Kivalliq Inuit Association
ᑭᕙᓪᓕᕐᒥ ᐃᓄᐃᑦ ᑲᑐᔾᔨᖃᑎᒌᑦ

ᑎᑎᖅᑲᖅᑲᕐᕕᖓ P.O. Box 340
ᑲᖏᖅᖠᓂᖅ, ᓄᓇᕗᑦ Rankin Inlet, Nunavut
X0C0G0

Water Licence 2AM-WTP1830, 2AM-MEA1530

DATE: March 2, 2026

SUBJECT: KIA comments on the updated Interim Closure and Reclamation Plan (ICRP) for the Meadowbank Complex

ᐊᕐᕕᐊᑦ
Arviat

ᖃᒪᓂᑦᑐᐊᖅ
Baker Lake

ᐃᒡᓗᓕᒑᕐᔪᒃ
Chesterfield Inlet

ᓴᓪᓕᖅ
Coral Harbour

ᓇᐅᔮᑦ
Naujaat

ᑲᖏᖅᖠᓂᖅ
Rankin Inlet

ᑎᑭᕋᕐᔪᐊᖅ
Whale Cove

Dear Mr. Dwyer,

The Meadowbank Gold Project, operating on Inuit Owned Lands near Baker Lake, marks the first project to close on Inuit Owned Lands since the signing of the Nunavut Agreement in 1993. We recognize that many Kivallirmiut have benefited from the project since operations began in 2010; it is essential that the project closure plan ensures that there are no detrimental and negative impacts of the project in the post-closure period. The Closure and Reclamation Plan must be compatible with Inuit Traditional Land Use, and meet all other regulatory requirements.

To this end, The KIA has engaged with Agnico Eagle over the past 14 month to better understand the design and environmental implications of the Updated ICRP. This engagement took the form of in-person and virtual meetings, site visits, and the exchange of Information Requests and Technical Comments. While many issues were resolved during this period, some concerns remain outstanding, and they are presented in the technical comments in this document. Further, the KIA recognizes that this is not the Final Closure and Reclamation Plan, and reserves the right to make additional comments on the closure of the Meadowbank Complex.

Thank you for the opportunity to participate in this review.

Sincerely,

Luis Manzo P, Ag.
Director of Lands
Kivalliq Inuit Association
Tel: (867) 645-5731
dirlands@kivalliqinuit.ca

Technical Comments

1. Arsenic Water Quality Objectives and Traditional Use

Inuit routinely drink water from the land without any additional treatment. The water quality forecasts at the Amaruq site for closure predicts arsenic concentrations that exceed Canadian Drinking Water Guidelines (CDWG) of 0.010 mg/L, and as low as reasonably achievable. Arsenic is a documented human carcinogen, and this value was determined by Health Canada as minimizing health impacts due to ingesting arsenic, while being achievable in municipal drinking water at a reasonable cost. Arsenic concentrations at the Amaruq site, specifically at Kangislulik Lake, Whale Tail North, Lake A15, and Lake A12, exceed the CDWG at post-closure, persisting to as long as 2065 in the current model. These values are summarized in Table 1.

The Proponent should manage water treatment at Amaruq to ensure that water in lakes in the post-closure period is safe for Inuit Traditional Use.

Table 1. Post-Closure As Concentrations in Select Lakes

Lake	**Baseline Concentration (mg/L)**	**Maximum Concentration in Post Closure (mg/L)**	**Date Canadian Drinking Water Quality Guidelines are met (0.010 mg/L)**
Whale Tail North	0.00013‡	0.024	2065
Kangislulik Lake	~0.0005	0.016	2061
Lake A15	0.00032	0.0122	2052
Lake A12	0.00032	0.012	2049

‡*Baseline concentration for Whale Tail measured in the South basin prior to mining*

2. Vault Pit Lake

The KivIA recommends that the design of the Vault dike breach limit the exchange of water from the downstream environment (ie, a spillway), and limit fish passage into the pit lake.

Kivalliq Inuit Association
ᑭᕙᓪᓕᕐᒥ ᐃᓄᐃᑦ ᑲᑐᔾᔨᖃᑎᒌᑦ

ᑎᑎᖅᑲᒃᑲᕕᖓ P.O. Box 340
ᑲᖏᖅᖠᓂᖅ, ᓄᓇᕗᑦ Rankin Inlet, Nunavut
X0C0G0

3. Tailings Storage Facility

The following is a summary of the technical review completed by Pinchin Ltd. And Geochange on the water saturation approach and the thermal modeling. The detailed review comments are available in Appendix 1, attached to this technical memo.

3.1 Water Saturation Approach

The water saturation approach for the Meadowbank Tailings Storage Facility (TSF) involves maintaining a minimum water content of the tailings of 85% by controlling the water levels within the impoundment. This will be an effective approach as long as water levels in the tailings are very carefully managed. This will require a robust water level/tailings saturation monitoring program to ensure that saturated conditions are maintained. In addition, an active water management program is required to assess the data against predictions on an on-going basis to allow adjustments as required to water and tailings management.

3.2 Thermal Model Review

The modelling framework and software selection are appropriate and consistent with standard industry practice. However, as presented;

- The modelling supports 4 metres of cover for maintaining frozen tailings conditions to 2100.
- The modelling demonstrates measurable thaw under 2 metres of cover.
- Calibration transparency is limited.
- Climate envelope justification is not fully documented.
- Sensitivity analysis is absent.
- Thaw duration and volumes are not quantified.
- Settlement implications of thaw are not evaluated.

Based on the information provided, the modeling results do not clearly demonstrate that a 2 metre cover maintains frozen tailings conditions under projected climate forcing, and the accompanying analysis and use of these results to justify reducing the cover from 4 metres to 2 metres are limited. Additional documentation and clearer linkage to closure performance objectives would be required to support reduction from 4 metres to 2 metres on thermal performance grounds.

If the 2 metre cover is advanced, a strengthened thermal analysis framework and monitoring plan would be necessary to manage long-term risk. Additional thermal analysis should include:

- Sensitivity modelling under SSP5-8.5.
- Time vs temperature projected profiles within tailings.
- Quantification of thaw duration and volume.
- Settlement modelling incorporating, if possible, adequate thaw-dependent compressibility.
- Clear reconciliation between thermal performance and closure risk framework.

☎ (867) 645-5725 1-800-220-6581 (867) 645-2348 info@kivalliqinuit.ca www.kivalliqinuit.ca

ᑎᑎᖅᑲᖅᑲᕕᖓ P.O. Box 340
ᑲᖏᖅᖠᓂᖅ, ᓄᓇᕗᑦ Rankin Inlet, Nunavut
X0C0G0

If additional monitoring is pursued to strengthen confidence in long-term thermal performance of the TSF cover, the program should be designed t:

1) Directly measure the key boundary conditions controlling ground heat flux,
2) Track the evolving thermal state of the tailings and cover, and
3) Feed those observations into an updated model that can be periodically re-calibrated and re-run to refine the predicted thaw timelines.

While there is already a network of vertical thermistor strings, an evaluation to ensure the following areas are well represented would be important:

- Cover profile (multiple sensors through the 2 metre cover thickness).
- Cover-tailings interface (highest value zone).
- Upper Tailings (er., first 2 – 5 metres).
- Deeper tailings (for thermal lag and long-term trend).
- Into underlying foundation material (to inform lower boundary behaviour).
- 'Background' location of undisturbed terrain, where a benchmark background thermal profile can be established.

Snow depth and snow distribution are among the most u=influential and most spatially variable drivers of ground thermal response. Site-specific snow monitoring would materially improve defensibility of projections. This could include:

- Continuous snow depth sensors on the cover surface and reference terrain.
- Seasonal snow surveys to capture redistribution.
- Where feasible, incorporate time lapse imagery and photogrammetry during winter to support spatial interpretation.

This site-specific data would provide confidence that the projected snow depth dataset aligns with historical site trends and allows a numerical model to reflect and incorporate measured snow data rather than relying solely on percentile projections.

Targeted measurements of climate data will better constrain surface energy balance terms that strongly influence thaw projections. These could include, but not be limited to:

- On-site albedo monitoring (or periodic field spot data collection), This would inform model values, as assumed high-percentage albedo can alter net radiation and warming.
- Local meteorological station continuity. Continued recording of Meadowbank site data collection, to build an expanding multiyear dataset for cycling in the numerical model.

ᑎᑎᖅᑲᕐᕕᖓ P.O. Box 340
ᑲᖏᖅᖠᓂᖅ, ᓄᓇᕗᑦ Rankin Inlet, Nunavut
X0C0G0

4. Financial Security

The proponent states* that certainty is required in order that the closure construction of the TSF can begin in 2026 and be completed by 2028 using the currently proposed water saturation approach with a minimum 2 metre cover. The proponent also states* that following completion in 2028 a reduction in security for the TSF will be requested.

The Kivalliq Inuit Association (KivIA) does not agree with a reduction in security for the TSF. The questions and comments in the thermal model review require responses that determine what impacts or changes may be required for the final design and closure strategy of the TSF. In addition, the KivIA holds the view that the security should not be reduced until the final design and closure strategy (i.e. Final Reclamation and Closure Plan) has proven its robustness into the Closure period.

*This information is found in the Summary report for the Interim Closure and Reclamation Plan for the Meadowbank Complex:

1) Executive Summary, page i, Paragraphs 3 and 4.

2) Section 6.0 - Permanent Reclamation and Closure / Sub-section 6.6 – Tailings Storage Facility, page 184.

February 27, 2026 PRIVATE & CONFIDENTIAL

GeoVector Management Inc
10 Green Street, Suite 310
Nepean, Ontario N2J 3Z6

E-mail: as.geovector@bellnet.ca

Attention: Alan Sexton, M.Sc., P.Geo.
Vice President Operations

Re: Technical Review of Proposed Tailings Cover
Meadowbank Mine
Pinchin File: 371029

1.0 INTRODUCTION & BACKGROUND

Pinchin Ltd. (Pinchin) was retained by GeoVector Management Inc (Client) to conduct a review of the proposed revised tailings cover design for the Meadowbank Mine. We understand that the Nunavut Water Board is currently reviewing the closure plan for the site and that review comments to the Board are required by February 27, 2026.

2.0 BACKGROUND

2.1 Proposed Tailings Cover Design Changes

Agnico Eagle Mines Limited (Agnico) is proposing an updated tailings cover approach at the Meadowbank mine to incorporate data acquired during monitoring at the site and to reflect more current approaches with respect to cover management.

3.0 REVIEW COMMENTS

3.1 Documents Review

The team reviewed the following documents related to the proposed cover design approach.

1. Interim Closure and Reclamation Plan for the Meadowbank Complex, Agnico Eagle, December 2025, Version 1.

   This document contains information on how the site will be closed and rehabilitated. It contains updated design, closure activities and monitoring data that have been collected since 2019, and consolidates closure approaches for the Meadowbank Mine and Whale Tail Mine into one document. The document also provides an updated estimate of financial liabilities related to closure. Information specific to closure of the Tailings Storage Facility (TSF) for the Meadowbank Mine is contained within Appendix 6J of this document, which is Document 2 below.

2. Evidence - Based Selection for Tailings Storage Facility Cover Configuration, Agnico Eagle, October 2025, Version A.

   This document describes proposed modifications to the TSF cover design and is the main document that has been assessed in Pinchin's review. This document contains the following three appendices that have also been important in our review:

   - Independent Review Board Letter of Recommendation
   - Meadowbank TSF Cover Sensitivity Methods
   - Simple Thermal Modelling Methods

   The original TSF cover design was prepared when Cumberland owned the site. The Project Certificate issued at that time contained the following Terms and Conditions related to TSF cover:

   Terms and Condition 18 (TC18)– *Cumberland (the owner) shall commit to a pro-active tailings management strategy through active monitoring, inspection, and mitigation. The tailings management strategy will include the review and evaluation of any future changes to the rate of global warming, compliance with regulatory changes, and the ongoing review and evaluation of relevant technology developments, and will respond to studies conducted during the mine operation.*

   Terms and Condition 19 (TC19)– *Cumberland (the owner) shall provide for a minimum of two (2) metres cover of tailings at closure and shall install thermistor cables, temperature loggers, and core sampling technology as required to monitor tailings freezeback efficiency. Cumberland shall report to NIRB's Monitoring Officer for the annual reporting of freezeback effectiveness*.

From the above terms and conditions of the approval it is apparent that potential adaptations were anticipated and indeed even recommended as data were acquired during site monitoring and as a result of the evolution of knowledge regarding climate change. Page 4 of Document 2 states – *As Prescribed by TC18, Agnico Eagle has evaluated technological development and reviewed changes in understanding of climate change. Where Cumberland only considered only considered thermal effects on metal leaching, Agnico Eagle has furthered considered the effect of saturation. Where TC19 was solely based on thermal assessment, Agnico Eagle is now considering thermal and water saturation when determining metal leaching potential*.

Pinchin's review therefore focuses on the updated approach incorporating tailings water saturation and the thermal modelling that was conducted to support the cover approach.

3.2 Thermal Model Review

The review of the thermal modelling was conducted by Geochange. Please see the memorandum in Attachment I for the review results. The main conclusion of the review was that "*Based on the information provided, the modelling results do not clearly demonstrate that a 2 m cover maintains frozen tailings conditions under projected climate forcing, and the accompanying analysis and use of these results to justify reducing the cover from 4 m to 2 m are limited. Additional documentation and clearer linkage to closure performance objectives would be required to support reduction from 4 m to 2 m on thermal performance grounds*". Section 9 of the memo in Attachment I provides recommendations.

3.3 Water Saturation Approach

Acid rock drainage (ARD) is generated when oxygen and water are in contact with sulphides that are present in the rock. All three of these components are required for acidic drainage to occur. The objectives of the updated proposed Meadowbank TSF cover are to maintain saturation in the tailings to prevent/minimize oxygen transfer into the tailings and to maintain the tailings in a frozen state.

Water covers/saturation barriers have become a widely-accepted means of ARD prevention for sulphidic material such as waste rock and tailings. In some cases this is accomplished by placing waste rock in a flooded pit to prevent oxygen contact or maintaining sulphidic material in a water saturated state by controlling water levels within tailings impoundments.

The water saturation cover approach for Meadowbank involves maintaining a minimum water content of the tailings of 85% by controlling the water levels within the impoundment. In this scenario the cover plays a limited role in limiting oxygen because the main control of oxygen ingress will be water present within the pores of the tailings. With this approach a cover is necessary to provide physical stability to the tailings storage facility, but it is the water saturation of the pores maintained by an elevated water level within the tailings that controls oxygen contact with the tailings. We consider this to be an effective approach as long as water levels in the tailings are very carefully managed. A robust water level/tailings saturation monitoring program is required to ensure that saturated conditions are maintained, and an active water management program is required to assess the data on an on-going basis and adjust the water management plan where necessary.

4.0 REVIEW TEAM MEMBERS

The review regarding water saturation was conducted by Byron O'Connor and Phil Tibble of Pinchin Ltd while the thermal model review was conducted by Ryley Beddoe. Their bios are provided below.

Philip Tibble, M.S.C., P.Geo. is a Senior Technical Manager (hydrogeology) in the Environmental Due Diligence and Remediation (EDR) group. Phil is a licensed geoscientist in Nunavut, NWT, British Columbia, Alberta, and Ontario.

Phil has 26 years of environmental consulting experience and has been involved in projects at a variety of exploratory, active, inactive, and abandoned mines across Canada including Ontario, Quebec, NWT and Nunavut. His mining experience includes assessing ARD/ML potentials from gold and base-metal mines. Mine site characterization in support of remediation and closure plans, He has evaluated cover performance via analysis of oxygen consumption dynamics and effluent analysis. Phil has also conducted site-wide hazard assessments across NWT/NU in support of Federal prioritization and reclamation programs.

Byron O'Connor, P.Eng. is the Vice President of Mining in the Environmental Due Diligence and Remediation (EDR) group. He is licensed in Nunavut and has project experience across the Arctic. He has worked on mining projects across Canada, including in the Yukon, NWT, and Nunavut and has done in-country mining work in Saudi Arabia, Kyrgyzstan, and Mongolia.

He has 38 years of environmental consulting experience and has been involved in environmental projects in all Provinces and Territories in Canada and in 11 other countries. His experience includes conducting site assessment, design and remediation work at sites impacted by petroleum hydrocarbons, chlorinated hydrocarbons, landfill leachate, and acid mine drainage. He has served as engineering manager on projects up to $50 million CDN and as project manager on projects up to $12 million CDN per annum. He has conducted numerous mine site assessments and prepared mine closure plans. He assessed the proposed tailings management approach with respect to water saturation.

Dr. Ryley Beddoe, PhD, P.Eng. is a Professor at the Royal Military College in Canada and holds a Canada Research Chair Tier II in Permafrost Engineering. She has a research program focused on understanding the overarching impact on geotechnical design driven by climate change in Canada's Arctic. Her research uses both physical modelling techniques as well as numerical model simulations to investigate the influence of climate on infrastructure, roads, and railways. Ryley is a founding partner of GeoChange, a specialized geotechnical engineering company that provides technical reviews and advanced thermal modelling expertise. She co-leads the GeoCORE Research group at RMC, and her research is supported by the Department of National Defence, Transport Canada, NSERC, Government of Northwest Territories, Alietum Ice, and the National Research Council. Professor Beddoe reviewed the thermal modeling.

5.0 CLOSURE

Please contact Byron O'Connor at 613.484.5607 or boconnor@pinchin.com with any questions regarding this review letter.

Sincerely,

Pinchin Ltd.

Prepared by:

Byron O'Connor, P. Eng (Nunavut)
Vice President, Mining

Reviewed by:

Phil Tibble, M.Sc., P.Geo.
Senior Technical Manager

\\Pinchin.com\kgn\Job\371000s\0371029.000 GEOVECTORMGMT,10GreenStNepean,EDR,Mining\Deliverables\371029 MeadowbankCoverReview GeoVectorManagement - DRAFT.docx

Template: Master Proposal Template, Engineering Services, ERC, July 18, 2024

Attachment I
Memorandum

GEOCHANGE

Memorandum

To: Byron O'Connor, PEng. VP-Mining, Pinchin Ltd.
From: Ryley Beddoe, PhD, PEng, GeoChange
Date: February 26th 2026
Subject: Technical Review of Thermal Modelling Supporting Reduction of TSF Cover Thickness from 4 m to 2 m – Meadowbank Complex

1. Overview

This memorandum provides a technical review of the thermal modelling presented Agnico Eagle Mines Ltd. (2025), Interim Closure and Reclamation Plan for the Meadowbank Complex, Appendix 6-J:Final Closure Design for North and South Cell TSF, Appendix C: Simple Thermal Modelling Methods. The modelling completed in Appendix C (SLR, 2025) was used to support the proposed reduction of the non-acid generating (NAG) rock cover thickness over the Meadowbank TSF from 4 m to 2 m.

The focus of this review is on model inputs, boundary conditions, transparency of calibration, interpretation of results, and the extent to which the modelling supports the design conclusion. In addition, the review includes suggestions regarding thermal monitoring instrumentation.

1.2 General Assessment of the Modelling Framework

The thermal modelling approach adopted by SLR is consistent with current standard practice for permafrost and cold-regions thermal assessments. The use of TEMP/W, a one-dimensional conductive heat transfer model with surface energy balance (SEB) boundary conditions, is appropriate for evaluating long-term thaw progression under projected climate forcing. The material property inputs, layered domain representation, and climate-driven boundary conditions align with common industry methodology for Canadian Arctic embankment and cover system assessment.

There is no indication that the modelling software or general framework is technically inappropriate. Based on the documentation provided, it is reasonable to conclude that the model results are likely internally consistent and technically valid within the assumptions and boundary conditions selected.

However, the ability to independently evaluate and/or fully interpret the results is limited by the absence of supporting detail in several key areas. Specifically, model inputs and calibration evidence, climate projections, sensitivity analysis, and meaningful temporal temperature metrics are not presented. While this does not invalidate the modelling, it materially constrains the ability to assess conservatism, uncertainty, and long-term resilience under alternate plausible climate trajectories.

With that context, the following sections address specific technical considerations.

2. Model Setup, Inputs, and Calibration

2.1 Model Inputs and Calibration

The thermal modelling inputs and calibration presented in Appendix C, Section 2.0, reference two key supporting datasets: previously developed climate projections extended to 2122, and prior calibration using site thermistor data and trial cell results. These references suggest that historical field data informed the modelling inputs.

However, the report does not clearly establish whether those calibrated climate datasets formed the base inputs for the present TEMP/W simulations. Section 3.1 indicates that initial temperatures were established using in-situ TSF thermistor data, yet the actual temperature profiles are not shown. There is no comparison between measured and simulated temperatures to demonstrate calibration accuracy or model fidelity prior to forward projection.

Given that long-term projections to 2100 are highly sensitive to initial conditions, this omission materially limits confidence in predictive reliability.

2.2 Model Setup and Bottom Boundary

The model domain extends approximately 55 m below ground surface, consisting of variable NAG rock cover thickness (1 to 4 m) over 25 m of tailings and 33 m of bedrock . This configuration is appropriate for a 1-D resolved conduction model. However, numerical resolution parameters such as mesh size and time step are not reported. Given that predicted thaw penetration into tailings under a 2 m cover is on the order of 0.6 m, spatial resolution is relevant to interpretation.

A constant upward heat flux boundary of 3.024 kJ/day/m² is applied at the bottom of the bedrock layer . For long-term projections extending to 2100, such an assumption may be reasonable, but on a ~55 m model, there was no mention, let alone sensitivity analysis presented to demonstrate robustness to lower boundary variation. In deep permafrost modelling, lower boundary stability assumptions can influence long-term thermal gradients, particularly under sustained warming scenarios.

3. Climate Boundary Conditions and Scenario Selection

3.1 Climate Scenario Envelope

Section 3.3 in Appendix C states that a 95th percentile climate projection dataset aligned with RCP4.5/ SSP2-4.5 was provided by the client and used for the thermal model. This represents a mid-range emissions pathway. Higher forcing scenarios (e.g., SSP5-8.5) were reported as assessed but not carried forward in the final modelling.

For a closure design intended to ensure long-term environmental protection and permafrost stability, the rationale for excluding higher emissions scenarios is not explained. While SSP2-4.5 is sometimes described as a “middle-of-the-road” pathway, long-term closure performance evaluations often consider bounding cases to understand risk exposure. Inclusion of a higher forcing comparison would have strengthened the evaluation envelope.

3.2 "95th Percentile" Parameters

Additionally, the model applies '95th percentile' values for air temperature, snow depth, and albedo. These parameters strongly influence surface heat flux and thaw depth. However, the derivation of these percentiles is not presented. There is no sensitivity analysis illustrating how variation in albedo or snow depth would affect thaw predictions. Snow depth, in particular, is a dominant control on Arctic ground temperatures due to its insulating properties, and interannual variability can substantially alter active layer development.

Without documentation of how the 95th percentile datasets were derived or how they compare to historical site records, it is difficult to evaluate whether the applied boundary conditions represent conservative, neutral, or potentially optimistic assumptions. This is of particular note regarding an albedo of 95th percentile, which could be significantly influence the heat that enters the soil cover, therefore the results.

5. Interpretation of Model Results

5.1 Overview

Table B of Appendix C indicates that:

- A 2 m cover results in approximately 0.62 m of thaw penetration into the tailings by 2100.
- A 3 m cover results in approximately 0.17 m of thaw.
- A 4 m cover results in no thaw penetration into the tailings.

The report concludes that approximately 4 m of NAG cover "may be sufficient to maintain the tailings in a frozen state year-round."

Importantly, the modelling does not demonstrate that 2 m of cover maintains frozen tailings. Figures presented for the 2 m scenario show thaw of the tailings occurring in each 5-year interval.

5.2 Lack of Quantification

The graphical model result summaries (Figures C through F, Appendix C) are presented in the form of bar charts summarize thaw depths in 5-year increments. However, it is unclear whether these results represent: maximum annual thaw in the 5-year period; maximum 'end-of-season' thaw; or a 5-year average.

In addition, the duration of unfrozen conditions is not provided. Without temperature vs time results within the tailings, it is not possible to determine:

- How long thaw persists each year,
- Whether thaw duration increases over time,
- The cumulative thermal exposure of the tailings,
- The effective thawed volume within the tailings profile.

This limited presentation of results constrains the ability to interpret the functional significance of the thaw penetration shown under a 2 m cover.

6. Thermal Analysis Results and their Linkage to Closure Risk and Design Logic

Section 2.4 of Appendix 6-J outlines the closure risk framework and references the saturated tailings design philosophy. Within that documentation, the LORAX appendix evaluates infiltration behaviour and presents in Table 2-2 estimates of the proportion of water retained within the cover versus that reaching the tailings surface for various cover thicknesses. Those results indicate that increasing cover thickness reduces the amount of water flux reaching the tailings and improves moisture retention within the cover system.

The hydrologic analysis therefore demonstrates a performance gradient: thicker covers result in reduced water transmission to the tailings and improved buffering capacity within the cover layer. The documentation notes that configurations of 2 m and greater provide improved performance relative to thinner alternatives, with increasing thickness further reducing flux to the tailings.

When considered alongside the thermal modelling results presented in Appendix C, an important linkage emerges. The thermal model indicates measurable thaw penetration into the tailings under a 2 m cover, with progressively reduced thaw at 3 m and elimination of thaw at approximately 4 m. Thus, both the hydrologic modelling (LORAX) and the thermal modelling (SLR) demonstrate improved performance with increasing cover thickness with respect to moisture flux control and thaw progression.

Despite this, the Appendix 6-J documentation does not clearly reconcile the combined implications of these analyses. If thicker covers both (i) reduce water flux to the tailings and (ii) reduce or eliminate thaw penetration, then increasing thickness appears to strengthen both hydrologic and thermal resilience objectives. The decision to adopt 2 m as sufficient is not accompanied by a clear explanation of how the increased water flux (relative to thicker covers) and the increased likelihood of thaw penetration are accommodated within the overall closure risk tolerance.

7. Settlement and Erosion Considerations

Section 2.3.2 of Appendix 6-J discusses settlement and erosion and indicates that thicker covers may increase differential settlement risk due to additional load applied to the tailings surface. The rationale that is presented is therefore that a reduced cover thickness (2 m) minimizes load-related settlement.

However, quantitative settlement modelling is not presented to compare deformation magnitudes between cover thickness scenarios. More importantly, the evaluation does not integrate thermal state into the settlement discussion. The thermal modelling indicates that under a 2 m cover, thaw penetration into the tailings is predicted. Thawing of previously frozen tailings can alter stiffness and compressibility characteristics, potentially increasing consolidation-related settlement.

The documentation does not assess whether the incremental structural loading associated with thicker cover is more significant than potential thaw-induced softening and consolidation under thinner cover. Nor does it evaluate how spatially variable thaw depth might influence differential settlement patterns across the TSF surface.

As such, the assertion that thinner cover reduces settlement risk is not explicitly reconciled with the modelling evidence demonstrating increased thaw penetration under 2 m. An integrated thermal–hydrologic–mechanical assessment would be required to determine whether reduced thickness truly represents the lower-risk configuration in the long term.

8. Overall Technical Assessment

The modelling framework and software selection are appropriate and consistent with standard industry practice. There is no indication that the modelling approach itself is fundamentally flawed.

However, as presented:

- The modelling supports 4 m of cover for maintaining frozen tailings conditions to 2100.
- The modelling demonstrates measurable thaw under 2 m of cover.
- Calibration transparency is limited.
- Climate envelope justification is not fully documented.
- Sensitivity analysis is absent.
- Thaw duration and volume are not quantified.
- Settlement implications of thaw are not evaluated.

Based on the information provided, the modelling results do not clearly demonstrate that a 2 m cover maintains frozen tailings conditions under projected climate forcing, and the accompanying analysis and use of these results to justify reducing the cover from 4 m to 2 m are limited. Additional documentation and clearer linkage to closure performance objectives would be required to support reduction from 4 m to 2 m on thermal performance grounds.

9. Further Recommendations

If the 2 m cover thickness is advanced, a strengthened thermal analysis framework and monitoring plan would be necessary to manage long-term thermal risk.

9.1 Strengthened Thermal Analysis

Additional thermal analysis should include:

- Sensitivity modelling under SSP5-8.5.
- Time vs temperature projected profiles within tailings.
- Quantification of thaw duration and volume.
- Settlement modelling incorporating, if possible, adequate thaw-dependent compressibility.
- Clear reconciliation between thermal performance and closure risk framework.

9.2 Monitoring Framework

If additional monitoring is pursued to strengthen confidence in long-term thermal performance of the TSF cover, the program should be designed to (1) directly measure the key boundary conditions controlling ground heat flux, (2) track the evolving thermal state of the tailings and cover, and (3) feed those observations into an updated model that can be periodically re-calibrated and re-run to refine predicted thaw timelines.

1. **Expanded Thermistor Network**
   While there is already a network of vertical thermistor strings, an evaluation to ensure the following areas are well represented would be important:
   - Cover profile (multiple sensors through the 2 m cover thickness),
   - Cover–tailings interface (highest value zone),
   - Upper tailings (e.g., first 2–5 m),

- Deeper tailings (for thermal lag and long-term trend),
- Into underlying foundation material (to inform lower boundary behaviour).
- ‘Background’ location in undisturbed terrain, where a benchmark background thermal profile can be established.

2. **Site-Specific Snow Monitoring**

Snow depth and snow distribution are among the most influential and most spatially variable drivers of ground thermal response. Site-specific snow monitoring would materially improve defensibility of projections. This could include:

- Continuous snow depth sensors on the cover surface and reference terrain.
- Seasonal snow surveys to capture redistribution, and
- Where feasible, incorporate time lapse imagery or photogrammetry during winter to support spatial interpretation.

This site-specific data would provide confidence that the projected snow depth dataset aligns with historical site trends, and allows a numerical model to reflect and incorporate measured snow data rather than relying solely on percentile projections.

3. **Climate Data**

Targeted measurements of climate data will better constrain surface energy balance terms that strongly influence thaw projections. These could include, but are not limited to:

- On-site albedo monitoring (or periodic field spot data collection). This would inform model values, as assumed high-percentile albedo can alter net radiation and warming.
- Local meteorological station continuity. Continued recording of Meadowbank site data collection, to build an expanding multiyear dataset for cycling in the numerical model.

10. Closure

This memo has been written to provide a technical review of thermal modelling used to support the proposed reduction of the non-acid generating (NAG) rock cover thickness over the Meadowbank TSF from 4 m to 2 m. It was prepared in accordance with the scope of work agreed upon with the client, Pinchin Ltd. I trust that the above information meets your current requirements. Please contact me if you have any questions or comments.

Ryley Beddoe, PhD, P.Eng.

GeoChange

9. References

Agnico Eagle Mines Ltd. (2025), Interim Closure and Reclamation Plan for the Meadowbank Complex, Appendix 6-J:Final Closure Design for North and South Cell TSF

from which: SLR Consulting (Canada) Ltd., (2025). *Meadowbank Complex TSF Thermal Cover Modelling – Existing Inputs*. Included as Appendix C to Appendix 6-J of the Final Closure Design for North and South Cell TSF, Agnico Eagle Mines Ltd.