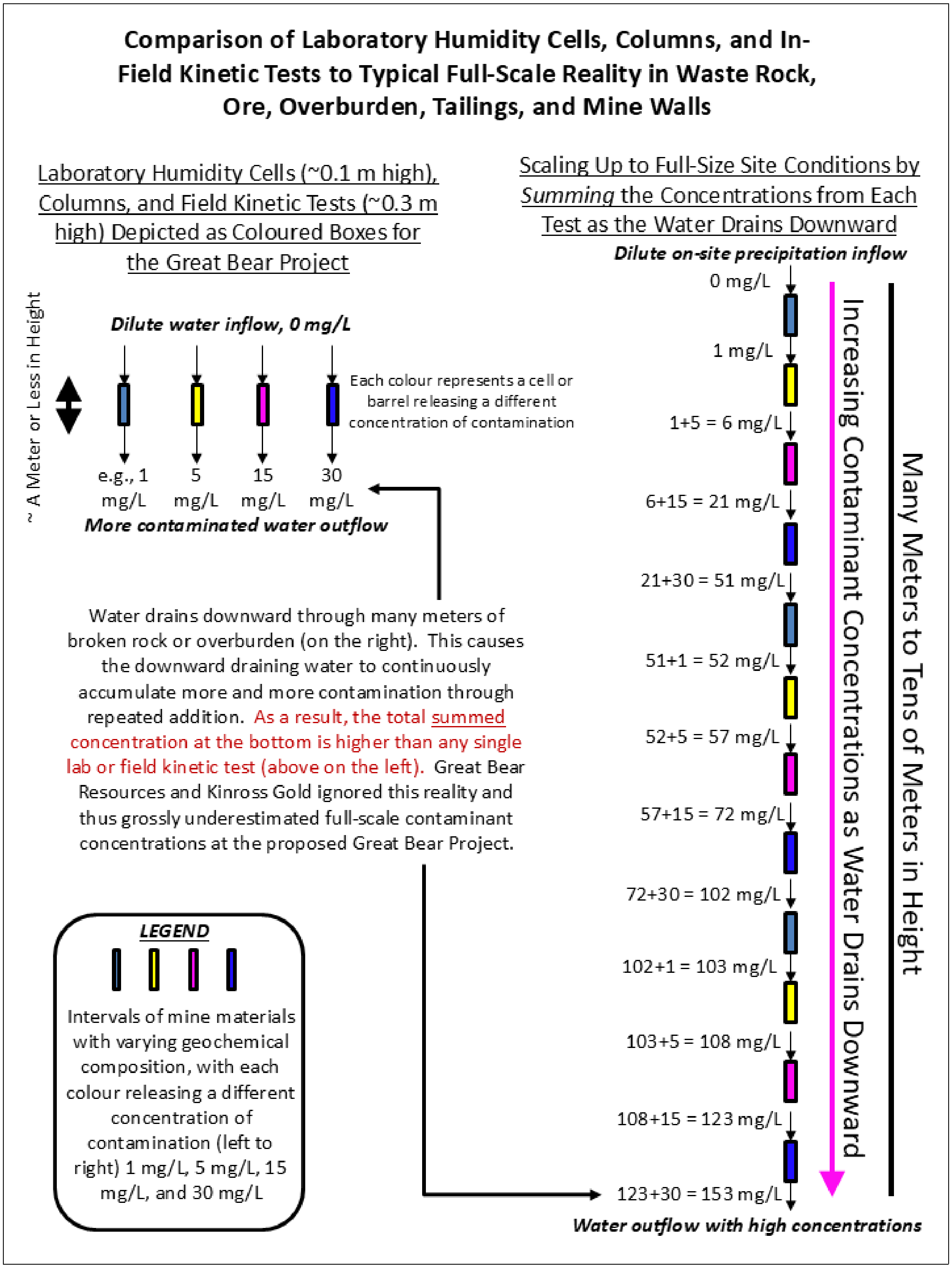

Figure 6-4. Comparison of laboratory humidity cells, columns, and in-field kinetic tests to typical full-scale reality in waste rock, ore, overburden, tailings, and mine walls, with a numerical example of flowpath analysis along the right side.

- It is alarming that Great Bear would calculate erroneous reaction rates of contamination and then state they are “very low” and “low” with no proof or verification. This gives the false impression that full-scale dissolved-water-quality degradation would be low and not always detectable from background levels at Great Bear. In reality, contaminant release at Great Bear will be “typical” based on the International Kinetic Database with 707 cells from 91 sites around the world, plus 93 columns. The typical rates can produce high and serious water contamination, like at the nearby Madsen and RLO Mines, with no corresponding planning at Great Bear to safely minimize and control the underestimated yet foreseeable degradation of water quality.

- Upon detailed inspection, the Great Bear Impact Statement shows there are significant amounts of additional data on contamination and ML-ARD that have not been released. This includes (1) important missing test results in 2025 and (2) revisions of years-old certified Certificates of Analyses by deleting unknown numbers of samples and analyses from review and inspection.

- Critical information that could likely confirm that Great Bear overburden is highly contaminating, like its rock and tailings counterparts, is missing because it is “under construction” and “in progress”. This is an serious failure of the Great Bear Impact Statement because impacts and applicable mitigation cannot be assessed when the critical information to identify impacts is “in progress”.

- The Great Bear Impact Statement should reliably scale-up small-scale information, like from 1 kg samples, to the full-scale of around 100,000,000,000 kg, and confirm the scaled-up results with intermediate-scale tests. The Impact Statement fails to do this in any reasonable and sensible way, and instead scales-up by not realistically scaling up following common-sense approaches. Thus, all full-scale predictions of dissolved contamination and ML-ARD in the Impact Statement are grossly underestimated.

7. Missing and Ambiguous Information in the Great Bear Impact Statement Leading to Missing or Underestimated Impacts for (a) Its Three Water-Treatment Systems, Including Their Impact on the Dilution Zone in the Chukuni River, and (b) Environmentally Unsafe Management and Disposal of the Resulting Water-Treatment Wastes Apparently Contrary to Ontario Regulations

7.1 Introduction

It is interesting and alarming that water treatment still requiring environmental dilution in the Chukuni River plays the major role in protecting the surrounding environment at Great Bear from its mining-generated contamination (see MDAG Section 5 above and 7.2 below), yet there is little detailed information on the three proposed water-treatment systems on which environmental protection strongly depends in the Great Bear Impact Statement.

There should be at least one or more appendices with details of the three water-treatment systems. These appendices should explain in great technical detail the important aspects justifying:

- the systems' expected impacts at Great Bear,
- their operational details at Great Bear,
- their variable site-specific levels of inflowing contamination,
- their expected effluent concentrations specific to Great Bear, and
- the environmental effects of disposal of their treatment wastes created by the chemicals added and by the contaminants removed from the water.

None of this detailed justification on treatment is in the Great Bear Impact Statement, with Section 4.4.6 Treated Effluent Discharge Location simply dismissing it by stating:

> "The treatment technology will be determined during detailed engineering design."

The few details included in the Great Bear Impact Statement, discussed in the following subsections, are so arbitrary and generic and "do not reflect actual conditions". Therefore, it is likely that Great Bear effluent will be substantially more toxic than stated in the Impact Statement, in turn degrading the Chukuni River worse than currently estimated, as explained in the following subsections.

In fact, the Great Bear Impact Statement includes the contention that no water treatment would likely be needed at all, and is discussed only as a "conservative approach". This contention is nonsense because of the expected on-site presence of acid rock drainage (ARD), high contaminant concentrations, and additional contaminants not considered by Great Bear (see MDAG Section 6 above). The ecosystems around Great Bear and the Chukuni River would likely be degraded and devastated without higher-quality water treatment than the Impact Statement includes.

Section 5.14.7 of the Impact Statement states:

> "Although these natural processes can be effective, A conservative approach has been taken, and it has been assumed that additional treatment will be required to remove metals, suspended solids, and some residual ammonia or other dissolved constituents in contact waters. The WTP [water treatment plant] will be a centralized facility located close the process plant and infrastructure area, with treated effluent that will be discharged by pipeline

> to the Chukuni River... Best available technologies that are economical achievable will be considered for the WTP to meet the protection requirements of local Indigenous Nations."

Note that only a single "the WTP" is mentioned, whereas there will be three treatment plants. Additionally, "economical achievable" is a criterion for Great Bear choosing water-treatment systems, but no economic analysis was provided as proof that thorough water-treatment systems could not be afforded.

This major lack of detailed justification on the three treatment plants is possibly due to Great Bear's false belief that decades-long to centuries-long water treatment of ML-ARD will not be needed. Nevertheless, somehow the Great Bear Impact Statement includes numerical effluent concentrations and treatment-waste concentrations up to several decimal places. It is impossible to have reliable estimates of treated water to several decimal places when the details of the treatment plants specific to Great Bear are not known and will not be known until years later. Therefore, the major and final point-of-control for environmental protection at Great Bear, the treatment of water, is mostly "guessed" up to several decimal places in the Impact Statement to guess there will be no significant impacts around the site or in the Chukuni River. As a result, the Great Bear Impact Statement should be rejected as unreliable.

Great Bear's approach of guessing at three water-treatment plants and their capabilities is alarming based on nearby minewater-treatment plants unable to successfully treat contaminated water similar to or less contaminated than Great Bear's (see MDAG Section 6 above). As the public record shows, the nearby Madsen Minesite and Red Lake Operation (RLO), composed of several minesites, have struggled for years to adjust and upgrade their water treatment, failing at times to consistently achieve even very lenient effluent limits (e.g., MDAG, 2025d, 2025e, and 2026a). Additionally, Madsen's water-treatment plant released acutely toxic water, <u>after treatment</u>, for up to months that killed fish and other aquatic life within four days based on 96-hour toxicity testing with rainbow trout and Daphnia magna.

Great Bear Resources and Kinross Gold have confirmed publicly that Great Bear geology, climate, and environment are similar to Madsen and RLO. Thus, similar failures of adequate water treatment can be expected at Great Bear based on its lack of site-specific design details that "do not reflect actual conditions", missing serious contaminants also likely requiring treatment, higher-than-predicted contaminant concentrations, and no proof-of-success in the Impact Statement.

As a result, the Great Bear Impact Statement lacks major details and information to decide reliably if the Great Bear Project should proceed or stop, and thus it should stop now. Otherwise, this would only become apparent after acceptance of the Impact Statement and the eventual engineering design, which can be expected to show that similar treatment of similar waters at Madsen and RLO have failed to meet lenient guidelines to the point of the treated water being acutely toxic to aquatic life. The environmental risk of allowing Great Bear to later reach the same failure, after acceptance of its erroneous Impact Statement, is too high and likely.

There are some older documents on some aspects of some of Great Bear's three water-treatment plants. However, these older documents likely no longer apply to the proposed full-scale mine operation and closure. If they do, they should be updated and provided as part of this Impact

Statement along with important details on all the treatment plants.

7.2 Great Bear's False and Misleading Argument for a Dilution Zone in the Chukuni River for Its Partially-Treated, Still-Contaminated Effluent

It is worthwhile considering why Great Bear needs an authorized toxic dilution zone in the Chukuni River to legally allow toxicity otherwise contrary to the Fisheries Act. Section 4 (Alternatives Assessment) of the Impact Statement explains that the "Treated effluent discharge location" to the Chukuni River has "No Viable Alternative" because:

> "The Chukuni River is the only watercourse near the PA [Great Bear Project Area] that has a large assimilative capacity and could potentially receive the treated effluent discharge from the Project. See Section 4.4.6 for additional information."

This is Great Bear's basis for "No Viable Alternative".

This is a false and misleading argument because it assumes that Great Bear's three treatment plants that (1) are currently only guesses, (2) are not designed in detail, and (3) "do not reflect actual conditions" (see MDAG Section 7.3 below), cannot lower contaminant concentrations any further. One treatment plant at Great Bear would be "membrane filtration" to partially treat water. A next level of improved treatment is reverse osmosis (RO). Reverse osmosis would greatly lower contaminants levels in all Great Bear contaminated water likely to concentrations needed for safe discharge locally, like into Dixie Creek, with minimal impact and as part of planned flow supplementation, but at greater cost. Like Great Bear's money-saving site design that statistically ensures one major uncontrolled toxic release of untreated water at least once a century (see MDAG Section 5), the treatment plants are designed to save money by only partially treating Great Bear water.

Therefore, Great Bear has used flawed logic to justify its partial treatment instead of full treatment. The "large assimilative capacity" of the Chukuni River is viewed as available to Great Bear. As a result, Great Bear will partially treat contaminated water only to the level needed for dilution in the River and thus save money. It does not have to be this way; Great Bear chose this to save on treatment costs.

Furthermore, although not stated in Section 4 (Alternatives Assessment), "No Viable Alternative" is limited by Great Bear's hidden economic analysis of what it considers "economic achievable", meaning what Great Bear is willing to spend:

> "Best available technologies that are economical achievable will be considered for the WTP to meet the protection requirements of local Indigenous Nations." (Section 5.14.7)

In any case, a major redesign of the Great Bear discharge and contaminant dilution zone in Chukuni River is needed beyond that currently in Appendix K-3. This major redesign would have to include higher flow rates than currently estimated, higher levels of contaminants, and additional contaminants such as from the STP (see MDAG Section 7.3 below).

7.3 Missing and Ambiguous Information on Water Treatment in the Impact Statement Precluding Reviews of Treatment Impacts at Great Bear

7.3.1 The Sewage Treatment Plant (STP)

As explained above in Section 7.1, detailed designs and operations of the three water-treatment plants at Great Bear would be determined only after project approval, despite nearby minesites failing for years to achieve much more lenient limits than Great Bear intends to meet. Nevertheless, the Impact Statement gives some information on treatment showing that the planned treatment would be insufficient at best and a failure at worst.

As an initial example, one of three planned treatment plants is the "sewage treatment plant" (STP) for human waste whose effluent would be discharged along with effluent from a second treatment plant into the Chukuni River. In Figures 2-3 and 2-4 above, copied from the Impact Statement, readers should try finding the STP effluent in Great Bear water-balance and water-treatment diagrams discharging to the Chukuni River. It is not there.

Nevertheless, the STP does exist in the Great Bear design because Section 5 of the IS mentions it (see the half page comprising all of Section 5.16.2 at the bottom of PDF Page 101), and Appendix I-2 provides average annual flows from it in a few tables while explaining:

> "In addition to providing fresh water to the process plant, the Chukuni River will supply water for civil works and to the accommodations complex. The accommodations complex is anticipated to require an average of 6.6 m^3/hr during the operations phase [MDAG Note: this is 6,600 L/hour and 110 L/minute on a continuous basis], with an increased demand of 17.9 m^3/hr during the construction phase. This water will be collected and treated in the sewage treatment plant. Treated water will be combined with WTP effluent, and discharged to the Chukuni River as a combined stream."

After treatment, this human-waste effluent from the STP will still likely carry some contaminants that can be toxic to aquatic life such as remnant pathogens including viruses and bacteria, Biological Oxygen Demand (BOD), persistent organic contaminants, and disinfectants perhaps like reactive chlorine that would have to meet the CCME aquatic-life guideline of 0.0005 mg/L. There are no detailed discussions of the STP effluent and its levels of contaminants in the Impact Statement. How can one assess and estimate impacts from the STP when basic information on the plant and its treated effluent into the Chukuni River are missing?

Flows predicted in Appendix I-2 show that, during three years of Construction, the treated effluent from the STP would be about one-third of the entire Great Bear treated discharge to the Chukuni River. As a result, its residual contamination will play a proportionally major role in impacts on the Chukuni River during construction. Again, important details to estimate and understand impacts from the STP cannot be found in the Impact Statement.

Great Bear has chosen partial water treatment followed by dilution in the Chukuni River. The neglect of its Impact Statement for additional potentially toxic contaminants is a major failure of the Impact Statement. As a result, impacts of the Great Bear Project would be substantially higher than given in its Impact Statement, including on the Chukuni River. In turn, there is no way to identify reliable mitigation for the additional contamination if any is available at all.

7.3.2 The Membrane Filtration Treatment Plant (MFTP)

This missing and ambiguous information also applies to the second treatment plant, Membrane Filtration (MF). There is a specialized, advanced, and much more expensive form of filtration known as Reverse Osmosis (RO). A general explanation is:

> "Membrane filtration is a broad, physical straining process that captures suspended solids, sediment, and bacteria based on particle size. Reverse osmosis (RO) is a specialized, advanced form of membrane filtration that forces water at the molecular level, removing up to 99% of dissolved minerals, salts, and microscopic contaminants."

Section 5.14.7 of the Impact Statement explains:

> "A portion of the contact water treatment stream (excess water from the TMF [Tailings Management Facility]) will be subject to enhanced water treatment (membrane filtration) to reduce sulphate concentrations in treated effluent. Membrane filtration is a separation process that uses a semi-permeable membrane to separate components of a liquid based on their size and properties. It involves passing the contact water to be treated through the membrane by differential pressure, to produce clear water and a reject solution."

Thus, Great Bear proposes an ambiguous, second treatment plant with membrane filtration with no detailed design until after approval. It is hard to understand how this MFTP would remove among the highest predicted levels of sulphate and other contaminants from the Great Bear TMF water using a physical straining process that captures suspended solids, sediment, and bacteria. In fact, such an MFTP cannot lower aqueous contaminants predicted in the Great Bear Impact Statement, because these predicted concentrations are only for dissolved parameters ("clear water") and do not include any suspended concentrations (see MDAG Section 6 above and MDAG, 2026a). Therefore, an MFTP would likely have little effect on Great Bear contamination and water quality estimated in Appendix K-2 and K-3 of the Impact Statement.

Nevertheless, the Impact Statement believes its MFTP would have a major effect on dissolved-contaminant water quality including lowering sulphate intended for the Chukuni River which could otherwise stimulate methylation. If we play along with this scenario for Great Bear, two major problems arise:

1) How could anyone estimate the water quality of the treated effluent sent to the Chukuni River when the MFTP treatment process is ambiguous? The Impact Statement without detailed explanations found a way to do this, and it is all based on a single page among tens of thousands of pages as explained below.
2) The treatment waste called "reject solution" in the Impact Statement would be a high-density water, like seawater or a brine, dumped into part of the mined-out Viggo Pit without a liner. Its density would drive it out of the pit and into the surrounding environment, in contradiction to the Great Bear groundwater model where the modellers told the model not to allow any water to leave that part of the Viggo Pit. Also, its very high aqueous

> concentrations of sulphate and other elements destabilize cement and clay. Thus, Great Bear's vision of disposing of most of the annual reject solution in the paste backfill is highly likely to be wrong. In turn, there would be insufficient storage capacity to contain this high-density solution at Great Bear, which is likely a fatal flaw because of the lack of alternative storage during operation. These issues are discussed further in MDAG Section 7.4.2 below.

As explained above, Reverse Osmosis (RO) is a specialized, advanced, much more expensive form of filtration that removes individual dissolved molecules from water. Is it possible that authors of the Great Bear Impact Statement assumed RO-type water treatment rather than normal membrane filtration would be typical of their proposed MFTP? Yes, this is the explanation.

"RO" and "reverse osmosis" is not mentioned anywhere in the Impact Statement's Section 5 (Project Description and Activities), Section 7 (Analysis of Changes to Pathway Valued Components), or Appendix K-2 (Mine Site Water Quality Model), but they all discuss membrane filtration. Despite several discussions of membrane filtration, reverse osmosis is mentioned only in a single place in Section 4 (Alternatives Assessment) but as an example of membrane filtration: "Membrane filtration, such as reverse osmosis..." (Section 4.4.3, In-system Water Treatment).

A critically relevant portion of the Impact Statement is Appendix K-3 (Receiver Water Quality Model), which is the key document for water treatment and discusses treatment effluent. Appendix K-3 discusses membrane filtration in several places, but does not mention reverse osmosis.

However, and this is remarkable, Appendix K-3 does discuss RO on a single page (Table C-1, PDF Page 192). This single page only is where all the predictions of influent concentrations ("feed concentrations"), treated effluent concentrations ("permeate concentration"), and treatment-waste reject-solution concentrations ("brine concentrations", see MDAG Section 7.4.2 below) come from in the Great Bear Impact Statement. Any errors and uncertainties on this single page render impacts including the Chukuni River in the Impact Statement unreliable at best.

This single page of Table C-1 on which impacts are based is simply an example of what RO might or might not achieve at Great Bear, with this page clearly stating near the top that:

> "The projection (Table 1 and 2) are estimates and do not reflect actual conditions. These values are subject to change depending on feed chemistry and temperature. Testwork and vendor input is required to verify the data."

To emphasize, this page explains that the effluent predictions for the MFTP as well as the waste reject solution (see MDAG Section 7.4.2), on which the impacts around Great Bear and the Chukuni River in its Impact Statement are based, **"do not reflect actual conditions"**, are subject to higher-than-predicted effluent concentrations with increasing feed chemistry (confirmed in MDAG Section 6 above), and change with temperature. It gets worse.

Additional notes and warnings of unreliability and of no association with Great Bear conditions on this single page further emphasize how these predictions for the MFTP are to the point of simply being guesses:

"Table 2: Permeate and brine concentrations for additional parameters in the feed (These values are not from the WAVE projection but based on experience)"

MDAG Note: The predictions for nearly two dozens contaminants at Great Bear are not even based on Great Bear information, but simply on "experience" of someone from somewhere. It is ludicrous that influent Feed Concentrations for Great Bear, which should come from ML-ARD studies (see MDAG Section 6 above), are simply based on someone's "experience".

Note 3: "Temperature was not reported, and is the single most important parameter"

MDAG Note: Temperature "is the single most important parameter" for predicting MFTP performance, but this most important parameter "was not reported" for Great Bear.

Note 9: "Feed water quality is not complete (indicated by a dash "-") and vendors will be interested in parameters not listed in the table such as silica, Ba, Sr and other parameter, organics/TOC/BOC that could potentially lead to premature fouling"

MDAG Note: The lack of Great Bear information for the other, missing contaminants means that estimates of their treatment efficiency by the MFTP could not be guessed.

Note 10: "The provided permeate and brine concentrations are preliminary and are expected to change with changes in feed chemistry over time."

MDAG Note: Again, treated effluent concentrations increase with increasing influent feed chemistry. And increased influent chemistry substantially above that predicted for Great Bear in the Impact Statement is confirmed in MDAG Section 6 above. Thus, there will be higher-than-predicted effluent concentrations.

Great Bear has chosen partial water treatment followed by dilution in the Chukuni River. The neglect of its Impact Statement for much higher, partially treated effluent contaminant concentrations, due to unrecognized but foreseeable much higher influent concentrations, is a major failure of the Impact Statement. As a result, impacts of the Great Bear Project would be substantially higher than given in its Impact Statement, including on the Chukuni River. In turn, there is no way to identify reliable mitigation for the higher-than-estimated contamination if any mitigation is available at all.

7.3.3 The Primary Water Treatment Plant (WTP)

The third water-treatment plant planned for Great Bear is also ambiguous and missing important details and justification. Section 5.14.7 of the Impact Statement states:

"The primary WTP design is expected to include the following sequential treatment steps:

- Collection and preliminary treatment (neutralization and softening) through chemical and reagent addition, and aeration in reaction mixing tank(s) to facilitate metals removal from the contact water
- Flocculant addition to bind solids into larger, heavier flocs to settle out and create a precipitate sludge and produce a clarified solution
- Filtration to remove additional solids.

Sludge from the water treatment plant will be pumped to the tailings pump box for co-disposal with tailings. Additional treatment steps may be added during detailed design as needed."

Section 4.4.6 adds:

"The treatment technology will be determined during detailed engineering design."

This is alarming because the nearby minewater-treatment plants at Madsen and RLO cannot achieve more lenient limits than Great Bear is targeting (see MDAG Section 7.1 above). Thus, there is no evidence that Great Bear will do any better and there is a higher probability that Great Bear will do worse.

What confidence does the Great Bear Impact Statement place on the predicted partially-treated, still-contaminated WTP effluent that will be disposed in the Chukuni River? Obviously very little, with Table C-2 of Appendix C of Appendix K-3 (PDF Page 193) pointing out:

Note 9: "The provided treated water qualities are estimates based on experience and projection results (not guranteed[sic])."

Note 10: "The treated water quality will change with changes in feed chemistry"

MDAG Note: ARD, higher near-neutral contamination, and missing contaminants were not included in the feed chemistry and thus treated water quality will be worse than currently predicted in the Impact Statement.

Note 11: "Testwork and vendor input is required to verify the data."

MDAG Note: Other than this single page saying additional testwork and input were needed for verification, Great Bear did not provide this additional testwork and input in the Impact Statement.

Additionally, Table 4-4 of Appendix K-3:

- uses the unreliable and likely underestimated partially treated contaminants from this WTP taken from someone's "experience",
- uses the treated concentrations from the MFTP that "do not reflect actual conditions" (Section 7.3.2), and
- ignores the additional and potentially toxic contaminants from the STP (Section 7.3.1).

Thus, Table 4-4 calculates the underestimated, year-by-year "Summary of Treated Effluent Discharge Quality (Annual Average)" with some predictions to several decimal places.

Because this Table 4-4 is "Annual Average", the weekly and monthly concentrations could vary perhaps tens times or more higher and lower than the stated Annual Average. These shorter-term peaks of contaminants for less than a full year could cause major adverse impacts in the Chukuni River, where the devastation of aquatic life over a few weeks would not recover in months or years despite later months having low concentrations. These major adverse impacts are not apparent in the Impact Statement because Great Bear reported only the steady-state and averaged concentrations (e.g., see MDAG Section 3.4).

Great Bear has chosen partial water treatment followed by dilution in the Chukuni River. The Great Bear Impact Statement ignores the potential for much higher partially treated effluent contaminant concentrations above and beyond someone's "experience", which is a major failure of the Impact Statement. As a result, impacts of the Great Bear Project would be substantially higher than given in its Impact Statement, including on the Chukuni River. In turn, there is no way to identify reliable mitigation for the higher-than-estimated contamination if any mitigation is available at all.

7.4 Planned Handling of Treatment Wastes That Would Significantly Raise Contaminant Levels above Current Predictions at, around, and beneath the Great Bear Site and That May Be Contrary to the Ontario Hazardous-Waste Regulation

As explained above in Section 7.3, there are three proposed water-treatment plants for Great Bear during proposed operation. The still-contaminated treated-water effluents were discussed above, whereas this Section 7.4 focuses on the fate of their contaminated treatment wastes containing whatever contaminants and treatment reagents are removed from the water. The treatment wastes from all three plants will likely be some form of toxic, leachable, and/or liquid hazardous waste.

Hazardous waste in Ontario is managed through a strict regulatory framework (Regulation 347) requiring it to be tracked, stored, transported, and treated via recycling, recovery, or safe disposal to protect public health and the environment. Hazardous-waste generators, likely including Great Bear, must register, and hazardous materials are typically disposed of through specialized, approved, or municipal facilities. The proposed handling and storage of STP sludge appear consistent with Regulation 347 (Section 7.4.1), whereas the handling and dumping of the other two treatment wastes appear contrary to Regulation 347 (Sections 7.4.2 and 7.4.3).

It is notable that the likely toxic sewage sludge will be "vacuum-trucked to a licensed facility", whereas the two water-treatment wastes which are also likely toxic, as well as hazardous waste, will be simply disposed in the TMF and West Viggo Management Facility. If this is allowed, then the TMF and the West Viggo Management Facility should be designed, built, and monitored as "licensed facilities" under onerous conditions for permitting and disposal of hazardous waste.

7.4.1 Sewage Treatment Plant (STP)

The first of three proposed Great Bear water-treatment plants is the domestic Sewage Treatment Plant (STP). The quality of its treated water, likely with remnant toxic contaminants, that would be disposed into the Chukuni River remains unknown and not discussed in the Impact Statement (Section 7.3.1). Nevertheless, its treatment waste ("sludge") that would likely be hazardous waste is explained clearly and concisely by Section 5.16.2 of the Impact Statement:

> "Sewage sludge from the plant is proposed to be vacuum-trucked to a licensed facility located off site, such as the Red Lake or Ear Falls wastewater treatment plant."

It is very important to remember that the disposal of the STP treatment waste sludge involves "a licensed facility" which is located "off site". This is important to remember because the toxic and likely hazardous treatment waste from the remaining two treatment plants will be disposed on site at Great Bear and not in licensed facilities. Instead, these other treatment wastes will likely leach into the Great Bear environment and/or redissolve into the recirculating water and the fugitive seepage from Great Bear, increasing contamination far above that currently estimated in the Impact Statement.

7.4.2 Membrane Filtration Treatment Plant (MFTP)

The proposed Membrane Filtration Treatment Plant at Great Bear (MFTP, see MDAG Section 7.3.2) would not create a solid or paste waste-treatment "sludge" like the other two treatment systems. Instead, it would create a very dense "reject solution", like seawater or brine, toxic to freshwater life that the Impact Statement erroneous views and simulates as water similar to other surface waters and groundwaters around Great Bear but simply with higher concentrations. This erroneous understanding of the unique physics and chemistry of this dense reject solution at Great Bear leads to a fatal flaw requiring major redesign of the Great Bear site and rejection of the Impact Statement.

The first aspect of the fatal flaw is the false belief that this high-density, high-contaminant, toxic reject solution can be used and thus disposed in the cemented paste backfill of the underground mine. This reject solution would include very high sulphate concentrations and other ions that would destabilize most cement formulations and thus cause the cement to not set and to not provide the geotechnical strength needed for ground support underground. Roughly 75% of the reject solution (~3,100,000,000 liters per year based on Table 5-1 of Appendix I-2) would be used underground and thus consumed in paste backfill according to the Impact Statement (e.g., Table 5-1 of Appendix I-2):

> "Reject solution will be held temporarily in the holding pond, then sequestered to the underground mine within the paste backfill. Reject solution that cannot be used in paste backfill or held in the holding pond will be pumped to the west VMF. Reject solution and contact water in the west VMF will be stored below the saddle elevation to keep it separate from the east VMF... During the first 12 years of operations in all modeled scenarios, the amount of reject solution produced is less than what may be used in paste backfill. Therefore, no reject solution is pumped to the west VMF. Shortly after Year 12, paste production will slow and the amount of reject solution produced will exceed what can be used in paste backfill. At this time, excess reject solution will be pumped to the west VMF. "

The proposed usage of any water other than relatively clean, low-contaminant water is typically tested in advance at Canadian mines to learn if it is compatible with cemented paste backfill. Apparently, this was not done for the Great Bear Impact Statement, and it is likely most to all of the reject solution cannot be used underground in paste backfill. It is telling that the geochemical tests done on Great Bear paste backfill did not use reject solution and thus the paste backfill was stable and the contamination from its seepage ("bleed water") was unrealistically low (Section 4.11.5 of Appendix K-2). As a result, virtually all reject solution would have to be stored on surface, starting at the beginning of mining (Year 1) and not Year 12 as the Impact Statement assumed.

This leads to the second aspect of the fatal flaw. At the surface, the remaining ~25% of the reject solution would be stored in the mined-out West Viggo Management Facility (West VMF, e.g., Section 5.14.7 of the Impact Statement). However, due to likely incompatibility with cemented paste backfill, then the required total 100% surface storage for all reject solution is equivalent to four West

VMFs, which does not exist in the Great Bear design.

The third aspect of the fatal flaw flows from the fact that Great Bear would not be able to safely store all reject solution. As a result, the MFTP could not be operated because 100% of the reject solution could not be safely stored. In turn, this means that high, elevated levels of sulphate and many other contaminants would not be removed from Great Bear effluent waters as currently planned. Instead, these high levels of sulphate and other contaminants would be discharged into the Chukuni River where they would contaminate the River water far greater than currently estimated and could greatly accelerate methylation. A new alternatives assessment, a site redesign, and a higher water to make paste backfill taking would likely be needed to determine if a viable alternative was available.

The fourth aspect of the fatal flaw is thMay 27, 2026e Great Bear design to store the reject solution in the unlined West VMF under the false belief the reject solution would remain contained in the West VMF. In reality, this dense water would not flow like relatively fresh water around Great Bear, but could instead move in a different direction, even opposite, depending on the Equivalent Porous Medium (EPM) assumed at Great Bear (see MDAG Section 3.3 above).

Hydrogeologists are trained and familiar with dense waters moving as separate masses independent of surrounding groundwaters. Saltwater intrusion due to rising ocean levels and climate change is an often-taught example. Thus, the Impact Statement contains incorrect statements like:

> "Reject solution that is pumped to the west VMF will mix with local inflows (runoff and groundwater). The mixed solution will be stored until the end of operations." (Section 4.4 of Appendix I-2)

It is interesting that the Impact Statement contains statements about the Great Bear groundwater model showing that water will only flow into the West VMF and no contaminated water like reject solution would flow out of it. For example, Section 4 of the Impact Statement states:

> "[groundwater] modelling has determined reject solution storage in the west VMF would be effective during operation" (Table 4.13-1 of Section 4)

However, this is misleading. The Great Bear groundwater model was instructed to not let any water including the dense reject solution flow out of the West VMF by forcing a model boundary condition on the West VMF:

> "To simulate the fully dewatered conditions for open pits (Scenarios 2 to 5 for LP Central pit and Scenario 2 for Viggo pit), outflow-only 1st type boundary conditions were applied to the open pit outer boundaries with inner pit cells deactivated." (Section 4.1.2.2 of Appendix H-2)

"1st type boundary condition" is a "Constant Head" condition (Section 3.1.3 of Appendix H-2). Thus, the simulated water table immediately outside the pits and the West VMF was manually forced to stay high and not fall as local groundwater drains inward. This artificially ensures no water can leave the West VMF and pits including the reject solution. In reality, the dense reject solution can be expected to disobey the modellers' instructions and force its way out of the West VMF and into the surrounding environment. Many more major errors rendering this Great Bear groundwater model unreliable and misleading were discussed above in MDAG Section 3.

The fifth aspect of the fatal flaw occurs at closure where:

> "reject solution would be pumped into the underground mine for permanent storage during closure".

In reality, this dense reject water would not remain in "permanent storage" in the underground mine but force its way outward into the surrounding groundwater system due to its significantly higher density, just as it would in the West VMF.

In summary, there is a fatal flaw in the Great Bear Impact Statement related to the waste Reject solution from the MFTP, rendering the Impact Statement invalid and environmentally dangerous to the local environment and the Chukuni River. This is part of the Impact Statement's major failure to safely and securely manage and store hazardous water-treatment wastes to protect public health and the environment as expected in hazardous-waste regulations like Ontario Regulation 347.

7.4.3 Primary Water Treatment Plant (WTP)

The generic and ambiguous Water Treatment Plant (WTP, MDAG Section 7.3.3) will treat a subset of contaminants at Great Bear estimated based on someone's "experience", including metals and pH control. This WTP will also have to treat very toxic, high-contamination acid rock drainage (ARD) within years of mining.

Such treatment sludge from pH control and metal precipitation is typically leachable hazardous waste that can redissolve and release its contamination when stored under conditions unlike those at which it formed. At pH levels differing from the pH of its formation (e.g., ~pH 10), this leachable hazardous sludge will dissolve. When buried under mine waste away from air, under anoxic conditions, this leachable hazardous waste will dissolve. Its dissolution leads to additional water contamination not predicted in the Great Bear Impact Statement.

Where would the treatment waste from this WTP be safely stored and managed consistent with Ontario Regulation 347? Section 5.14.7 of the Impact Statement explains:

> "Sludge from the water treatment plant will be pumped to the tailings pump box for co-disposal with tailings. Additional treatment steps may be added during detailed design as needed."

Thus, the WTP leachable hazardous waste will not be safely managed and not securely stored like STP waste. Instead, it will be co-disposed with tailings in the TMF, at a different pH and buried with tailings under anoxic conditions, which are the perfect conditions for it to redissolve into the tailings porewater.

From there, the major irrefutable errors in the Great Bear Impact Statement (see MDAG Section 2 above) say, all simultaneously, that:

- This redissolved contamination will only stay in the recirculated water (see Figures 2-3 and 2-4 above). This would cause the contaminant levels to consistently increase to higher and higher levels through time, with some occasionally removed for treatment that would re-create treatment waste from which it originated.

- This redissolved contamination will also never move because the water is “locked” in place in the tailings.
- This redissolved contamination will also drain out the bottom of the TMF where it will both (1) enter the surrounding environment and (2) not enter the surrounding environment and instead be caught by pump wells where it will be placed back into the recirculating water to consistently increase its contaminants to higher and higher levels.

This is the self-contradicting errors and nonsense that mark this Great Bear Impact Statement, as pointed out throughout this MDAG document. These errors affect many issues, like treatment waste discussed here, whose impacts cannot be reliably assessed for Great Bear.

7.5 Summary

The Great Bear Impact Statement proposes to only partially treat its contaminated water with three water-treatment plants and then take advantage of dilution in the Chukuni River to lower its still-contaminated concentrations in mg/L further by increasing contaminant loadings in kg/day in the River. Therefore, reliable estimated impacts on the Chukuni River by Great Bear's effluents are critical for safe environmental protection. However, the Great Bear Impact Statement fails greatly by underestimating its treated-effluent’s impacts due to:

1) the release of additional but ignored contaminants causing additional but ignored impacts, and
2) the release of substantially higher levels of contaminants than the estimated impacts are currently based on.

As a result, impacts of the Great Bear Project after water treatment, including in the Chukuni River, would be substantially higher than given in its Impact Statement. In turn, there is no way to identify reliable mitigation for the higher unpredicted contamination or whether any sufficient mitigation is available at all.

As further evidence, the two single pages in the Impact Statement on which water treatment, and thus impacts to the Chukuni River, are based explain clearly that the stated predictions of treatment at Great Bear in the Impact Statement:

- “do not reflect actual conditions”,
- require additional verification by Great Bear,
- are “preliminary” in places,
- are “based on experience” of someone somewhere with no confirmation of relevance to Great Bear,
- will worsen with increasing influent concentrations (as confirmed in MDAG Section 6), and
- are missing critical input parameters like temperature.

Because Great Bear has chosen to depend on water treatment to protect the environment including the Chukuni River, these two pages show that estimated impacts in the Impact Statement based on treatment are very likely wrong and underestimated. Thus, the Great Bear Impact Statement fails to reliably identify impacts and mitigations that would occur at the Great Bear site and in the Chukuni River.

Additionally, the planned unsafe handling and disposal of hazardous water-treatment wastes at Great Bear ensure the treatment waste will further contaminate the surrounding environment beyond that estimated in the Impact Statement. For the treatment waste from Membrane Filtration, there is a fatal flaw that would preclude Great Bear from being built as designed.

8. Failure of the Great Bear Impact Statement to Meet IAAC Instructions under Tailored Impact Statement Guidelines to Provide Potential Changes to Surface-Water Quality by Fugitive Dust

In the Great Bear Impact Statement, Appendix A-2: Concordance Table for IAAC Submission 1 to the Tailored Impact Statement Guidelines ("Federal Guidelines") states under Part 8.6.2 (PDF Page 13) that:

> "Effects to groundwater and surface water" are to include "potential changes to surface water quality due to the generation and deposition of dust and particulate matter and any contaminants they contain (such as metals, mercury, methylmercury)"

MDAG note: the "contaminants they contain" and their leachability would come from ML-ARD geochemical studies in the Impact Statement like Appendix K-2.

This Concordance Table indicates Great Bear fulfillment of this requirement on contaminated dust is supposedly found in "Key Text" "S[ection] 7.7", "Ap[pendix] K-2", and "Ap[pendix] K-3".

These required changes to water quality are difficult to locate in the Impact Statement and are grossly underestimated based on a self-contradicting error. Thus, the Great Bear Impact Statement fails to reliably meet IAAC condition on water-quality impacts by fugitive contaminated dust and air emissions.

Section 7.7 of the Impact Statement that supposedly provides "changes to surface water quality" does not provide such changes. Nevertheless, there is recognition of fugitive contaminated dust, such as during operation of Great Bear:

> "Fugitive dust emissions and subsequent deposition on surface water features from the mining of the LP Central pit and management of rock and unconsolidated materials in stockpiles, the construction of a MWP and progressive reclamation activities."

However, there are no estimated changes.

Instead, Section 7.7.6 on Mitigation states:

> "A dust management plan will identify sources of dust, outline control measures and specify inspection and record-keeping to support effective management and to minimize the potential for fugitive dust deposition on the surface water receiving environment. For example, dust from roads and stockpiles will be controlled with water sprays and, if needed, dust suppressants; additional mitigation and management measures for fugitive dust are provided in Section 7.2.6."

Just as water treatment at Great Bear will still release contaminated water (see MDAG Section 7 above), so dust management will only reduce but not eliminate fugitive contaminated dust. "Changes to surface water quality" are still not provided.

The quoted "Section 7.2.6 " is entitled "Mitigation and Enhancement Measures". It states:

> "A dust management plan will be prepared prior to the construction phase that will be modified for the operations phase and closure phase as appropriate, to identify potential sources of fugitive dusts, outline mitigation measures that will be employed to control dust

> generation, and detail the inspection and record keeping required to demonstrate that fugitive dusts are being effectively managed. "

There are no "changes in water quality" in this Section 7.2.6 either, but it appears the Impact Statement assumes its dust management would be 100% effective 100% of the time which is false.

Turning to Appendix K-2, there is no mention of "dust" at all in its 125 pages. Thus, it is erroneous for the Impact Statement to say that Appendix K-2 fulfills the IAAC condition as Key Text.

Turning to Appendix K-3, Appendix K-3 states:

> "Metal loading rates from dust deposition were estimated by multiplying the measured dust deposition rate at each point (in grams per square metre) by the total surface area of the upstream waterbody or watercourse for each node. This calculation provided an estimate of the total dust deposited on surface water upstream of each receiver node. These values were then combined with whole-rock metal geochemical test results for mine rock to determine the associated metal loadings."

First, "whole-rock metal geochemical tests results" by definition do not include trace elements like mercury and arsenic. Appendix K-2 includes analyses for trace elements like mercury and arsenic, but these are based on a different analytical technique. However, this analytical technique as used by Great Bear was typically applied to partially digested samples so that only a portion of trace elements like mercury and arsenic were detected, with some later samples analyzed for full amounts. Therefore, it is not clear whether Appendix K-3 included only partial or full amounts of trace elements for the fugitive dust.

Second, during construction, little reactive mine waste would be exposed so that fugitive contaminants found in rock and tailings would obviously be minimal. On the other hand, during operation, there would be large wind-exposed surfaces on hundreds of millions of tonnes of contaminated mine wastes, including 300 hectares of wind-blown tailings in the TMF with no ponded water by design (e.g., see MDAG Section 2 above), the Mine Rock Stockpile, the Overburden Piles, and other components.

Therefore, wind-blown fugitive contamination, in grams per second, can reasonably be expected to be orders of magnitude higher in contaminants like mercury and arsenic from these large minesite components at Great Bear during Operation than during Construction. Remarkably and in contradiction, Section 7.2 of the Impact Statement estimated that releases of toxic elements like mercury and arsenic in grams per second from the Great Bear site would be lower during Operation than during Construction (Tables 7.2-5 and 7.2-7 of Appendix K-3) as summarized in Table 8-1 below.

This gross underestimation likely by orders of magnitude also applies to other contaminants like (1) SiO_2 which is a major component of Great Bear rock, tailings, and overburden, and (2) cyanide (HCN) which should be much higher during operation due to cyanide usage for processing and volatilization from the many water flows containing some process water (see Figures 2-3 and 2-4 above). Yet somehow the HCN emission rate during operation is anomalously the same as construction.

Table 8-1. Air emission rates of contaminants from the Great Bear site during Construction and Operation Phases at the off-site Point of Impingement (POI), anomalously showing lower or similar rates during Operation than Construction despite several hundreds of hectares of wind-exposed mine wastes like fine-grained tailings and blasted mine rock, apparently with Great Bear unrealistically assuming virtually 100% effective dust suppression 100% of the time during Operation but failing to estimate related water-quality impacts as instructed by IAAC Condition 8.6.2 in the federal Tailored Impact Statement Guidelines

	grams of contaminant per second		kilograms of contaminant per yr
Contaminant	Construction Phase[1]	Operation Phase[1]	Operation Phase
Arsenic	0.057	0.047	1,480
Mercury	0.000019	0.000015	0.47
Cyanide (HCN)	0.56	0.56	17,700
SiO_2[2]	2.3	1.8	56,800
Copper	0.022	0.018	568
Zinc	0.16	0.13	4,100
SO_2[3]	3.2	2.8	88,300

[1] Values taken from Tables 7.2-5 and 7.2-7 of Section 7 of the Great Bear Impact Statement, with Operation values likely orders of magnitude underestimated as explained in the text; values for Point of Receptor (POR) in Tables 7.2-6 and 7.2-8 are similar.

[2] A major part of more than one hundred million tonnes of Great Bear rock, tailings, and overburden planned for mining during Operation, but relatively minimal during Construction.

[3] SO_2 gas can form sulphate in the air, which is then deposited into waters and soils where it can increase mercury methylation under certain conditions.

It is irrelevant here whether Project Concentrations in ug/m^3 of air exceed Ambient Air Quality Criteria, as Tables 7.2-5 to 7.2-8 in the Impact Statement emphasize, because:

1) mercury, arsenic, and other elements would be in more reactive leachable forms in mine-waste dust due to disturbance, blasting, hauling, crushing, and disposal, and
2) Part 8.6.2 of the Tailored Impact Statement Guidelines specifically requires “potential changes to surface water quality” and not air quality.

Multiplication of the estimated emission rates in grams per second for Operation provides contaminant emission rates in kilograms per year (see the right column of Table 8-1). For mercury and arsenic, this yields 0.47 kg of mercury/yr and 1.5 tonnes of arsenic/yr from the Great Bear site, which should be orders of magnitude higher than construction but for unknown reasons are not. Even these underestimated emission rates from fugitive dust alone can lead to significant additional environmental impacts and mercury methylation than included in the Great Bear Impact Statement. Much higher emission rates of other contaminants (Table 8-1) are predicted for other contaminants like cyanide, SiO_2, and SO_2 that can be deposited in waters and air as sulphate.

Returning to Appendix K-3 and the quotation above on "Metal loading rates from dust deposition ...", Appendices B and D of Appendix K-3 provide some numerical watershed-based estimates of "Sulphate Dust Loads" multiplied by "Freshwater (Runoff Only)" to obtain "Sulphate mg/L" in surface water at various locations in Dixie Creek and the Chukuni River. These appendices show that watershed-wide Sulphate Dust Loads, carried by watershed-wide surface runoff into Dixie Creek and the Chukuni River, can add up to a few mg/L of sulphate to these surface waters. This is a significant impact for Dixie Creek and the Chukuni River. This impact is based on Sulphate Dust Loads of approximately 0.00002 to 0.00007 grams per second in the Dixie Creek watershed below Node DIX-1 to DIX-5, and similarly Loads of approximately 0.00005 grams per second in the Chukuni Watershed between upstream and downstream of the Dixie Creek confluence.

The major error here is that Appendices B and D of Appendix K-3 grossly underestimate the impacts of sulphur in fugitive air emissions using approximately 0.00005 grams per second, compared with Section 5's air-quality impacts (copied in Table 8-1 above) based on 2.8 grams per second for SO_2 representing sulphate. Thus, Section 5 of the Impact Statement indicates that Appendix K-3's calculated impact of air emissions on aqueous sulphate is roughly 50,000 times too low. In fact, Appendix K-3's rate of roughly 0.00005 grams per second for sulphate is lower than all rates in Table 8-1 except highly toxic mercury itself with a roughly similar rate. Therefore, there is a major self-contradicting error in the Impact Statement, spanning up to several orders of magnitude, between air emissions and the unexplained very small associated impacts of substantially lower air emissions on water quality.

Therefore, the Great Bear Impact Statement fails to reliably meet IAAC Condition 8.6.2 in the federal Tailored Impact Statement Guidelines for water-quality impacts by fugitive contaminated dust. The Great Bear response to "potential changes in water quality" by fugitive dust were said to be presented in "Key Text" "S[ection] 7.7", "Ap[pendix] K-2", and "Ap[pendix] K-3" according to Appendix A-2.

- The Key Text of Appendix K-2 fails to mention "dust" at all.
- The Key Text of Section 7.7 contains a major error with air-quality emission rates of several contaminants like mercury and arsenic estimated to be <u>lower</u> during operation than during construction. This is not reasonable because Great Bear operation after construction would create hundreds of wind-exposed hectares with hundreds of millions of tonnes of mine waste including intentionally unsaturated fine-grained tailings, overburden, and blasted, reactive mine rock. Even at the current significantly underestimated rates in the Impact Statement, the Great Bear site will likely release much more than 0.47 kg of mercury/year and 1.5 tonnes of arsenic/year <u>due to fugitive air emissions alone.</u>
- The final Key Text of Appendix K-3 addresses water-quality impacts of fugitive air emissions by (1) not explaining the source of the primary deposition rate and (2) explaining the levels of the many contaminants in dust were determined by a laboratory analytical method not

capable of measuring many of these contaminants. The air emissions used in the Key Text of Appendix K-3 are up to orders of magnitude lower (up to ~50,000 times lower) than the air emissions stated in Key Text of Section 7.7, which is another self-contradicting error in the Impact Statement. Furthermore, much higher emission rates are predicted for other contaminants like cyanide, SiO_2, and SO_2. SO_2 can convert to sulphate deposited into waters and soil that might stimulate methylation. Realistic impacts of these contaminant loadings in air emissions on water quality and terrestrial toxicity remain grossly underestimated in the Impact Statement and could be orders of magnitude worse than currently estimated.

9. Conclusion

In 2026, Kinross Gold and Great Bear Resources submitted a large Impact Statement (IS) for mining of the Great Bear gold deposit. This Impact Statement consists of dozens of numbered sections and lettered appendices, cumulatively reaching tens of thousands of pages, with many different authors and completion dates.

This MDAG document reviewed many relevant sections and appendices, showing that the Great Bear Impact Statement:

- is self-contradictory on major and primary issues,
- contains self-generated irrefutable errors that nullify and void the Impact Statement, and
- fails in its objectives to reliably identify and mitigate serious adverse impacts on the surrounding environment such as Dixie Creek and on the Chukuni River.

Nevertheless, there is sufficient information to conclude that the construction, operation, and closure of the Great Bear site would cause far greater impacts than the Impact Statement estimates. In other words, the Great Bear Impact Statement underestimates the numbers, extents, and severities of impacts that can be expected at the Great Bear Project. As a consequence, the proposed mitigations by Great Bear to minimize impacts on the local environment and the Chukuni River would likely fail.

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