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December 24, 2025

REFERENCE: CRAWFORD NICKEL PROJECT – RESPONSE TO COMMENTS ON THE IMPACT STATEMEMENT (CIAR REF NO. 83857)

Dear Mr. Jensen,

Canada Nickel Company ("Canada Nickel") completed the submission of the Impact Statement for the Crawford Nickel Project ("the Project") on November 22, 2024. Through the subsequent technical review of the Impact Statement undertaken by the Impact Assessment Agency of Canada (IAAC), and in consideration of feedback provided by federal authorities, provincial ministries, Indigenous Nations, and the public, the IAAC determined that additional information was required to complete their review. On May 30, 2025, the IAAC issued comments to Canada Nickel on the Project Impact Statement largely related to water diversions, changes to flow, feasible offsetting for loss of fish habitat, and the downstream extent of potential contaminants of concern and requested Canada Nickel provide responses to facilitate the IAAC's continued review of the Impact Statement.

Canada Nickel recognizes the importance of providing comprehensive information to support the federal assessment of potential effects and to inform decision-making in the public interest. Since receipt of the comments, Canada Nickel has continued to work collaboratively with Indigenous Nations, the IAAC, and relevant provincial and federal authorities to prepare responses that address each of the comments.

Canada Nickel is pleased to provide our responses to the comments issued by the IAAC. This information does not change the assessment of effects, nor the results of the Impact Statement, and continues to demonstrate that for adverse effects within federal jurisdiction, adverse residual environmental effects are predicted to be of low to moderate significance during all phases of the Project.

In some cases, the additional assessment identified refinements to predicted effects and further identified new or modified mitigation measures that will be applied to the Project. Canada Nickel continues to be committed to adaptive management planning by integrating adaptive management into follow-up programs, allowing for continuous improvement of environmental management practices, and flexibility to address new circumstances throughout the life of the Project.

In addition to the successful completion of the Impact Assessment process, Canada Nickel will obtain the necessary permits and regulatory approvals required for each phase of the Project. Canada Nickel recognizes that comprehensive permitting and adherence to federal, provincial, and local regulatory frameworks are essential for responsible Project development and environmental stewardship.

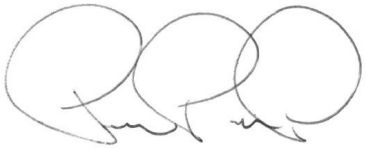
As the Project proceeds through subsequent Project phases, Canada Nickel will continue to actively consult with the public and stakeholder organizations, such as continued engagement through our Socioeconomic Committee, Environmental Committee, and Workforce Planning Committees. Canada Nickel also commits to continue engagement with potentially impacted Indigenous Nations, with an emphasis on open, respectful dialogue, clear communication channels, and meaningful participation.

Closing

We trust that the information provided will meet the requirements and allow the IAAC to complete its analysis of the Impact Statement.

Please contact Mathieu Boucher, Environmental Manager, for any questions regarding this matter.

Sincerely,



Pierre-Philippe Dupont
VP Sustainability



Mathieu Boucher
Environmental Manager

Attach. Responses to Comments

cc. Sydney Oakes, Canada Nickel Company
Chris Powell, Stantec
Roger Freymond, Stantec

Crawford Nickel Project ("the Project")

Canada Nickel's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project
(Received May 30, 2025)

Fish and Fish Habitat

December 24, 2025

CANADA NICKEL COMPANY

Stantec

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Abbreviations

Abbreviation	Full Term
HADD	harmfully altered, disrupted, or destroyed
HSI	habitat suitability index
NDR	North Driftwood River
MECP	Ministry of the Environment, Conservation, and Parks
PA	Project Area
WBR	West Buskegau River

Fish and Fish Habitat

FFH-01 Fish Habitat Loss – Potential Effects of Predicted Flow Changes

Comment Description (Context and Rationale):

While the Impact Statement (IS) reported fish habitat loss from direct overprinting, there are outstanding requirements to understand fish habitat loss from changes to groundwater and surface water flows. IAAC requires enough information to characterize residual effects on fish habitat (such as magnitude, geographic extent and duration after mitigation), with consideration of the permitting process as a means to refine details. Downstream river flows were identified as a valued component of interest in the TISG and reiterated through discussions of key issues.

The approach taken to assess the effects to fish and fish habitat as a result of changes in flow contains a substantial gap. Changes in the quantity and timing of surface water and groundwater affect whether fish can continue to carry out life history processes in affected areas, and therefore may constitute harmful alteration, disruption, or destruction of fish habitat.

Chapter 17 of the IS uses three surface water models to predict changes in the timing and quantity of flow in the North Driftwood River, West Buskegau River, and Jocko Creek watersheds for the purposes of characterizing the pathway of effect titled "Alteration of stream flows". These models were used to predict increases and decreases in flow at the "model outlet" (the most downstream sub-watershed) for each watershed. The IS reported the frequency that a change (increase or decrease) in flow greater than 10% was predicted to occur at the model outlets, as per DFO guidance.

However, there remains a large area of unassessed effects to fish habitat between the Project Area (PA) and the model outlets which is necessary to understand to determine the extent of adverse effects to fish and fish habitat. Chapter 7 indicates "it was assumed that predicted flow changes would not result in dewatering of watercourses in the Local Study Area (LSA) downstream of the PA. This assumption was made in the absence of hydraulic modelling in these watercourses."

No rationale was given for excluding changes to flow in the LSA between the PA and the model outlets, and no discussion on the potential magnitude, extent, or duration of effects to fish and fish habitat or how they would be addressed was provided. Notably, changes in the timing and quantity of flow are provided on a sub-watershed basis for some watersheds at certain time periods (Appendix C.5), but these appear to have been provided to inform the water quality effects assessment only and do not provide the information necessary for IAAC to understand fish habitat loss. IAAC has the option to assume fish habitat will be lost throughout all downstream rivers, but this may over-estimate the effect and reduce any feasibility of off-setting.

The IS defined a project-caused low flow threshold that would cause effects on fish and fish habitat as well as a project-caused high flow threshold. Although these thresholds may be useful as discussion points to help readers understand extremes, there are substantive effects that could prevent fish from carrying out life history processes, either directly or through changes in habitat, in between the 10% threshold defined by DFO, and the high and low thresholds defined in the IS.

Groundwater contributes to the overall volume of water available for fish to carry out life history processes at all times of year, and it also may contribute specific habitat refuges that are important for fish. For example, groundwater contribution may regulate the temperature and oxygen levels during certain times of year, and may be sought out by fish as a means to remain within their tolerable limits of temperature and oxygen concentration. The IS included a groundwater model, but it is not clear how and where groundwater contributions to surface water and fish habitat may change as a result of the project.

Finally, substantial habitat baseline gaps were noted downstream of the PA (such as minimal fish community and habitat sampling to validate the desktop information provided, and no characterization of baseline sediment transport). While these gaps will need to be filled to support permitting, they should also be taken into account in providing conservative estimates for the impact assessment.

Reference to TISG and IS:

TISG: Section 8.8.2

IS: Chapter 14, Chapter 15, Chapter 16, Appendix B.5, Appendix C.4, Appendix C.5

Required Information to Resolve Comment:

1) *Provide a conservative estimate of fish habitat that is predicted to experience instantaneous changes in flow that exceed 10% at any point during the life of the project. Update the quantity of affected fish habitat reported in 17.4.2.3 and elsewhere. (Note: while not all of this habitat may need to be offset in permitting, a conservative evaluation of effects should be provided in the absence of a detailed assessment informed by field verification).*

Canada Nickel's Response:

Changes in instantaneous flows caused by the Project cannot be predicted by the Surface Water Quantity model. The Surface Water Quantity Model is only able to predict flows on a daily time step. It does this by using a watershed model that incorporates daily climate data (e.g., precipitation, temperature) and daily flow data as well as groundwater inputs from a steady-state groundwater model. Nevertheless, flow changes in the North Driftwood River (NDR), West Buskegau River (WBR), and Jocko Creek predicted on a daily time step by the Surface Water Quantity model can be assessed by comparing the differences between daily baseline flows and daily predicted flows during various Project phases: construction, operations, closure, and post-closure. This was what was done for the Impact Statement, the results of which are presented in Chapter 15 Assessment of Potential Effects on Surface Water.

Since submission of the Impact Statement, a review of the proposed water management plan and water balance has been completed, along with corresponding updates to the Surface Water Quantity modeling, to reduce the downstream extent of the predicted water quality mixing zone in the NDR, as requested by the Ontario Ministry of the Environment, Conservation, and Parks (MECP). The results of this work are presented in response to SW Qual-02 Surface Water Quality – Effluent Mixing. Two new flow scenarios were modeled to address MECP's request:

- "Pre-post development balancing" whereby the volume of effluent discharged to the NDR to match baseline flows in sub-watershed ND5, the first sub-watershed downstream of the Project Area (PA) and diversion channel. In this scenario, excess effluent is discharged to the WBR.
- "1:1 flow balancing" whereby the volume of effluent discharged to the NDR is equal to the volume of non-contact natural run-off in the river at sub-watershed ND5. In this scenario, excess effluent is discharged to the WBR.

Only the predicted flow changes for the "1:1 flow balancing" scenario in Year 17 of mine operations in the NDR are discussed here. This is because the "1:1 flow balancing" scenario represents a more conservative (i.e., greater change in flow) scenario than the "pre-post development balancing" scenario (based solely on hydrologic changes), Year 17 of mine operations is the "snap-shot" in the mine life when Project effects on flows in the NDR are predicted to be greatest, and predicted flow reductions in the WBR occur only when flow rates result in the river overtopping its banks.

For the existing climate and climate change scenarios, flow changes in the NDR >10% of baseline daily flows are predicted to occur in all six sub-watersheds of the NDR between the confluence of the new diversion channel with the mainstem river (sub-watershed ND8) to the confluence of the NDR with Lennox Creek (sub-watershed ND1) (Table FFH-01.1; Attachment FFH-01-1). Flow changes in the NDR downstream of the confluence of Lennox Creek are predicted to be less than 10% for both climate scenarios.

Table FFH-01.1 Number of Days of Flow Changes Greater Than 10% of Baseline Daily Flows for Year 17 in the Sub-watersheds of the North Driftwood River Downstream of the Project Area

Sub-watershed (in order from upstream to downstream)	# of Days	
	>10% Flow Reduction	>10% Flow Increase
Existing Climate Scenario		
ND8	204	96
ND7	197	96
ND6	191	96
ND5	178	92
ND3	99	74

Sub-watershed (in order from upstream to downstream)	# of Days	
	>10% Flow Reduction	>10% Flow Increase
ND1	56	62
Climate Change Scenario		
ND8	196	142
ND7	192	143
ND6	188	143
ND5	193	130
ND3	67	81
ND1	39	52

The estimated habitat area in the NDR that is predicted to experience a >10% change in flow (i.e., ±10% of baseline flow) during Year 17 of the Project is 573,090 m^2 (57.3 ha) (Table FFH-01.2). This habitat area does not necessarily reflect the amount of fish habitat in the NDR that may be adversely affected or harmfully altered, disrupted, or destroyed (HADD) by the Project, it only reflects the amount of habitat that is predicted to experience either a 10% increase or a 10% decrease in flow at some point during the life of the Project.

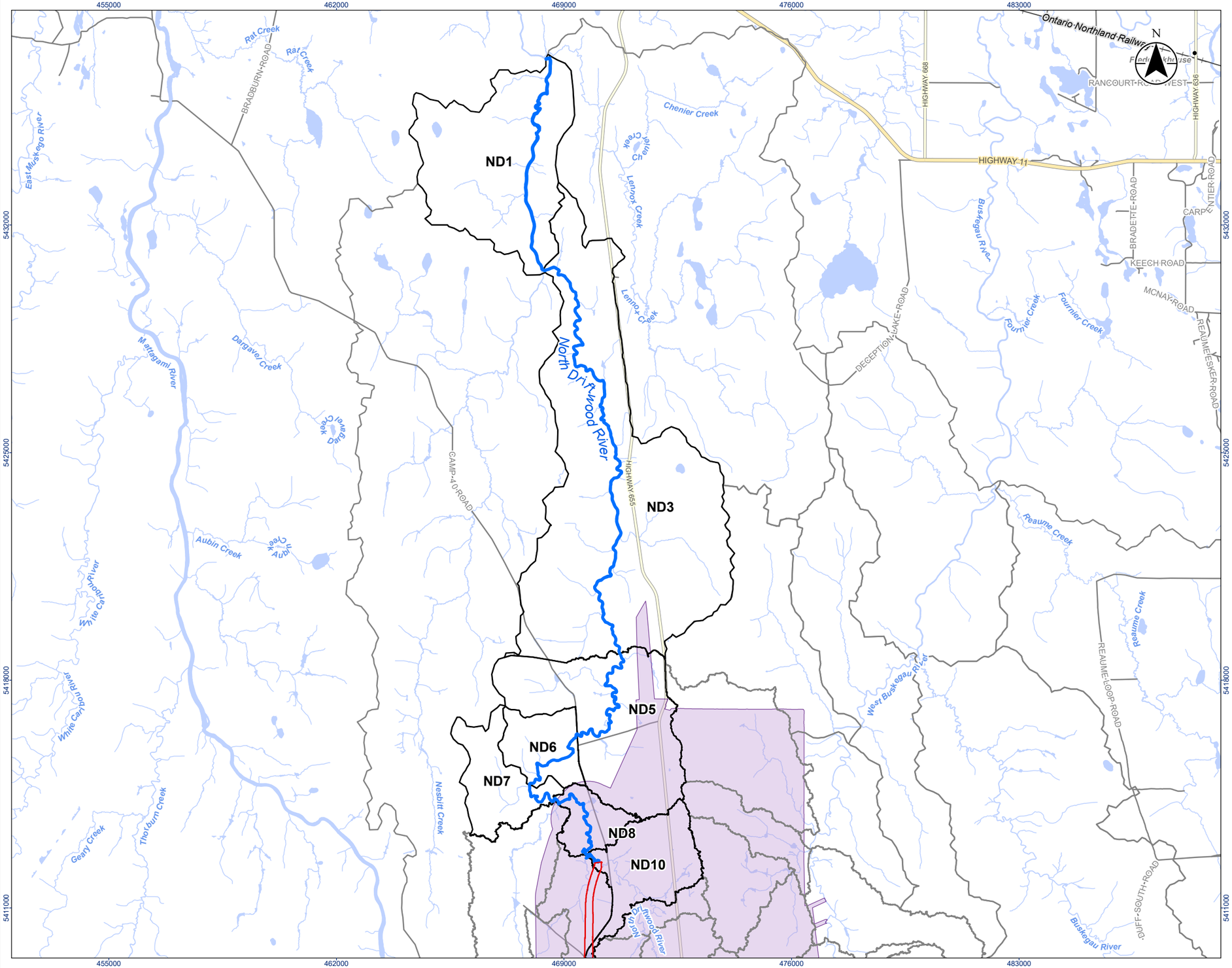
Table FFH-01.2 Estimated Habitat Area in the North Driftwood River between the Confluence with the New Diversion Channel and the Confluence with Lennox Creek

Sub-watershed (in order from upstream to downstream)	Channel length (m)	Average Channel Width (m)	Total Area (m^2)
ND8	4,015	9.26	37,179
ND7	1,717	9.26	15,899
ND6	3,145	13.7	43,086
ND5	5,703	14.2	80,983
ND3	16,308	14.8	241,358
ND1	7,847	19.7	154,586
Total	38,735		573,090

2) *Provide a map showing fish habitat that is conservatively predicted to experience instantaneous changes in flow that exceed 10% at any point during the life of the project.*

Canada Nickel's Response:

A map showing the fish habitat that is conservatively predicted to experience flow changes >10% of baseline in the NDR during Year 17 of Operations is provided in Figure FFH-01.1. This map does not necessarily reflect the amount of fish habitat in the NDR that may be adversely affected or HADD by the Project, it only reflects the amount of habitat that is predicted to experience either a 10% increase or a 10% decrease in flow at some point during the life of the Project.



Stantec

Legend

- Diversion Channel Footprint
- North Driftwood River
- Project Area
- Watershed Boundary

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Watercourse
- Waterbody

0 2.5 5 km

1:120,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location
Timmins, Ontario

160901195 REVA
Prepared by stomic on 2025-12-17

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
FFH-01.1

Title
Sub-watersheds of the North Driftwood River Predicted to Experience Flow Changes >10% of Baseline Flows in Year 17 of Project Operations

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3) *Provide an analysis on how changes in flow may affect fish and fish habitat, ensuring the linkage with life history processes of fish that inhabit the affected areas. Include variability of changes in flow in the analysis of effects (i.e.: increases and decreases in flow in the same habitat during different project phases). Ensure that the analysis is linked to existing baseline data and current understanding of fish distribution in the PA and LSA.*

Since submission of the Impact Statement, Canada Nickel has developed HEC-RAS 2D models in sub-watersheds ND6 (near-field), ND3 (mid-field), and ND1 (far-field) of the NDR and in sub-watersheds WB3 (near-field) and WB1 (far-field) in the WBR. Additional discharge measurements are required at each model section in 2026 to develop the rating curves needed to calibrate the models over the range of flows predicted to occur in the NDR and WBR over the life of the Project. Until then, model results are preliminary. Nevertheless, the models allow an initial prediction of how hydraulic parameters (e.g., water depth and water velocity) may change in the NDR and WBR with the Project, parameters that are important to various fish life stages (e.g., spawning, rearing).

Model sections in the NDR were centered on rocky riffles, the habitat type that is more sensitive to flow changes than runs and pools and the habitat type used most frequently by White Sucker (*Catostomus commersonii*) and Walleye (*Sander vitreus*) for spawning. Model sections in the WBR were centered on run habitat, the only habitat type present in the WBR within the zone of predicted flow changes >10% of baseline.

White Sucker and Walleye were identified as fish species valued by Indigenous Nations during engagement activities during the Impact Statement review. Based on the fish and fish habitat assessment conducted in 2023 and 2024, Walleye are not present in the NDR but are present in the WBR. White Suckers are present in both rivers. The distribution of these fish species in the NDR and WBR was confirmed during the Impact Statement review and through engagement with provincial biologists and Indigenous Nations.

An initial analysis of the potential effects of predicted flow changes caused by the Project on White Sucker spawning and egg incubation habitat was conducted using the near-field model section in the NDR for Year 17 for existing climate conditions for the "pre-post development balancing" scenario and the "1:1 flow balancing" scenario. This analysis was conducted because:

- The frequency and magnitude of predicted flow reductions are greater for the NDR than for the WBR; mostly flow increases are predicted to occur in the WBR for the "pre-post development balancing" scenario, with flow decreases only occurring during high flow periods when flow overtops the banks.
- Flow reductions were assumed to have posed greater risks to fish and fish habitat than flow increases in the NDR and WBR; flow increases that cause the river to flood its banks will not result in any change to the hydraulic conditions within the channel itself.
- The near-field model site is in sub-watershed ND6, the sub-watershed closest to the PA (i.e., immediately downstream of the confluence of the mainstem and the new diversion channel) and, therefore, the location where predicted flow changes caused by the project are largest.

- Year 17 of mine operations represents the "snap shot" in the mine life when Project effects on flows in the NDR are predicted to be greatest.
- Walleye are not present in the NDR within the zone of predicted flow change >10% of baseline flow.
- White Sucker spawn over fast-flowing gravel/cobble riffles, typically during the descending limb of the spring freshet hydrograph when water temperatures are >10°C (Twomey et al. 1984[1]; Curry and Spacie 1984[2]; Nelson and Paetz 1992[3]), the habitat type most sensitive to flow reductions and the season when predicted flow reductions in the NDR for Year 17 of Project Operations are greatest.
- The Surface Water Quantity model predicts the spring freshet occurring in February for the climate change scenario which creates additional uncertainties regarding the timing of White Sucker spawning that are avoided when using only the existing climate scenario.

Only the results of the analysis for the "pre-post development balancing" scenario are discussed below because, after running flow predictions for both scenarios through the HEC-RAS 2D model and analyzing the effect of the predicted water depths and water velocities on the availability of White Sucker spawning and egg incubation habitat in the NDR, it was determined that the "pre-post development balancing" scenario resulted in a larger change in useable spawning and egg incubation habitat for White Suckers in the NDR and, therefore, represented a more conservative estimate than the "1:1 flow balancing" scenario.

The near-field model site in the NDR is an approximately 380 m long section that includes two rocky riffles separated by a deeper, slower flowing run (Figure FFH-01.2). The upstream riffle was deeper (~50 cm) with coarser substrates (i.e., sand/gravel/cobble/small boulder) than the downstream riffle (~30 cm) which had sand/gravel/cobble substrates in September 2025. Sand was the dominant substrate type in the run habitat between the two riffles with silt and clay substrates along the channel margins and frequent woody debris pieces.

[1] Twomey, K.A., K.L. Williamson, P.C. Nelson, and C. Armour. 1984. Habitat Suitability Index Models and instream flow suitability curves: White Sucker. U.S. Fish and Wildlife Service, U.S. Department of the Interior. FWS/OBS-82/10.64

[2] Curry, K. and A. Spacie. 1984. Differential use of stream habitat by spawning catostomids. Am. Midl. Nat. 111(2): 267-279

[3] Nelson, J.S., and M.J. Paetz. The Fishes of Alberta. 2nd edition. University of Alberta Press, Edmonton, AB.

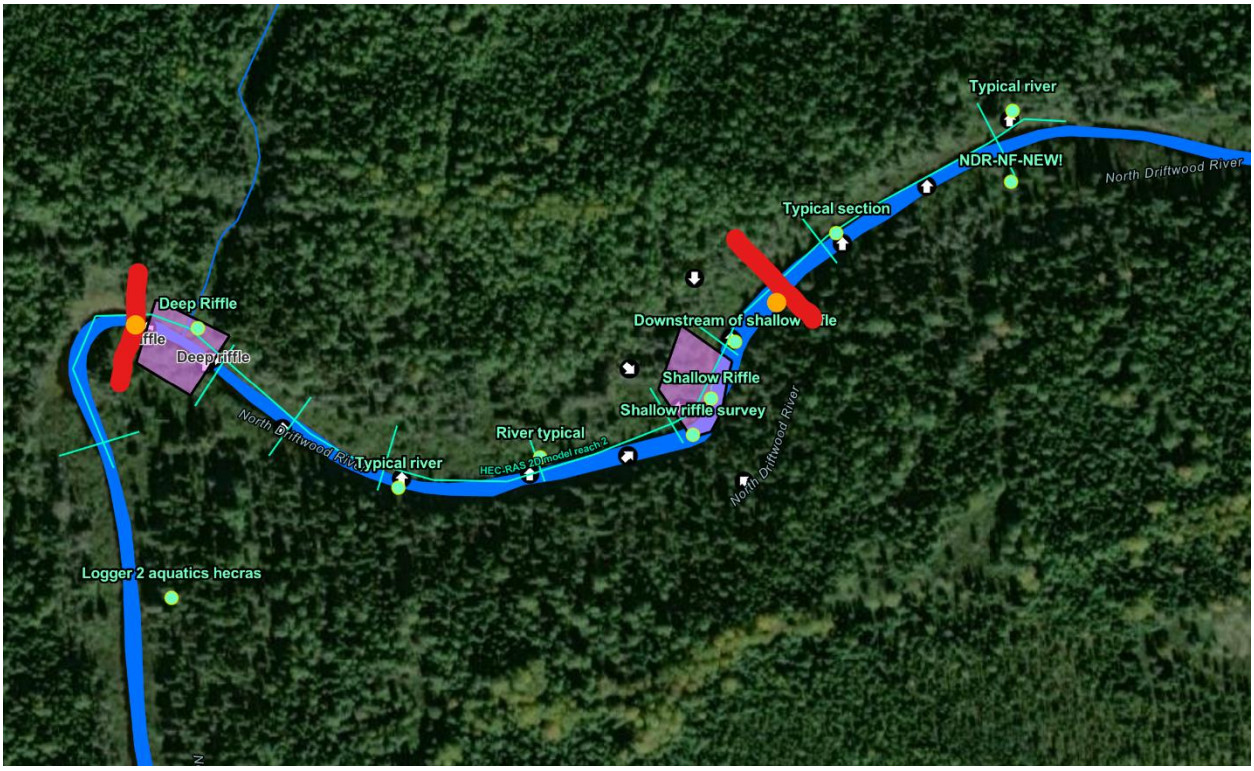


Figure FFH-01.2 Near-field HEC-RAS 2D model section in the North Driftwood River (i.e., between red slashes); flow is from left to right

The HEC-RAS 2D model at the near-field site in the NDR predicts average water depth (m) and average water velocity (m/sec) in each polygon of homogenous habitat within a 2-dimensional matrix that extends across the channel, from bank to bank, and from top of the model domain to the bottom at a given stream discharge (m^3/sec). For this analysis, the near-field HEC-RAS 2D model in the NDR was run for flows ranging from 0.2 m^3/sec to 2.0 m^3/sec, the discharge at which the NDR approaches bank-full depth at the near-field model site (i.e., 2.11 m^3/sec). The near-field HEC-RAS 2D model is unable to compute water depths and water velocities when flows are high enough to cause the river to exceed its banks. However, hydraulic conditions (i.e., water depth and water velocities) within the river channel are assumed to be the same as those predicted at bank-full discharge because the relatively flat topography of the NDR valley allows any additional flow above bank-full discharge to spill out onto the river's floodplain, resulting in a negligible effect on hydraulic conditions in the channel.

Raster files from the HEC-RAS 2D models representing the predicted water depths and water velocities at each flow and habitat suitability indices (HSIs; Figure FFH-01.4) for White Sucker spawning and egg incubation were used to predict available habitat within the modeled site. Available habitat was quantified on a cell-by-cell basis from the water depth and water velocity raster files and the spatial delineation of available substrate using the formula shown in Equation 1; substrates at the near-field model site were optimal for White Sucker spawning and egg incubation (i.e., clean gravel/cobble) and were assumed not to change following Project construction and operation. Total habitat area for each flow was calculated as the cumulative sum of habitat area calculated for all cells within the wetted channel area.

Equation 1

$$Habitat\ Area = \sum (Cell\ Area) x (Depth_HSI)\ x (Velocity_HSI)$$

Where "cell area" = the spatial area of each polygon of habitat with homogenous water depth and water velocity in the raster file (in m^2); "depth_HSI" = the suitability score of the average water depth in the raster polygon (from 0 = unsuitable to 1 = ideal); and "velocity_HSI" = the suitability score of the average water velocity in the raster polygon (from 0 = unsuitable to 1= ideal).

Attachment FFH-01-2 provides a graphical representation of the spatial extent of the high and low quality White Sucker spawning and egg incubation habitat at the near-field model site in the NDR at flows ranging from 0.2 m^3/sec to 2.0 m^3/sec; red represents areas with unsuitable spawning and egg incubation habitat (HSI score = 0) and green represents areas with ideal spawning and egg incubation habitat (HSI score = 1). Based on the HSI curves[4] for White Sucker spawning and egg incubation (Figure FFH-01.3 and Figure FFH-01.4), the shallow riffle at the downstream end of the modeled section had a larger area of ideal White Sucker spawning and egg incubation habitat over the range of modeled flows compared to the deeper riffle at the upstream end of the modeled reach. The quantity of ideal White Sucker spawning and egg incubation habitat in the shallow downstream riffle appears to peak at 0.4 m^3/sec and then decreases as flows increase, particularly in mid-channel. At the highest modeled flow (2.0 m^3/sec), high quality White Sucker spawning and egg incubation habitat is present only along the margins of the shallow downstream riffle.

[4] Suitability curves range from 0=unsuitable to 1=optimal for each habitat variable important for White Sucker spawning and egg incubation (e.g., riffle water depth, riffle water velocity, riffle substrate composition, spring water temperature, etc.)

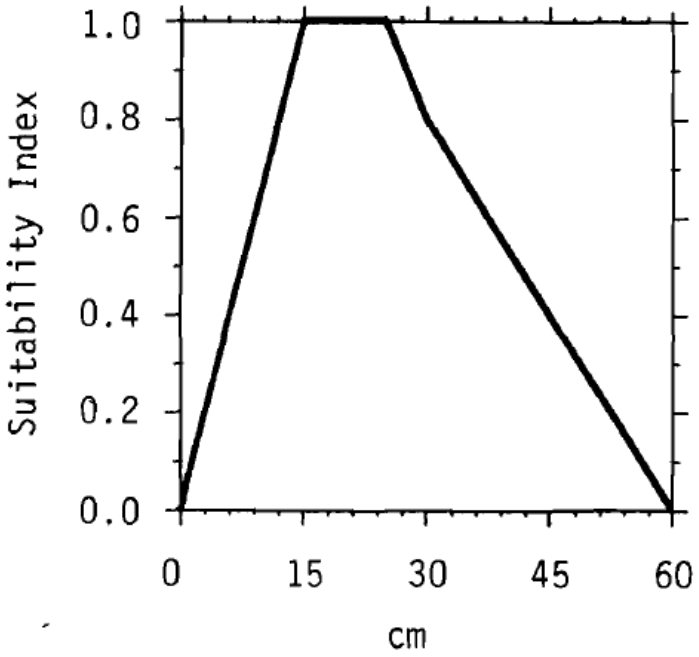


Figure FFH-01.3 **Habitat Suitabilty Index for Water Depth for White Sucker Spawning and Egg Incubation (Source: Twomey et al. 1984)**

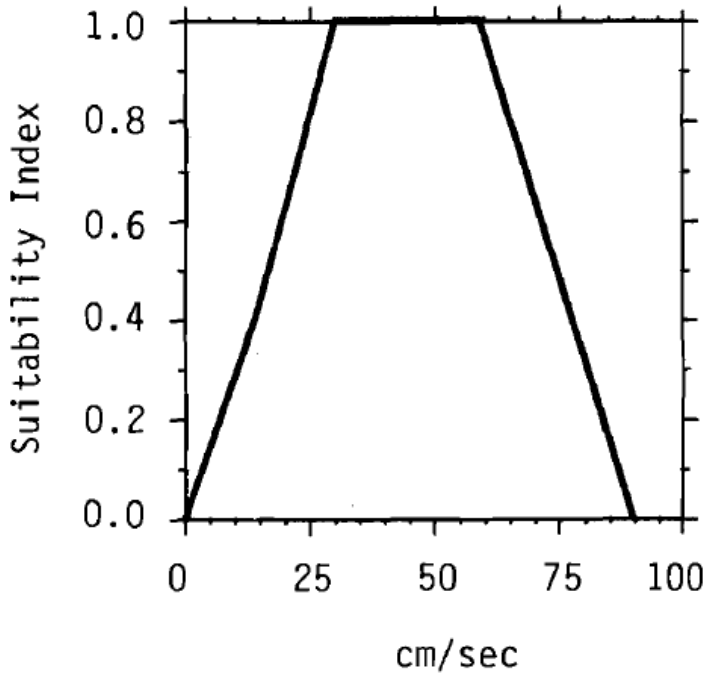


Figure FFH-01.4 **Habitat Suitability Index for Water Velocity for White Sucker Spawning and Egg Incubation (Source: Twomey et al. 1984)**

At the near-field model site in the NDR, total White Sucker Spawning and egg incubation habitat is at maximum at a discharge of 0.4 m^3/sec (Figure FFH-01.5). Other notable trends in this relationship are that the quantity of White Sucker spawning and egg incubation habitat decreases faster at flows <0.4 m^3/sec than at flows >0.4 m^3/sec and flow reductions occurring when the river discharge is >0.4 m^3/sec result in an increase in White Sucker spawning and egg incubation as long as the decreases don't result in a flow <0.4 m^3/sec.

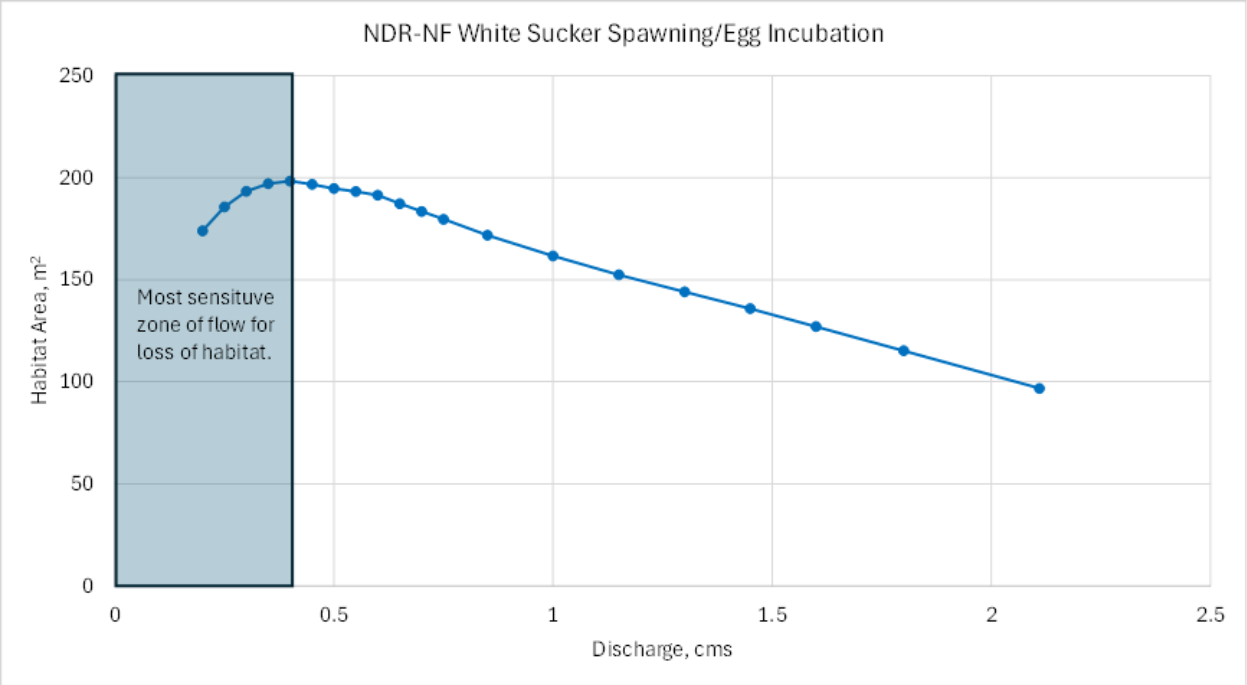


Figure FFH-01.5 Relationship Between Stream Discharge and White Sucker Spawning and Egg Incubation Habitat Availability at the Near-field Site in the North Driftwood River

A comparison of the predicted annual hydrographs for baseline and Year 17 of Operations flows is at the near-field site in the NDR is provided in Figure FFH-01.6. Predicted flow reductions are largest (up to 65% lower) during the descending limb of the spring freshet (i.e., late April/early May), the period when White Suckers are typically beginning their spawning migrations. Lower flows are also predicted to occur during the summer, fall, and winter but those reductions are typically <25% of baseline flows.

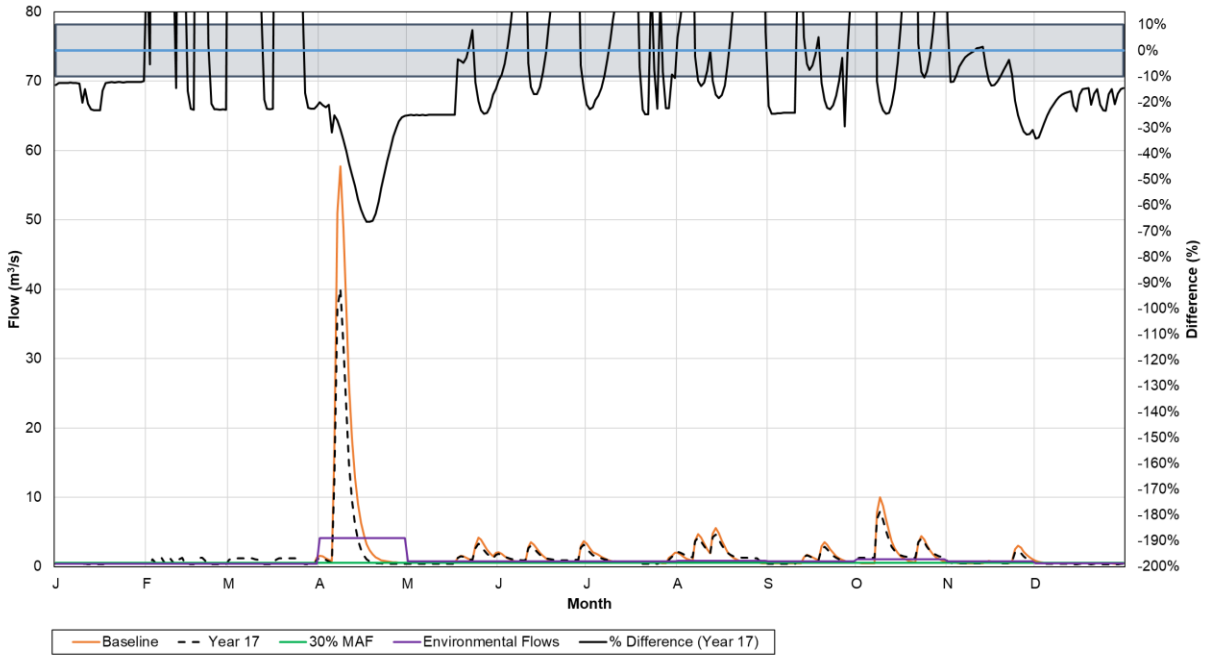


Figure FFH-01.6 **Comparison of Predicted Baseline and Year 17 of Operations Flows for the "Pre-Post Development Balancing" Scenario in Sub-watershed ND5 (near-field) of the North Driftwood River for Existing Climatic Conditions**

Figure FFH-01.7 shows the difference in total White Sucker spawning and egg incubation habitat available at the near-field site in the NDR during April, May, and June (the range of months when White Sucker spawning and egg incubation can occur in northern Ontario depending on climatic conditions) for baseline flows and flows predicted in Year 17 for the "pre-post development balancing" scenario. On average, the quantity of White Sucker spawning and egg incubation habitat at the near-field site in the NDR is higher for the predicted flows in Year 17 of Project operations than what is available under baseline flows in April and May (20% and 3% higher, respectively) and only slightly lower than baseline in June (4% lower) (Figure FFH-01.8).

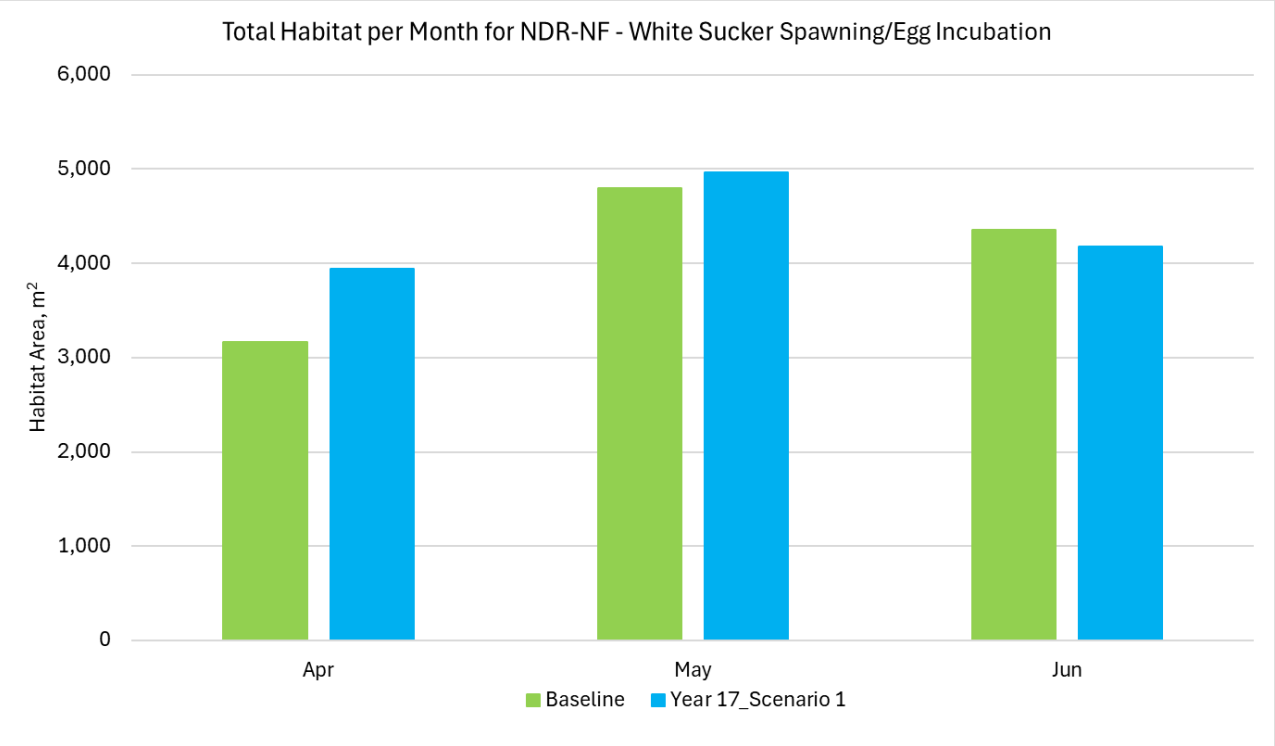


Figure FFH-01.7 Comparison of Monthly White Sucker Spawning and Egg Incubation Habitat Availability Between Baseline Flows and Year 17 of Operations Flows at the Near-field Site in the North Driftwood River

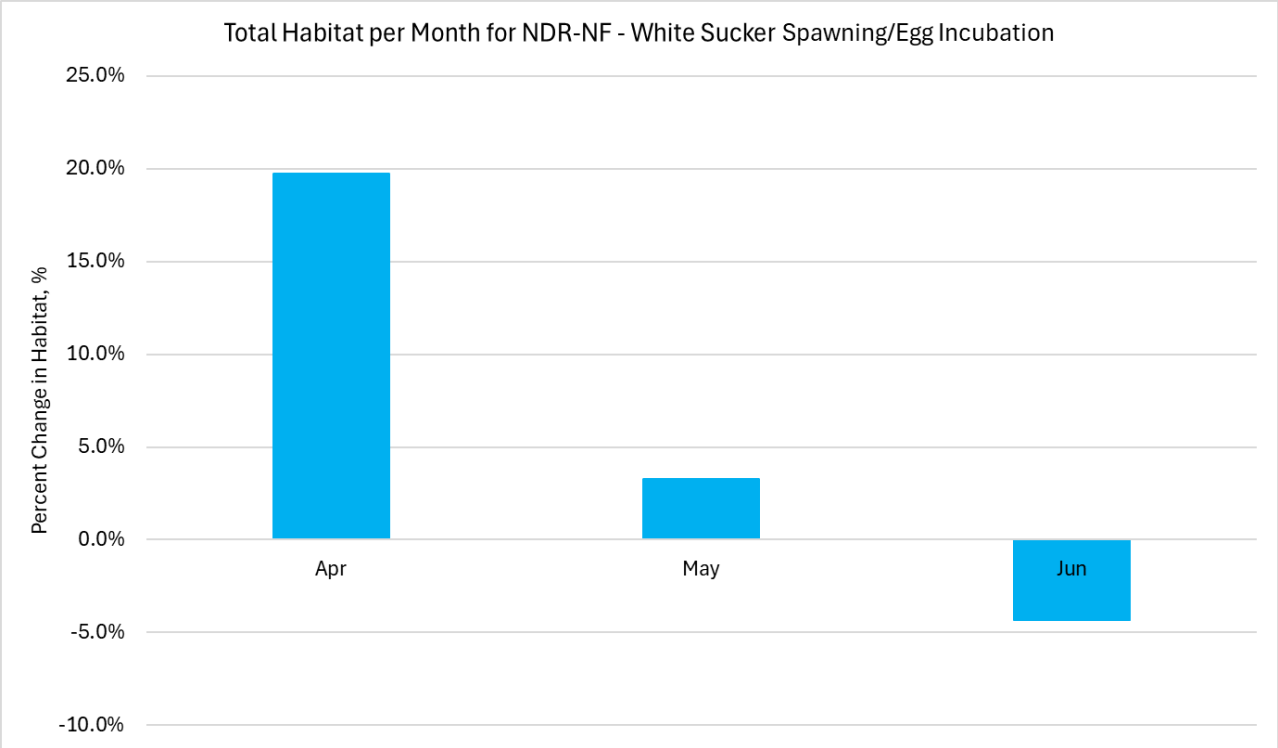


Figure FFH-01.8 Percent Change in White Sucker Spawning and Egg Incubation Habitat in April, May, and June Between Baseline Flows and Predicted Flows in Year 17 of Project Operations

Flow reductions in April and May were predicted to result in increases in the quantity of White Sucker spawning and egg incubation habitat but were predicted to result in a decrease in the quantity of White Sucker spawning and egg incubation habitat in June at the near-field site in the NDR. This is predicted to occur because, as shown in Figure 5, habitat availability increases when flows reductions occur at flows exceeding 0.4 m^3/sec. This is largely driven by the improved habitat due to a reduction in water depths (and less so because of a reduction in water velocity) which place them into a more suitable range for White Sucker spawning and egg incubation.

4) *Provide a qualitative assessment of whether habitat refuges are likely to be important for local fish species, and if so, to what degree those areas may be affected.*

Habitat refuges are important for fish populations at some point of the year and at some part of their life cycle. In northern rivers such as the NDR and WBR, habitat refuges for large-bodied fish species such as White Suckers and Walleye, are deep pools, lakes, and larger mainstem rivers (e.g., Abitibi River and Frederick House River. These types of habitats are important because they provide refugia from warmer water temperatures and lower flow conditions in summer and deeper, lower velocity habitat in winter when food availability is lower and ice conditions make shallower, faster flowing riffles and runs less suitable and more energetically costly for fish.

All sub-watersheds in the NDR downstream of the PA that were predicted to experience a >10% reduction in flow at some point during the life of the Project were classified as "above average" overwintering habitat for White Suckers (Figure 16 of Appendix A of the Supplemental Baseline Report[5]). This was because the NDR downstream of the PA is a 4th order river with perennial flow and numerous large pools with residual depths (i.e., water depth below the downstream pool invert elevation) >2 m. These pools are deep enough and frequent enough to provide overwintering habitat for juvenile and adult White Suckers throughout the winter[6].

The size, residual pool depth, and frequency of these pools in the NDR downstream of the PA are not expected to change substantially with the Project, even though flow reductions in the NDR for the "pre-post development balancing" scenario are predicted to be 11%, 20%, and 15% lower than baseline in November, December, and January for Year 17 of Project operations[7]. This is because pools are the least sensitive habitat type in rivers to flow changes (compared to shallower riffles and runs), and because the predicted flow reductions are unlikely to be large enough to cause the NDR to freeze to the bottom or to reduce water depths at the pool outlets such that the residual pool depths decrease in winter.

All sub-watersheds in the WBR downstream of the PA that were predicted to experience a >10% reduction in flow at some point during the life of the Project was classified as "above average" overwintering habitat for White Suckers and "below average" overwintering habitat for Walleye (Figure 16 and Figure 10, respectively, Appendix A of the Supplemental Baseline Report). The quality of overwintering habitat in the WBR was considered lower for Walleye than for White Suckers because Walleye are known to overwinter in lakes and deeper mainstem rivers, such as the Frederick House River, instead of shallower tributary rivers such as the WBR.

No change in the availability of overwintering habitat for White Suckers or Walleye is expected to occur in the WBR downstream of the PA. This is because average monthly flows are predicted to increase in the WBR in winter (November to March) for the "1:1 flow balancing" scenario and the "pre-post development balancing" scenario. These higher flows are expected to maintain or increase the availability of pool habitat in the river during winter.

5) *For all the above, ensure that uncertainty in groundwater and surface water models (GW-01(a-e), SW Quan-01(a-d), SW Quan(a-b)) is carried through conservatively in estimates of potential impacts to fish and fish habitat. If adaptive water management measures are plausible to ensure changes to water quantity are controlled within agreeable limits to sustain fish habitat, outline those measures at a conceptual level. If they are also expected to be incorporated into permitting regimes, describe how.*

The analyses presented above relies on results from the Groundwater Model, Surface Water Quantity model, HEC-RAS 2D models in the NDR, and application of habitat suitability indices. Like all models, each of these models has inherent uncertainty because they are mathematical abstractions of reality that

[5] Stantec 2024. Crawford Nickel Project: Fish and Fish Habitat Supplemental Baseline Report. A report prepared for Canadian Nickel Company. September 2024

[6] There are no Walleye in the NDR upstream of the impassable waterfall located approximately 22 km upstream from the Abitibi River

[7] 10%, 14%, and 6% lower than baseline in November, December, and January in Year 17 of Project operations for the "1:1 flow balancing" scenario

rely on the quality of the input data, the accuracy of the model to predict existing conditions (i.e., model calibration), and the number and validity of assumptions made during model development. The assumptions and uncertainties described in the groundwater (*GW-01(a-3*) and surface water (*SW Quan-01(a-d) and SW Quan(a-b)*) models have been incorporated into the assessment presented in this response to provide results that are conservative and that acknowledge uncertainty.

The approach taken during modeling steps included in this analysis was to base the assessment on the "worst-case" scenario (i.e., the scenario that was predicted to result in the greatest changes in flow in the NDR and WBR). This "worst-case" scenario was informed by:

- A steady-state groundwater modelling approach was used to predict effects of open pit dewatering. This approach provides a conservatively high estimate of groundwater table drawdown and, therefore, an overestimation of potential effect on shallow and deep groundwater levels and corresponding changes in groundwater discharge rates to surface water features.
- Use of the "pre-post development flow balancing" scenario from the Surface Water Model because it resulted in larger changes in the available White Sucker spawning and egg incubation compared to the "1:1 flow balancing" scenario from the Surface Water Model.
- Use of the near-field HEC-RAS 2D model in the NDR instead of the mid-field and far-field models to assess the effect of the predicted change in flows on fish and fish habitat because the predicted flow changes in the NDR are larger at the near-field model site than at the mid-field and far-field model sites.
- Use of HEC-RAS 2D model output only from the shallow riffles in the near-field model site in the NDR; shallow riffles are the habitat type used by White Suckers for spawning and egg incubation and, because they are the shallowest and fastest-flowing habitat type in rivers and streams, are the habitat type most sensitive to changes in flow.

Despite the conservatism of the approach, the following uncertainties remain in the analysis:

- Predicted flow changes in the NDR and WBR are based on a watershed model calibrated to the 1991 water year. Therefore, predicted daily flows do not necessarily represent average conditions based on the available flow record; changes in daily and monthly average flows in the NDR and WBR based on the 30-year regional flow record will be predicted in 2026 once the site-water balance and Surface Water Quantity model are re-run for each year that paired climate and flow data are available.
- The cumulative effect of climate change on future flows in the NDR and WBR after the Project is constructed and operating are currently ignored due to the uncertainty associated with how fish life cycle periodicity in the NDR and WBR will change in response to an earlier spring freshet and wetter summer and fall.
- The HEC-RAS 2D models in the NDR and WBR have not been calibrated for the range of flows that occur during the water year and in the historical period of record; only two flow measurement were taken at the model locations in 2025, and both were during fall. Additional

flow measurements will be conducted in 2026, including during the spring freshet, to develop more robust rating curves at the upstream and downstream ends of each model location.

- HEC-RAS 2D models at the mid-field and far-field site in the NDR and at the near-field and far-field sites in the WBR have not been used to date to determine the downstream extent of potential effects to fish and fish habitat in both rivers. While it is expected that results from the more downstream models in the NDR will show smaller effects than the near-field site in the NDR because of the attenuating effects of run-off contributions from unaffected NDR tributaries, the potential effects may extend further downstream than expected due to the channel geometry at these other locations. The Project is expected to largely increase flows in the WBR due to the need to reduce the length of the mixing zone in the NDR. While it is expected that these flow increases will not adversely affect fish and fish habitat in the WBR, modeling of the change in hydraulic conditions will be required to demonstrate this contention. Additional modeling will be conducted in 2026 once additional flow measurements are collected to develop the rating curves needed to calibrate the models.

- Habitat suitability indices for White Suckers and Walleye developed from the published literature were used to quantify the potential change in spawning and egg incubation habitat; these HSIs rely on data collected from studies conducted throughout the geographic distribution of both species and, therefore, may not accurately represent habitat preferences of White Suckers and Walleye in the NDR and WBR.

- The analysis present in this response assumes that hydraulic conditions are the factor limiting fish production in the NDR and, therefore, that the predicted change in flow in the NDR cause by the Project will have the greatest effect on fish populations. Other potential limiting factors in the NDR include water temperature, dissolved oxygen concentration, primary production (algal density), secondary production (benthic invertebrate density and drift), water quality, and inter-species competition, factors that may or may not be affected by flow changes.

- The current analysis focuses solely on spawning and egg incubation habitat for White Suckers in the NDR; it ignores potential effects to other fish species in the NDR and other White Sucker life stages (e.g., rearing, migration, overwintering). However, for reasons explained above, the approach used for this analysis was considered conservative.

Despite these remaining uncertainties, adaptive water management to mitigate potential effects on fish and fish habitat in the NDR and WBR is possible. For example, Canada Nickel is currently working to address concerns raised by the MECP about the spatial extent of the predicted "mixing zone" in the NDR by balancing the amount of effluent discharged to the NDR and the amount of effluent discharged to the WBR. The ability to do this is made possible by the combination of: 1) inclusion of modular water quality treatment in the Project design; 2) five individually operated water collection ponds, part of a water management system sized to accommodate the 1:100 year run-off event, plus the ability to store water in the open pit; and 3) inclusion of site water management infrastructure (e.g., pipelines and pumps) that allow treated effluent to be discharged at different rates and "moved" between the NDR and WBR watersheds as required. Ultimately, the ability to reduce adverse effects to fish and fish habitat in the NDR and WBR due to flow alterations will be constrained by the maximum sizes of the water quality

"mixing zones" allowed by the MECP in the NDR and WBR and the simultaneous requirement to meet Canadian and/or Ontario water quality guidelines for the protection of freshwater aquatic biota at the downstream ends of each "mixing zone"; there will be a constant trade-off between water quantity and water quality in the NDR and WBR because the Project is located in the headwaters of both watersheds.

Conceptually, adaptive water management at the Crawford Nickel site would include:

1. Monitoring flows and water quality in the NDR and WBR at near-field, mid-field, and far-field locations within and downstream of the "mixing zones" and in suitable reference sites upstream of the Project or in adjacent, unaffected rivers so that data from "impact" sites can be compared to "control" sites before and after Project construction in a "Before-After-Control-Impact" study design.

2. Developing trigger response thresholds for stream flows and specific water quality parameters (informed by the Surface Water Quality Model and any future updates) based on the HEC-RAS 2D models developed for this analysis and pertinent water quality guidelines and/or site-specific water quality objectives or Science-based Environmental Benchmarks.

3. An adaptive management framework that has the following hierarchy of responses: 1) confirm the effect occurred and was due to the Project and not a result of a regional phenomenon (e.g., statistical validation of result, laboratory and field data QA/QC, follow-up sampling); 2) investigate the cause of the observed Project-related effect; 3) assessment of the magnitude and geographic extent of the observed effect; and 4) corrective actions.

4. Implementing corrective actions that may include, but not necessarily be limited to: 1) increasing water treatment capacity and/or efficacy; 2) reducing pumping rates in one watershed and increasing pumping rates in the other watershed; 3) increasing the size, depth, or number of water collection ponds; 4) increasing the storage capacity in the open pit; and/or 5) diverting water from the headwaters of Jocko Creek or other nearby watersheds.

FFH-02 Fish Habitat – Diversion Channel Feasibility

Comment Description (Context and Rationale):

The IS did not provide sufficient information to determine the geotechnical feasibility of the North Driftwood Diversion Channel as an offset for fish habitat and location of effluent discharge.

Conceptually, it is possible that the North Driftwood Diversion Channel can be designed to incorporate fish habitat features sufficient to count towards fish habitat offsetting. However, there are substantial uncertainties and risks associated with the construction of a 7.5 kilometer long diversion channel that were not discussed in the IS. Many of these were highlighted in a meeting with DFO on June 10, 2024. Additionally, Appendix C.4 shows that the predicted groundwater discharge rate in the North Driftwood River after decommissioning will be a 66% decrease from baseline while other surface water bodies return to baseline, but it is not clear why this is or whether this is for the natural river or the diversion.

Areas of uncertainty regarding the diversion channel include:

- *the geotechnical feasibility, including effects of changes in groundwater discharge to surface water (throughout the life of the project);*
- *basing a detailed design on modelled (rather than measured) flow and sediment transport (a hydrological model has been generated, but has not been applied to allow an understanding of the challenges in the diversion channel design – for example, it's uncertain whether the channel will contain an appropriate flow throughout each year and throughout the life of the project (see GW-01(a-e), SW Quan-01(a-d), SW Quan(a-b));*
- *time-lag associated with the construction, stabilization, and functioning of the diversion channel relative to the project and required water management timelines;*
- *water quality in the constructed channel from its planned use as a contact water discharge point source; and,*
- *the degree to which natural channel design can be incorporated successfully.*

For fish and fish habitat, the two primary risks associated with this proposed diversion include:

- *unstable bed and banks leading to erosion and associated downstream impacts; and,*
- *failure to establish natural channel design and fish habitat features as a consequence of site and water management constraints (e.g., geotechnical, flow regime, sediment transport, water quality).*

This information is required to determine the feasibility of the currently proposed project design and mitigation (offset) for the loss of fish habitat.

Reference to TISG and IS:

TISG: Section 8.8.3

IS: Chapter 14 – Section 14.4.2.3.4, Appendix M, Appendix C.4 – Section 6.4

Required Information to Resolve Comment:

1) *Provide an estimate of the habitat that is expected to be gained as a result of a North Driftwood Diversion Channel that incorporates natural design features.*

2) *Clarify whether predicted changes in the groundwater discharge rate are for the natural river or the diversion channel (e.g. throughout Appendix C.4).*

3) *Provide the analysis for the predicted groundwater discharge rate and how it may affect the feasibility of the diversion channel (throughout the life of the project). Explain why the North Driftwood River does not return to baseline ground water levels after decommissioning, while other surface water bodies do.*

4) *Provide an assessment of the technical feasibility and challenges of achieving natural channel design principles that incorporates the proposed diversion's topography, potentially exposed earthen*

materials, expected flow regime, identified challenges and other relevant factors, and proposed mitigation and any adaptive management measures.

Canada Nickel's Response:

1) *Provide an estimate of the habitat that is expected to be gained as a result of a North Driftwood Diversion Channel that incorporates natural design features.*

Attachment FFH-03 provides updated effects on fish and fish habitat that will require offsetting and a habitat balance comparing fish habitat losses to offsetting gains. Table 5-2 of Attachment FFH-03 provides the relative habitat value (RHV) and weighted habitat gains for proposed offsets, which have been adjusted for anticipated time lags and uncertainty. For the North Driftwood Diversion Channel offsets will be achieved within the channel itself and by creating fish habitat features within the floodplain. Cumulatively, these features are anticipated to provide approximately 26 ha of fish habitat and account for roughly 1/3 of the total offsetting. This area estimate is based on the anticipated channel area contained within the bank full width plus a percentage of the diversion channel floodplain that will be designed to provide direct fish habitat. Please see Attachment FFH-03 for more details on updated estimates of offsetting gains within the North Driftwood Diversion Channel and other offsetting measures.

2) *Clarify whether predicted changes in the groundwater discharge rate are for the natural river or the diversion channel (e.g. throughout Appendix C.4).*

Groundwater discharge rates are estimated for the reaches of the NDR that exist during the project phase being presented. Under baseline (existing) conditions this includes ND3, ND5, ND6, ND7, ND8, ND10, ND13, ND14, ND16, ND17, ND18, ND21, and ND23. Following construction of the diversion, this includes ND3, ND5, ND6, ND7, ND8, ND11, ND15, ND18, and ND20.

3) *Provide the analysis for the predicted groundwater discharge rate and how it may affect the feasibility of the diversion channel (throughout the life of the project). Explain why the North Driftwood River does not return to baseline ground water levels after decommissioning, while other surface water bodies do.*

Predicted groundwater discharge to the existing NDR were presented in the response to GW-01a. Groundwater discharge estimates were based on calculated baseflow index (BFI). The calculated BFI describes the proportional contribution of baseflow to total streamflow for the full drainage area upstream of each of the hydrometric monitoring stations that are present within the NDR sub-watershed. The unit baseflow rate was developed using local monitored flow data. The calculated BFI for the sub-watersheds associated with the NDR are 0.22, which suggests that the groundwater contribution to streamflow is relatively low, and that the NDR is predominantly surface water fed. Based on this characterization, the feasibility and success of the diversion channel will be based primarily on the ability of the diversion channel design to maintain surface water flows, which would account for approximately 80% of the total flow. The current design is such that the flow to the diversion channel will be controlled and maintained by two surface water discharge points that will direct flow and discharge throughout the life of the project. The project has attempted to balance discharges to the NDR and the WBR on a watershed proportionality basis. The existing NDR through the mine site will be interrupted with infilling from stockpiles, or where it

intersections with the open pit. The diversion channel is anticipated to become the new groundwater discharge location as it is expected that groundwater discharge in similar proportions to existing conditions would be developed into the diversion channel.

Predicted water table drawdown post closure is presented in Impact Statement Appendix C.4 Figure A.14. Near the NDR, including the five headwater lakes (Mel Lake, Sutherland Lake, Jack Lake, Gerry Lake and Martin Lake) and Unnamed Lake (near the West Stockpile)), groundwater elevations are predicted to return to within 1m of baseline. Groundwater discharge to the NDR is predicted to be 66% lower than in baseline largely due to the way the diversion channel was simulated in the model. As a detailed design is not yet available, the diversion channel was included as a straight-line, 11 m wide, 1 m deep channel, with a surface water elevation which decreased linearly from the elevation of Martin Lake at the upstream end to the elevation of the NDR reach ND8 at the downstream end. The diversion was represented using 73 model cells. In comparison, the reaches of the NDR which will be removed when the diversion is constructed were modeled based on observed depths, widths, and alignments. The meandering nature of these reaches were included in the numerical groundwater flow model, which resulted in this section of the NDR being represented by 200 model cells. The differences in river lengths between the scenarios contributes in part to the decrease in simulated flow rates. From a broad view of number of model cells used to simulate the river segments, the footprint of the diversion channel is 52% that of the existing meandering stream system. Depicting the meanders provides greater length over which groundwater contributions to baseflow may be computed and as such, the current straight-line simulation of the diversion segment is conservatively protective in computing a baseflow contribution along its length. Optimizing groundwater discharge will be a consideration during detailed design of the diversion.

4) *Provide an assessment of the technical feasibility and challenges of achieving natural channel design principles that incorporates the proposed diversion's topography, potentially exposed earthen materials, expected flow regime, identified challenges and other relevant factors, and proposed mitigation and any adaptive management measures.*

A discussion of the technical feasibility of the North Driftwood diversion channel has been appended to this response as Attachment FFH-02-2.

FFH-03 Fish Habitat Offsetting

Comment Description (Context and Rationale):

The IS's conceptual fish habitat offsetting plan does not provide sufficient information to understand its feasibility to offset the predicted loss of fish and fish habitat. This is compounded by the uncertainties in the predicted amount of fish habitat loss (FFH-01). IAAC requires enough information to characterize residual effects on fish and fish habitat (such as magnitude, geographic extent and duration after mitigation), with consideration of the permitting process as a means to refine details.

Government reviewers have a general understanding of the species and habitat types that will be directly impacted by the project and therefore require offsetting. DFO advises that there are no biological barriers preventing the development of an offsetting plan, that is, there are no fish and fish habitat resources reported in the footprint of the project that are irreplaceable or that will jeopardize a species at risk. However, uncertainty about the ability to offset remains high, particularly in light of the geographic scale of project effects.

Effects to fish and fish habitat have not been adequately predicted, and the proposed measures to offset for those losses are still highly conceptual and carry significant uncertainty.

More information is needed to understand the scale of habitat loss and the ability for offsetting options to mitigate it. More certainty in the feasibility of the offsetting plan is needed to determine the extent of significance of adverse effects to fish and fish habitat.

Reference to TISG and IS:

TISG: Section 8.8.3

IS: Appendix M

Required Information to Resolve Comment:

1) *Revise the predicted fish habitat loss by resolving deficiency FFH-01, with respect to habitat alteration from flow changes.*

2) *Revise the conceptual fish habitat offsetting measures listed in Table 5.1 of Appendix M of the IS to include an initial coarse assessment of anticipated quantitative gains for each measure. Compare the potential gains for each measure to the estimated fish habitat loss (including how out-of-kind comparisons were made). Include a discussion on the likelihood that the proposed measures will adequately offset predicted losses.*

3) *If additional assessment reveals high levels of uncertainty in the ability to achieve habitat gains from the construction of the North Driftwood Diversion Channel, provide alternative offsetting measures. Provide the information from #2 above for any alternative offsetting measures proposed.*

Canada Nickel Response:

1) *Revise the predicted fish habitat loss by resolving deficiency FFH-01, with respect to habitat alteration from flow changes.*

As stated in response to FFH-01, changes in instantaneous flows caused by the Project cannot be predicted by the Surface Water Quantity model. FFH-01 addresses potential changes in flow in the river mainstems, downstream of the PA. Fish habitat affected by flow reductions in smaller tributaries is dealt with in this response to FFH-03, which provides an updated account of habitats that required offsetting.

Attachment FFH-03 provides a detailed list of watercourses anticipated to require offsetting and includes expected flow reductions in each watercourse (excluding river mainstems, which are addressed in the FFH-01 response). Watercourses that are not overprinted, including river main stems, are not anticipated to experience instantaneous changes in flow (i.e., momentary flows at a specific point in time) that exceed 10% during the life of the project. It is important to note that whether changes in flow for offset areas occur instantaneously depends on several factors, including construction sequencing, timing of works (e.g., whether constructed in the dry), and other site-specific considerations. As such, while conservative predictions have been applied, the actual timing of flow changes cannot be determined with certainty at this stage. Regardless of whether flow changes in these offset areas occur instantaneously or gradually, the affected habitats will be offset in accordance with regulatory the Fisheries Act and Mining and Diamond Mining Effluent Regulation.

2) *Revise the conceptual fish habitat offsetting measures listed in Table 5.1 of Appendix M of the IS to include an initial coarse assessment of anticipated quantitative gains for each measure. Compare the potential gains for each measure to the estimated fish habitat loss (including how out-of-kind comparisons were made). Include a discussion on the likelihood that the proposed measures will adequately offset predicted losses.*

Attachment FFH-03 provides a revised list of the conceptual fish habitat offsetting measures and includes an initial coarse assessment of anticipated quantitative gains for each measure. Potential gains for each measure are compared to estimated fish habitat loss and a description of how out-of-kind comparisons were made is included. A discussion on how the proposed measures expected to offset predicted losses is also provided.

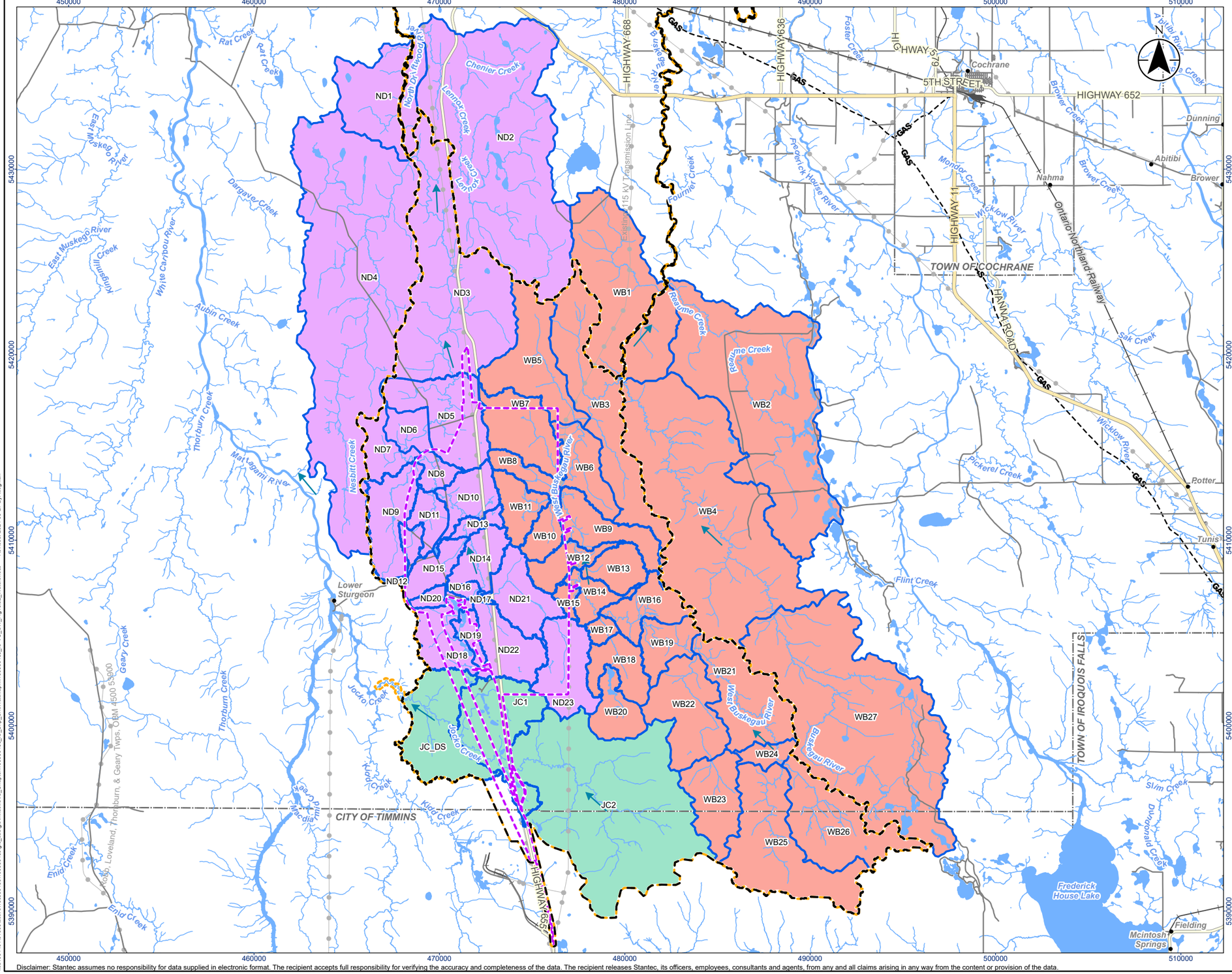
3) *If additional assessment reveals high levels of uncertainty in the ability to achieve habitat gains from the construction of the North Driftwood Diversion Channel, provide alternative offsetting measures. Provide the information from #2 above for any alternative offsetting measures proposed.*

Attachment FFH-02-2 address the questions about the feasibility of natural channel design and the North Driftwood Diversion Channel. Attachment FFH-03 provides a revised list of the conceptual fish habitat offsetting measures and includes measures of uncertainty for each measure. Table 4-1 in Attachment FFH-03 provide rational for uncertainty values selected. Levels of uncertainty are generally low, with most assigned an uncertainty value of 10% (Attachment FFH-03, Table 4-1), including offsetting habitat gains achieved by through natural channel design and habitat enhancements within the diversion channel floodplain.

High levels of uncertainty are not anticipated for offsets in North Driftwood Diversion Channel, but a detailed plan for alternative offsetting measures will be developed and included in the Offsetting Plan as the plan advances through ongoing consultation with agencies, stakeholders, and Indigenous Nations. It is anticipated that the offsets presented in Attachment FFH-03 will be identified as primary and as contingency offsetting items, depending on consultation with DFO, stakeholders, and Indigenous Nations. While specific alternative offsetting measures will be provided in an updated Offsetting Plan, Canada Nickel would prefer to also incorporate flexibility and adaptive management into the monitoring programs. This would allow for Canada Nickle to adjust offsetting based on offsetting methods that are found to be working well, address habitat limitations that are identified in future, and incorporate future input from agencies, stakeholders, and Indigenous Nations.

Attachments

Attachment FFH-01-1 Figure of Project Area Existing Watersheds and Subwatersheds



Legend

- Project Area
- Local Study Area
- Regional Study Area

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Existing Transmission Line
- Natural Gas Pipeline
- Watercourse
- Municipal Boundary - Lower Tier
- Waterbody
- Sub Watershed
- Jocko Creek Watershed
- North Driftwood River Watershed
- West Buskegau River Watershed
- Watercourse Flow Direction

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.

Project Location
Timmins, Ontario

160930456 REVA
Prepared by tcoghlan on 2024-09-27

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

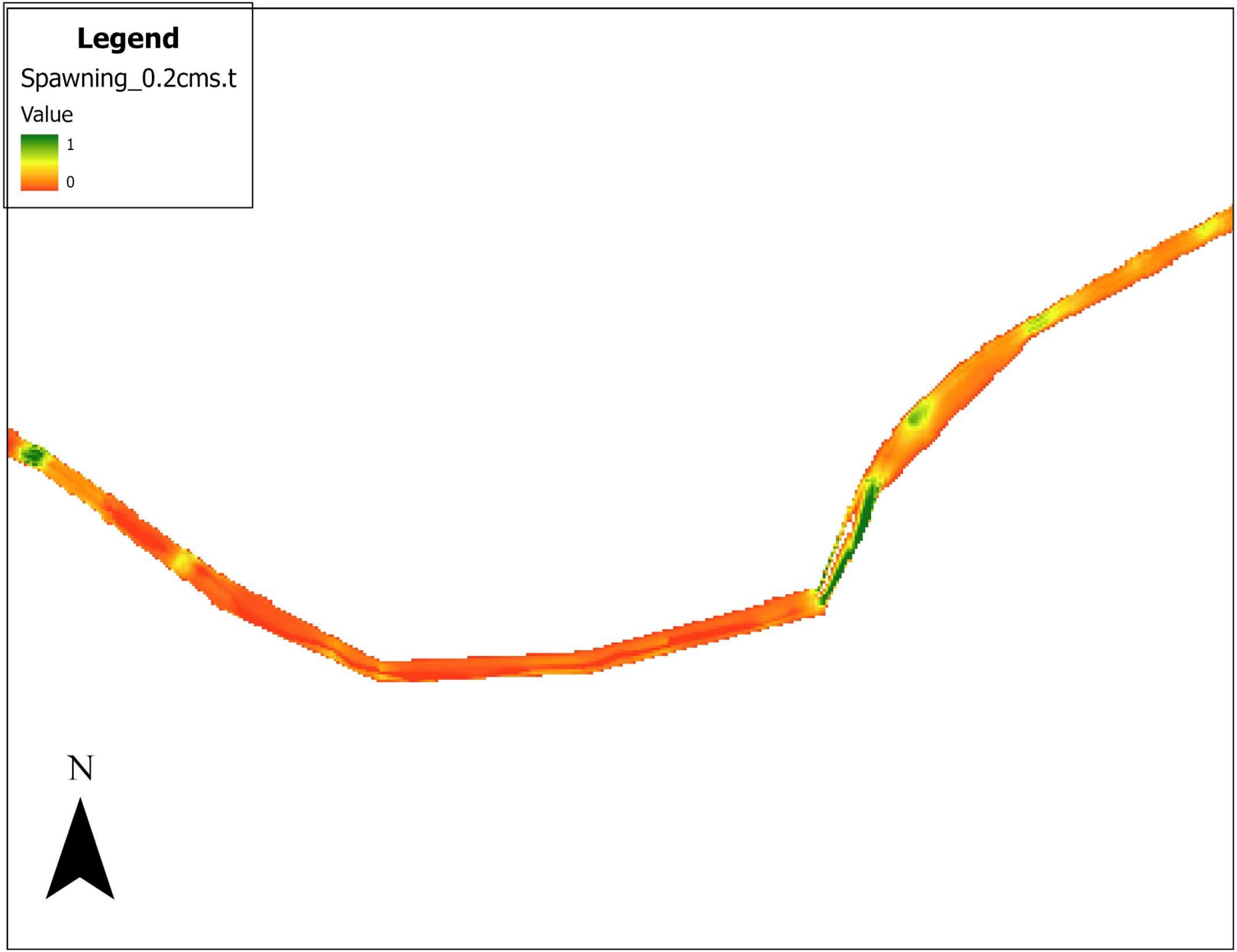
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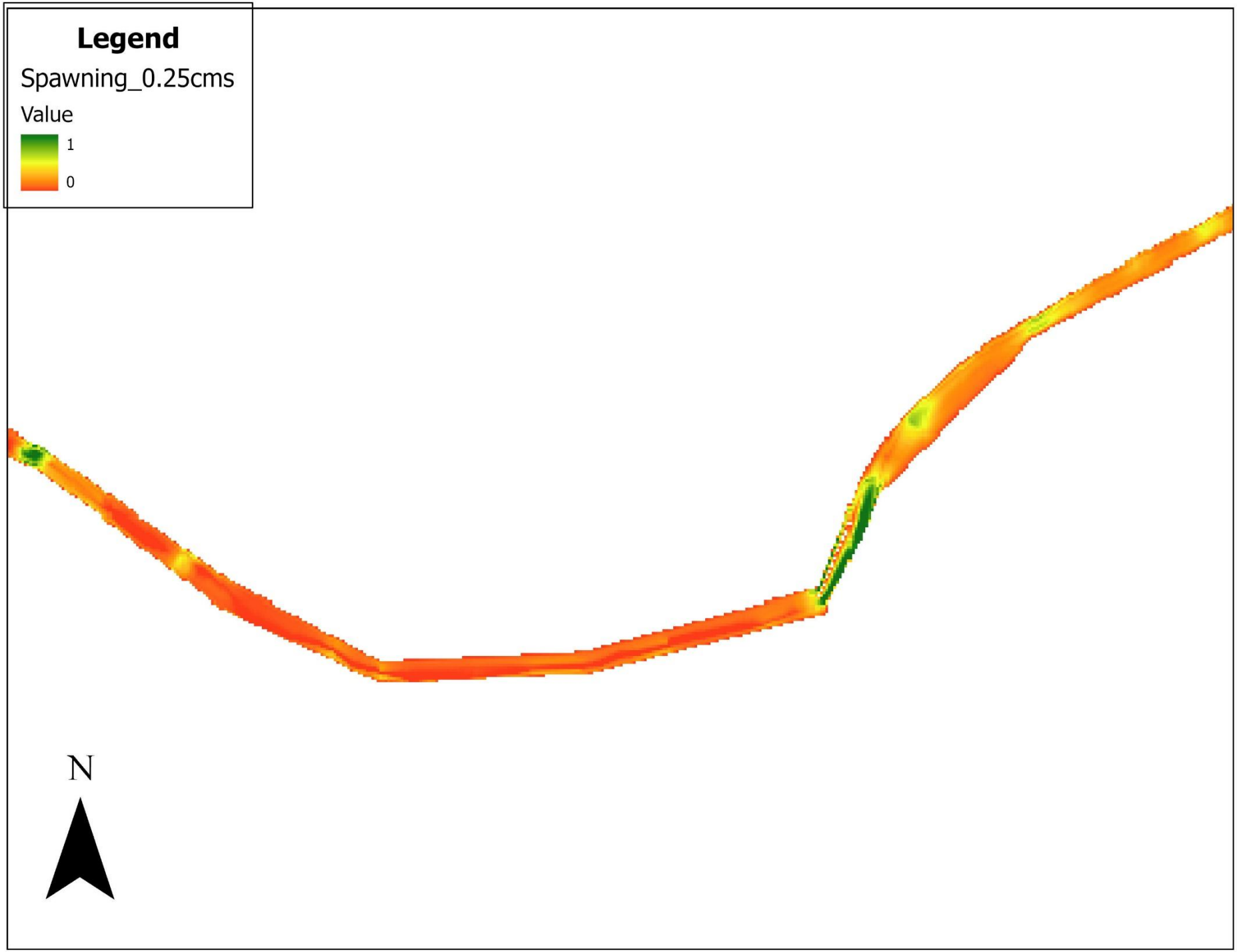
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Project Area Existing Watersheds and Subwatersheds

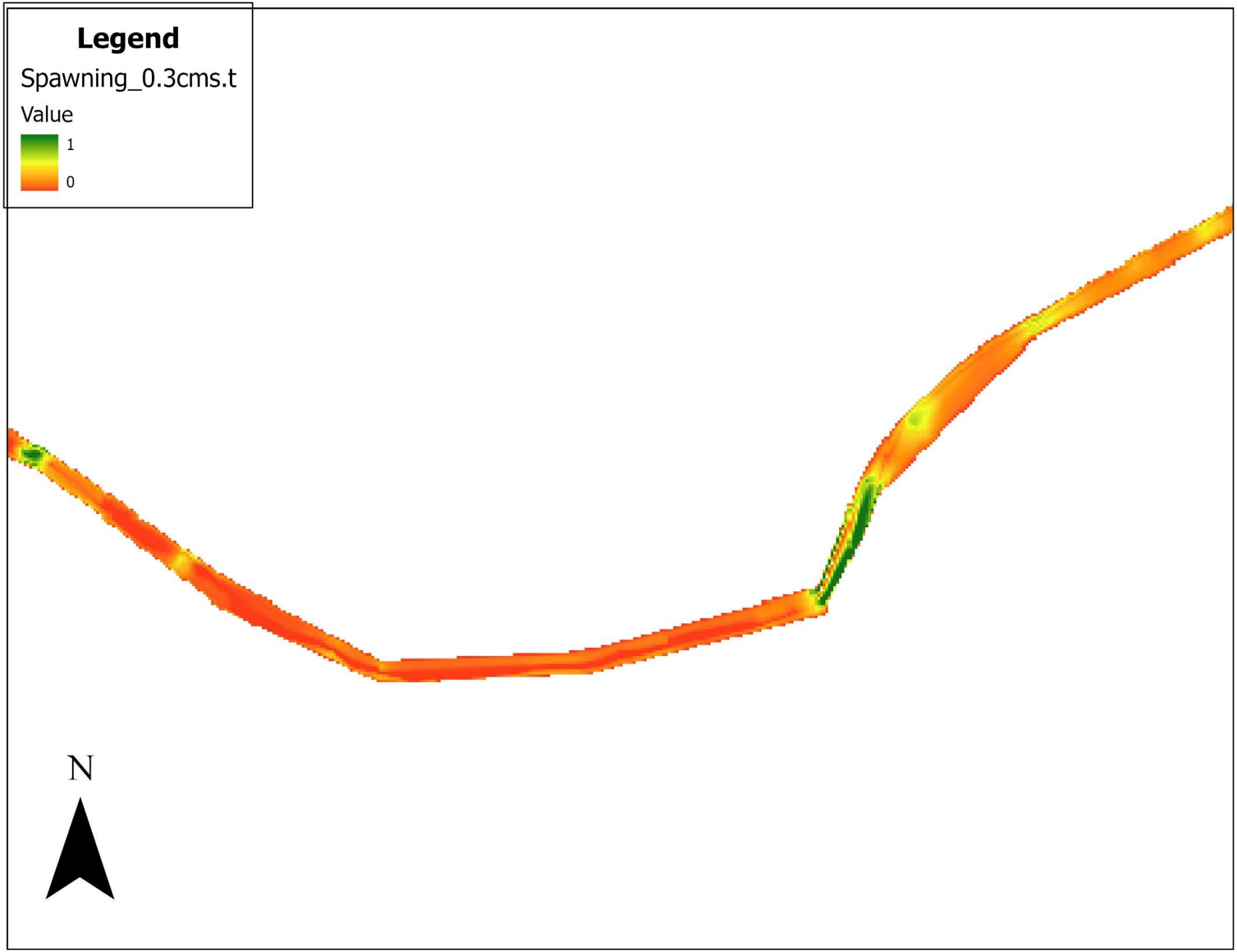
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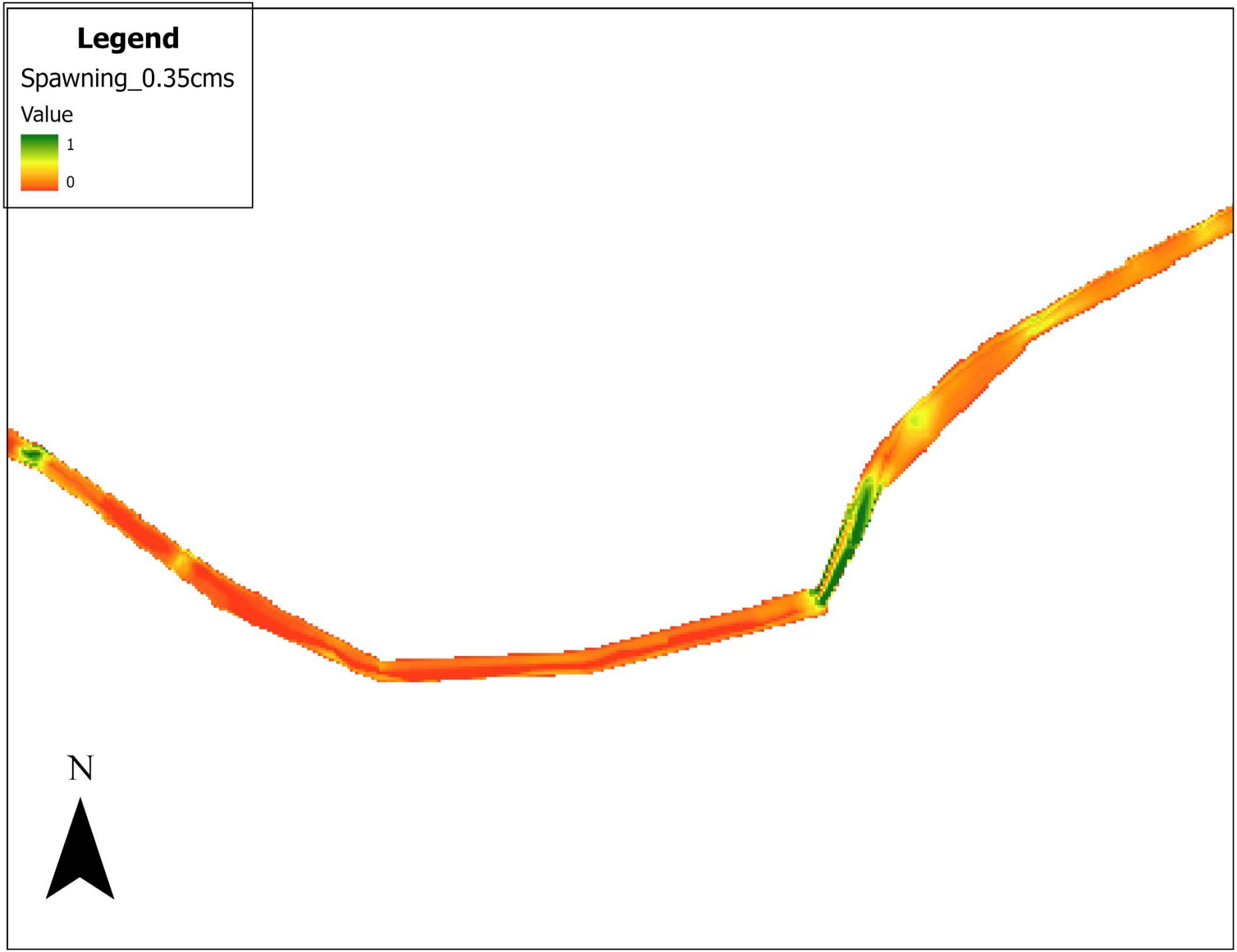
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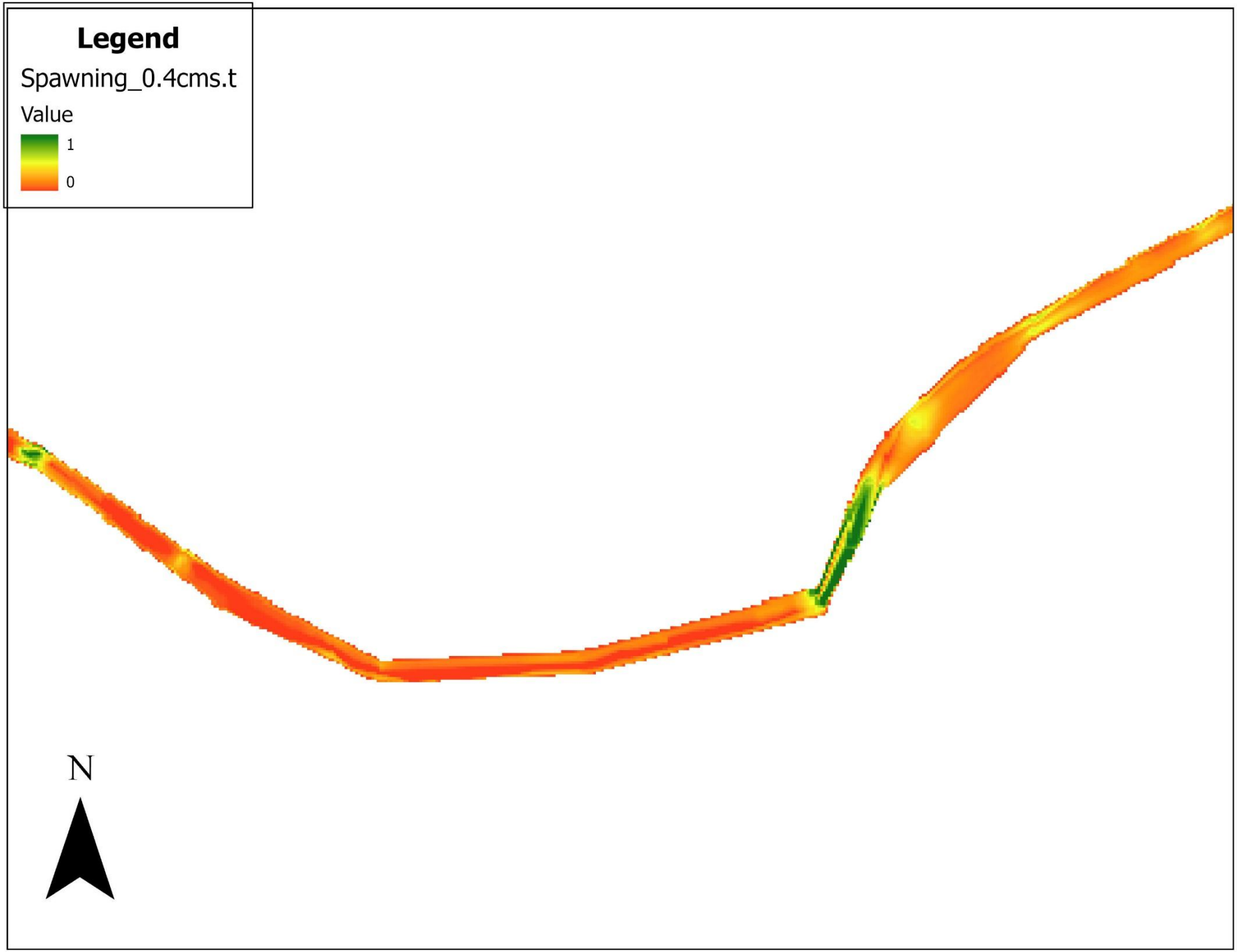
Attachment FFH-01-2 Spatial Extent of White Sucker Spawning and Egg Incubation Habitat at the NDR-NF Monitoring Site

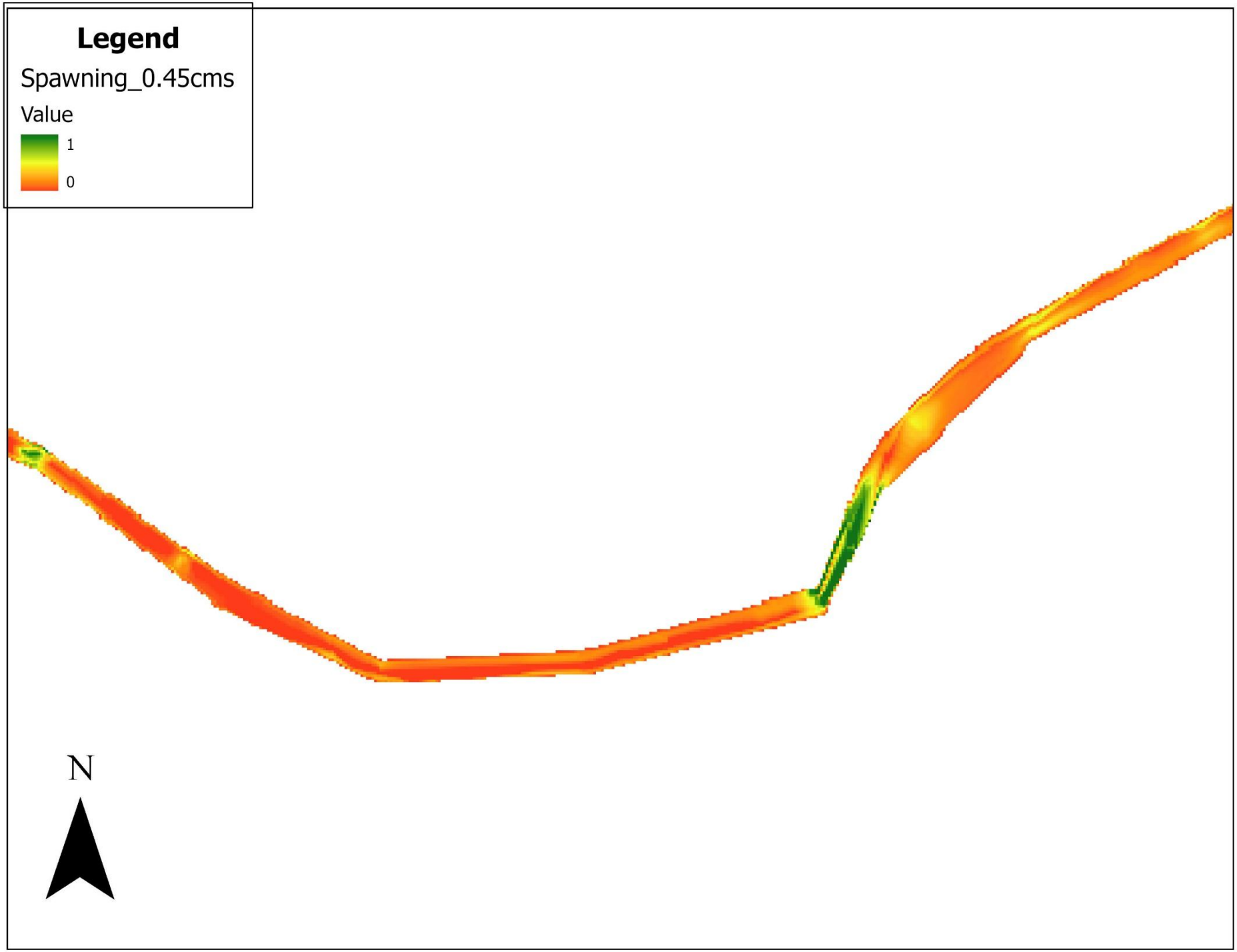

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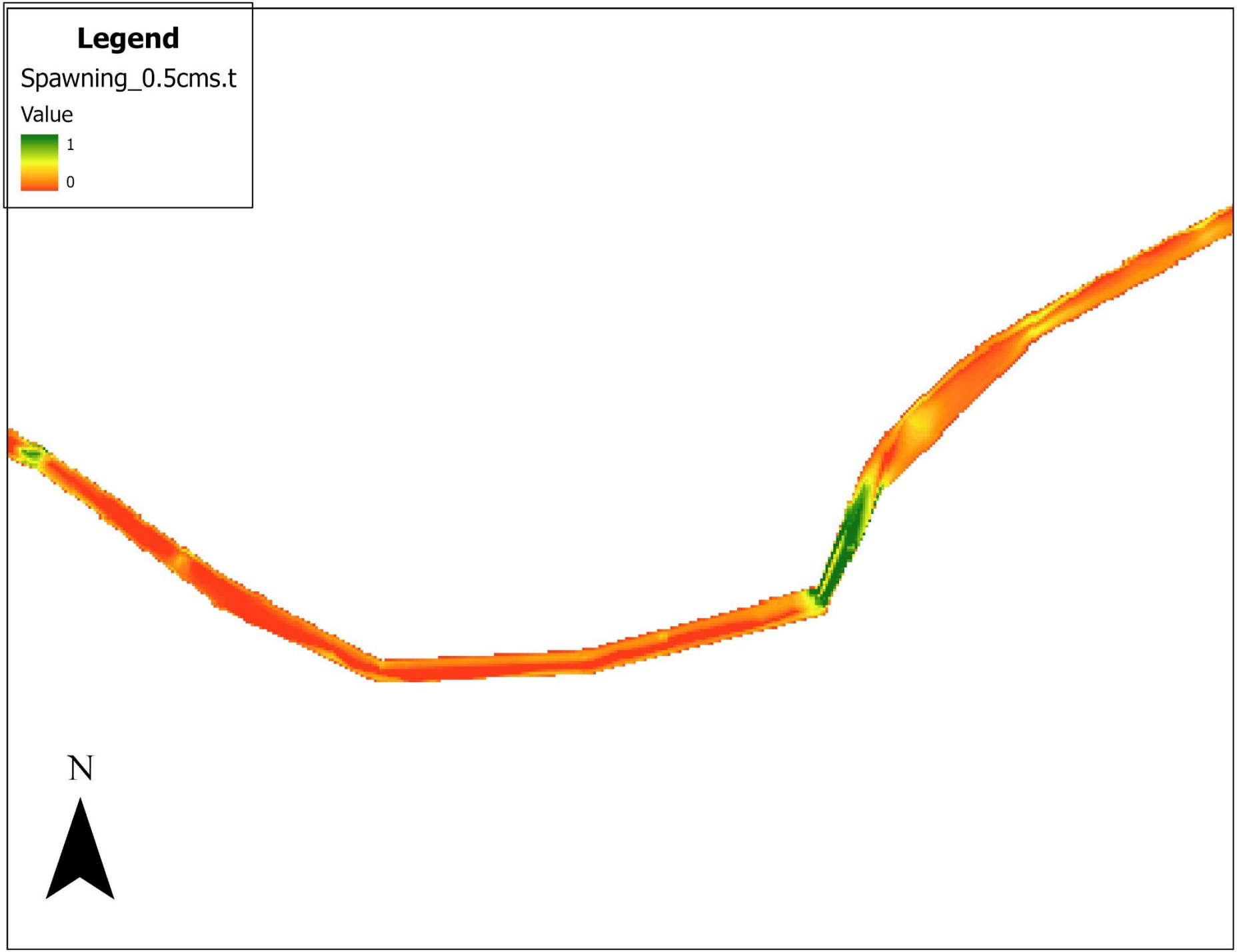

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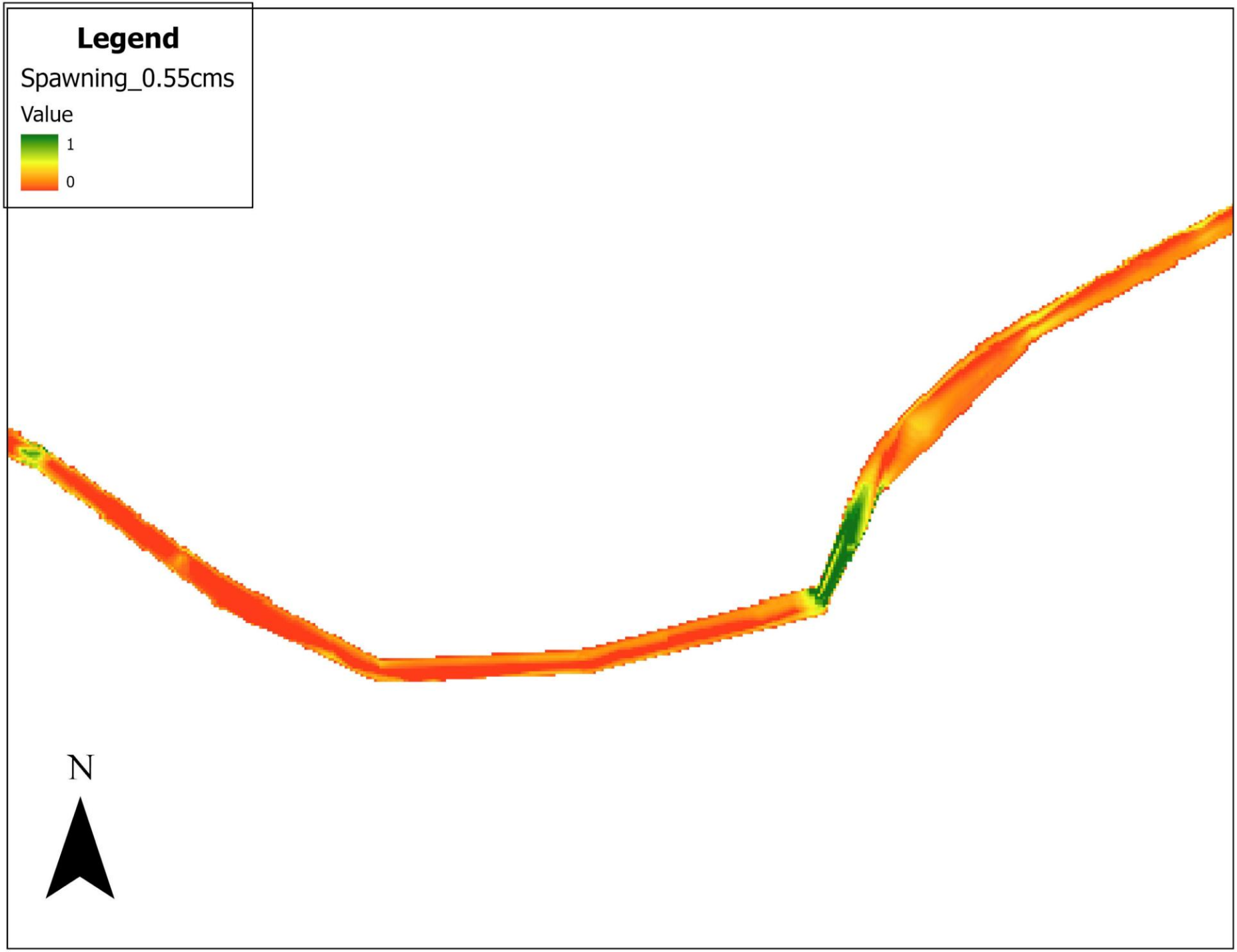

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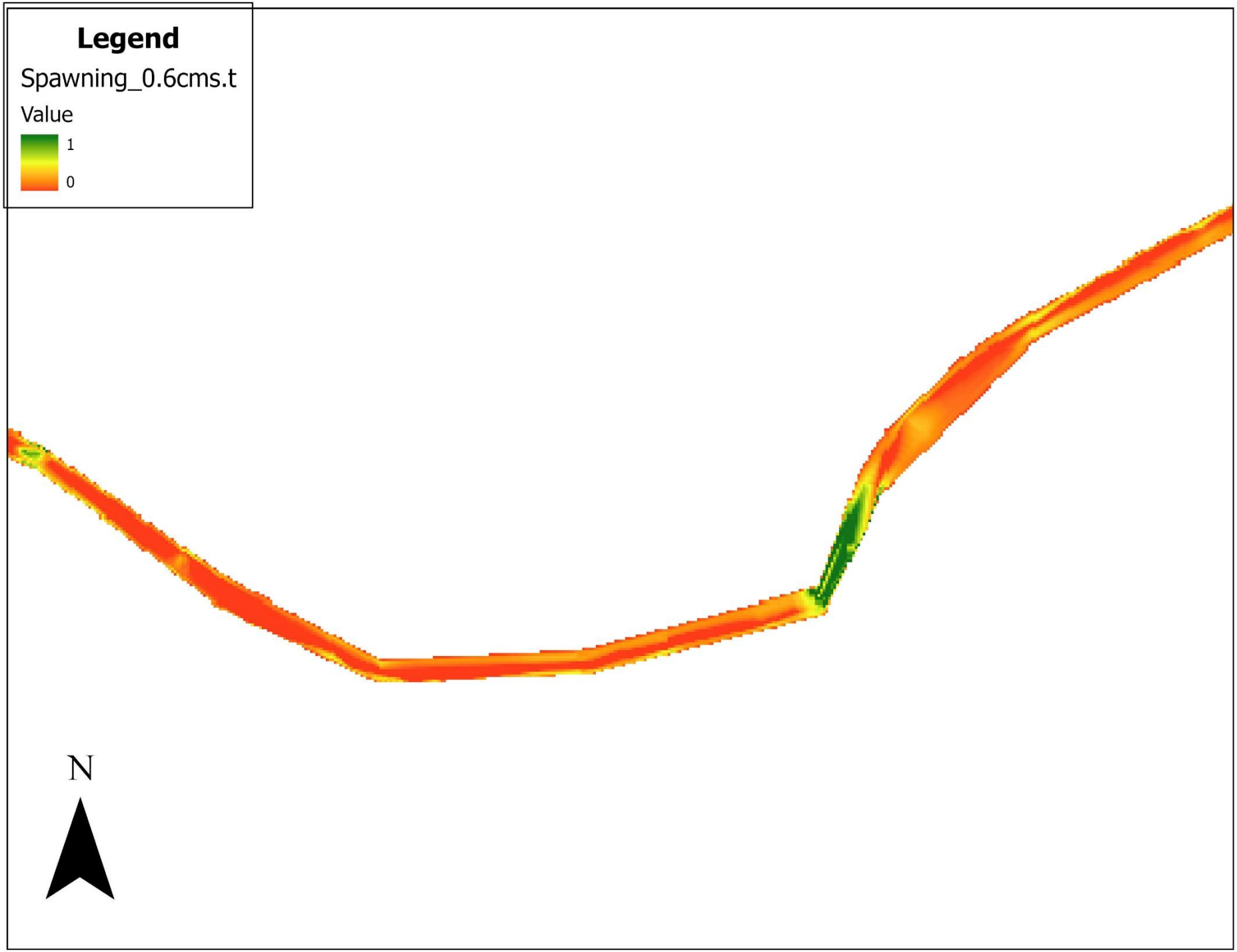

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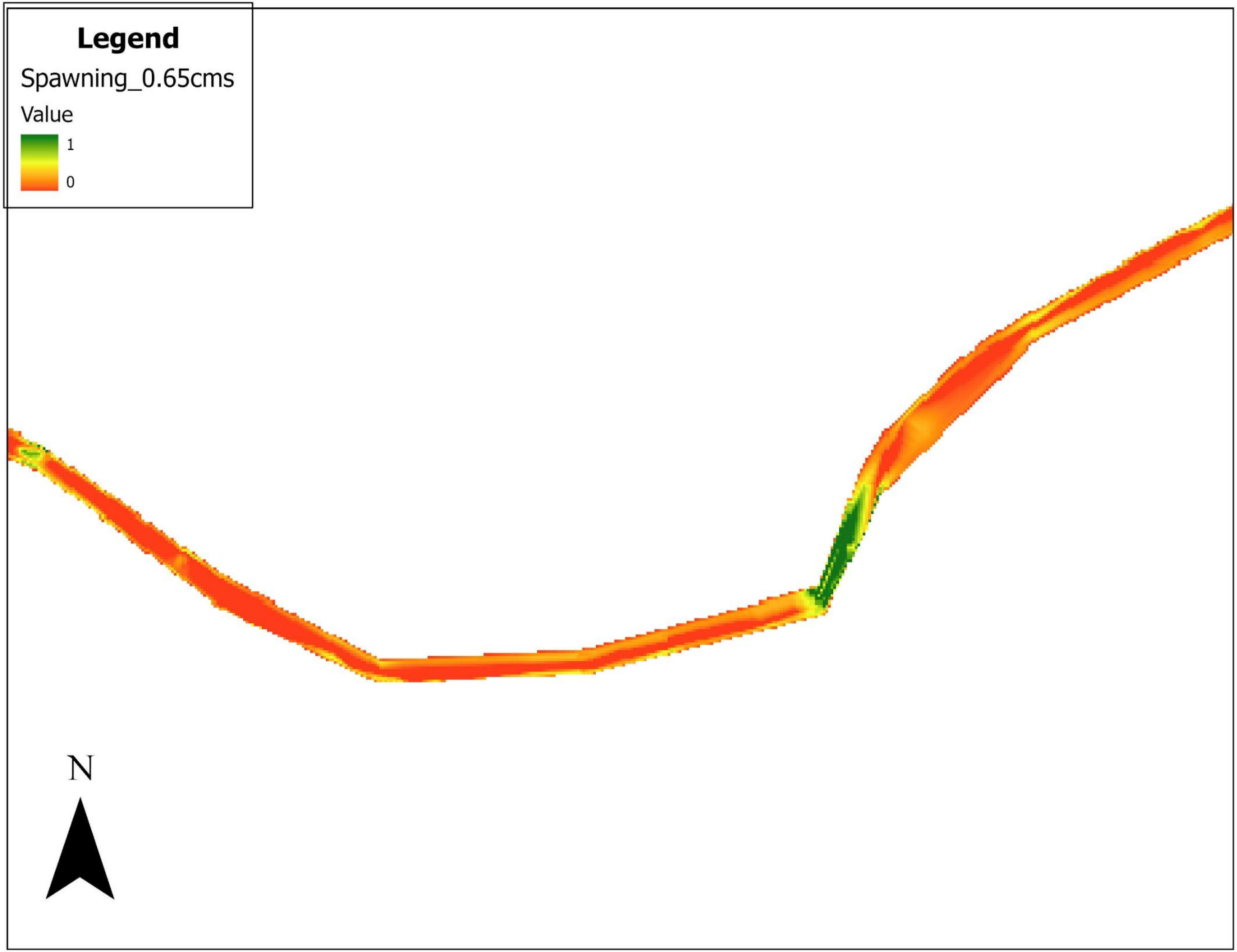

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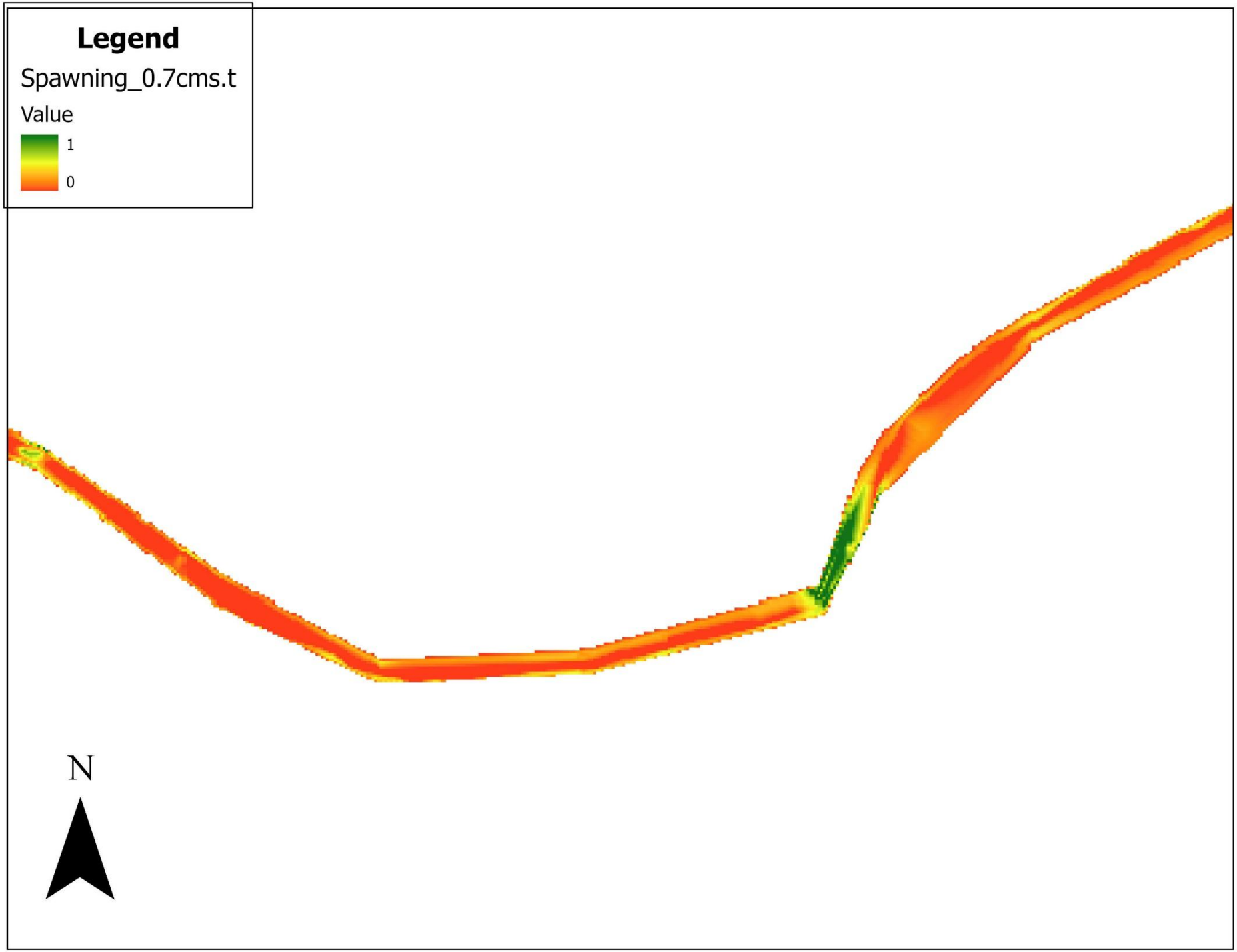

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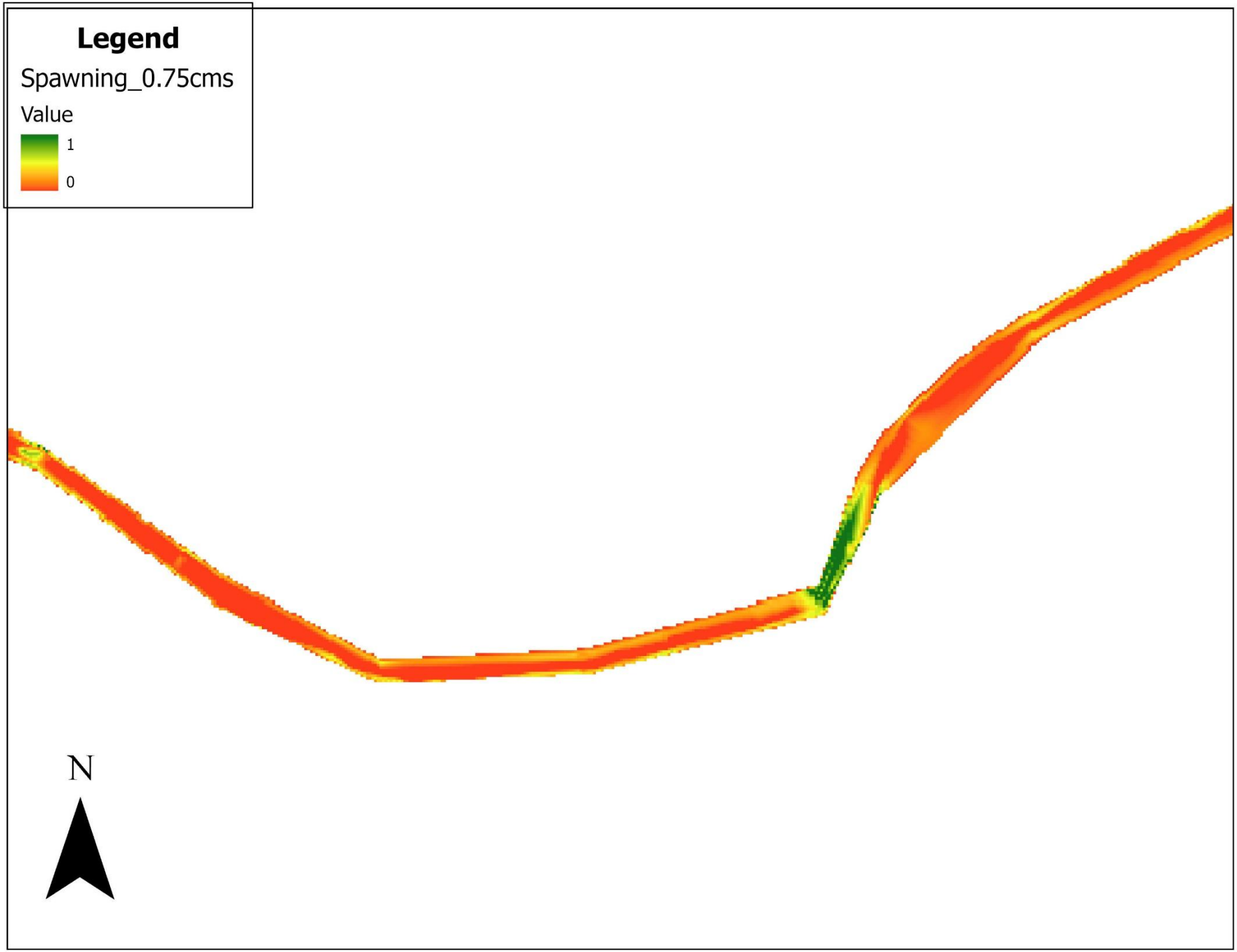

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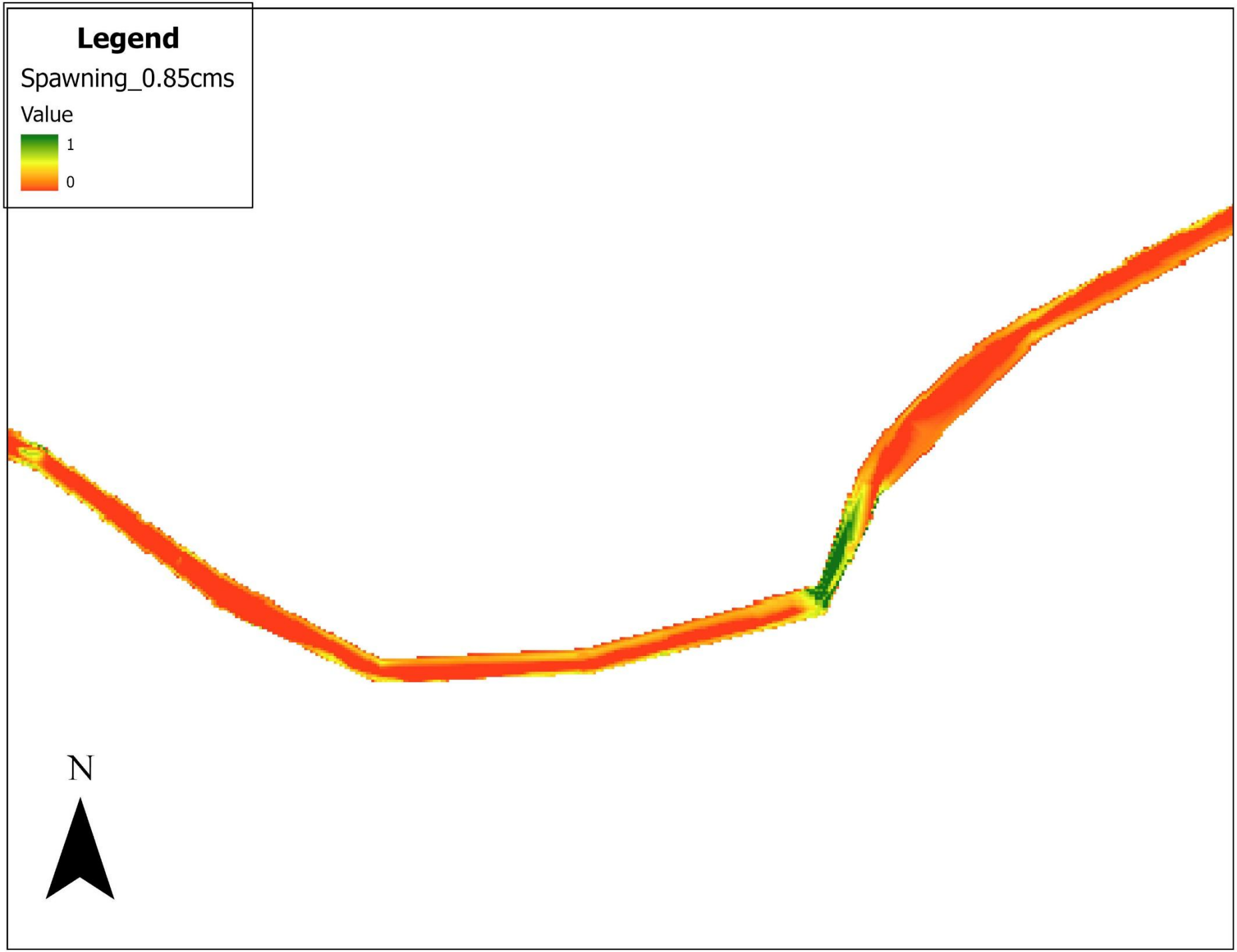

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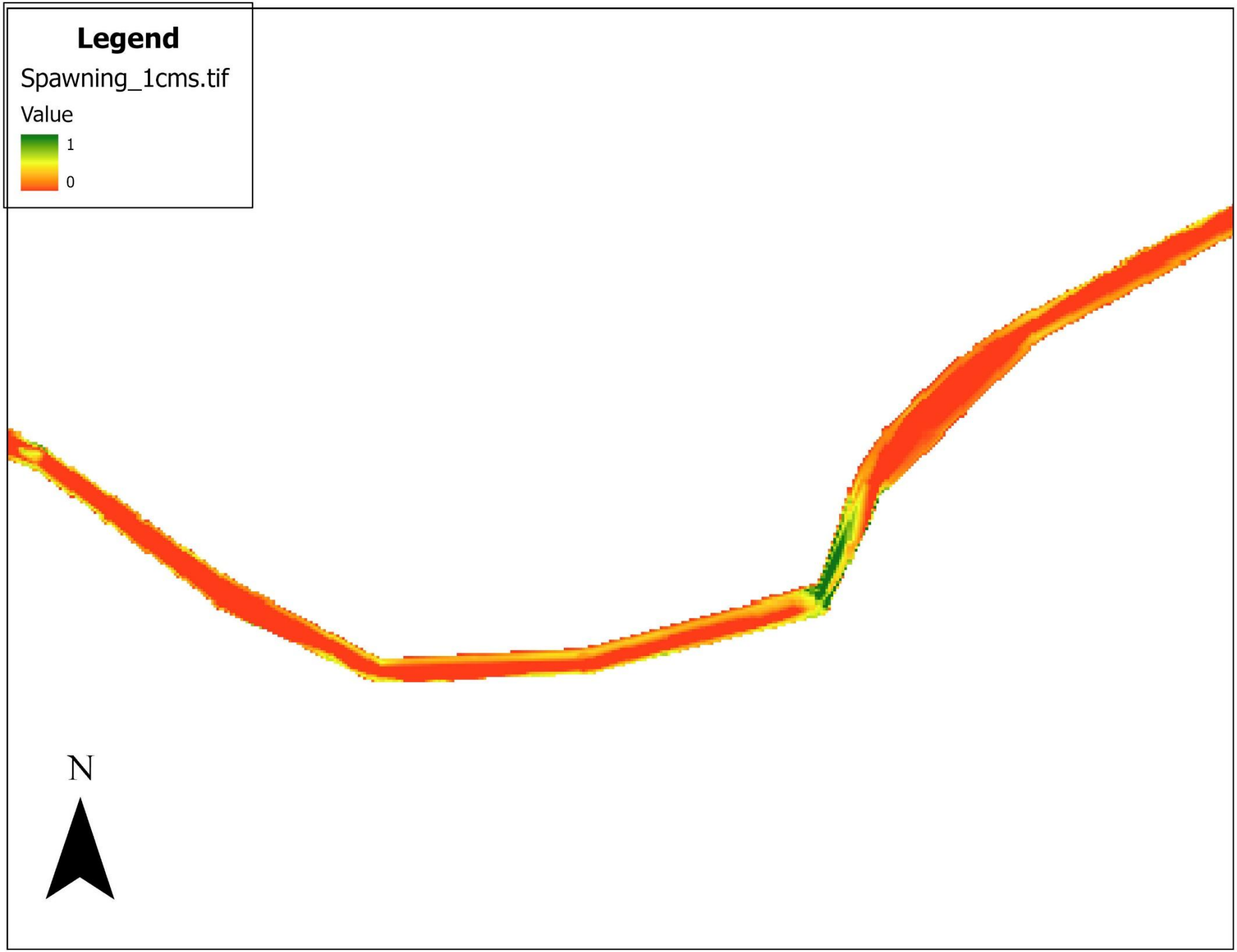

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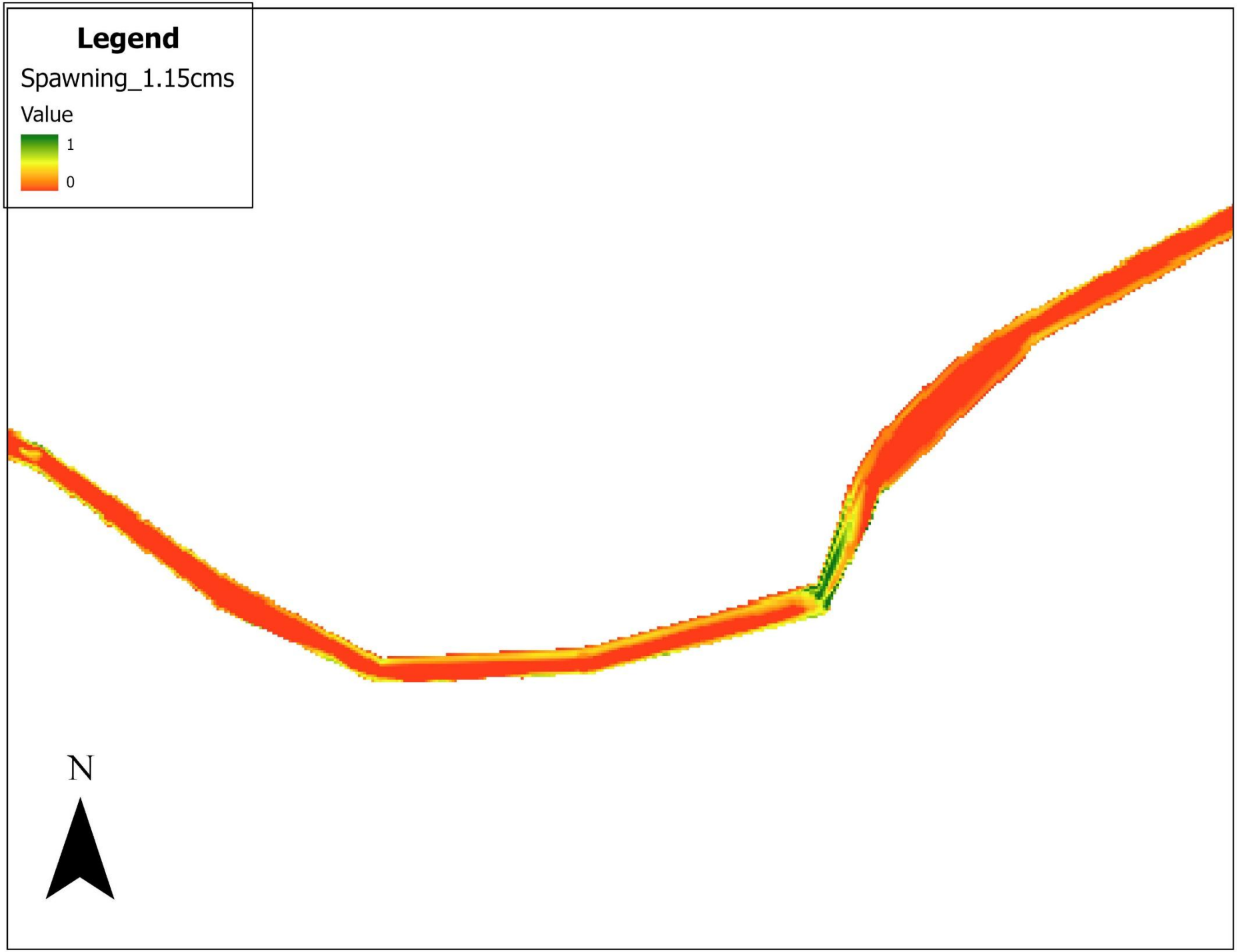

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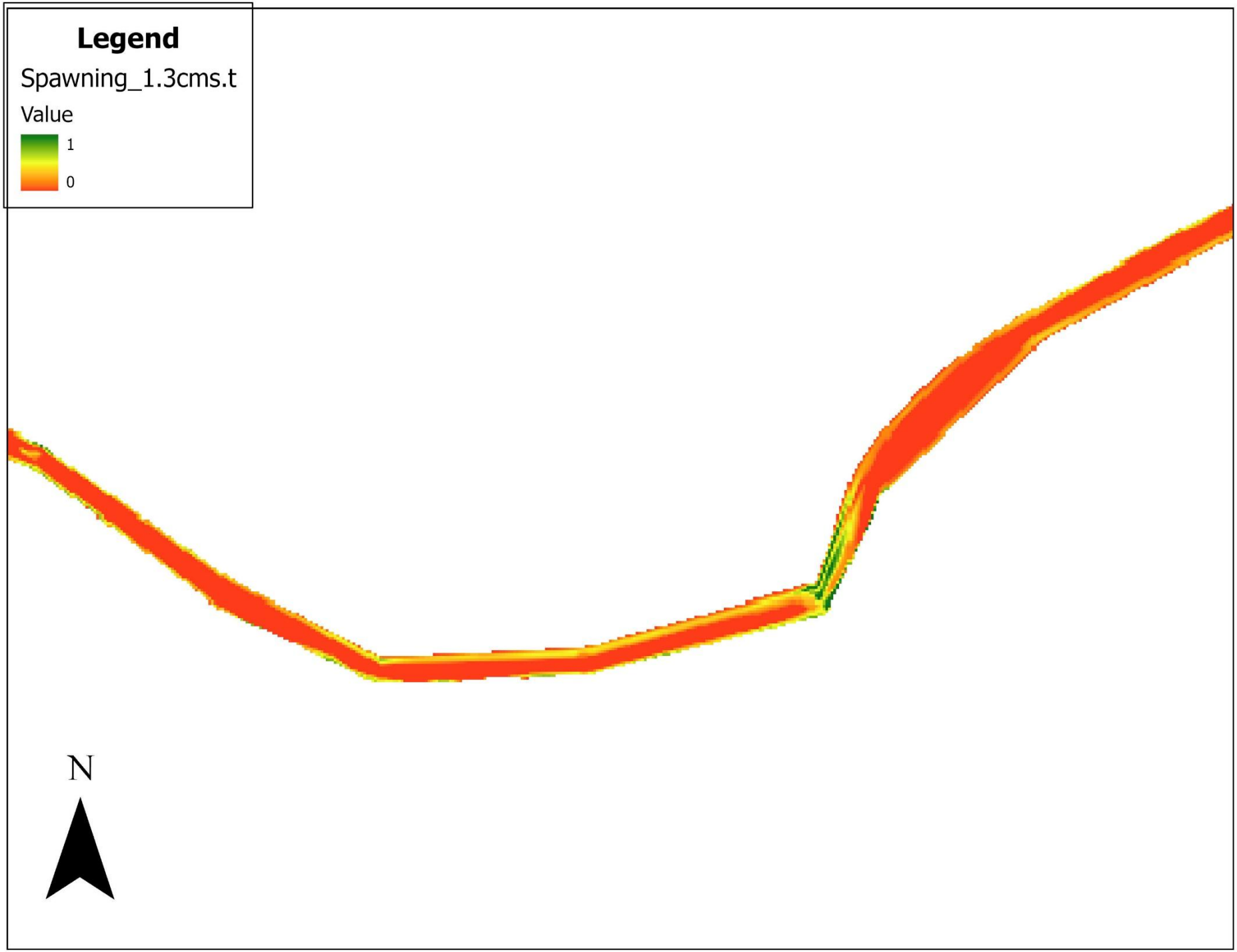

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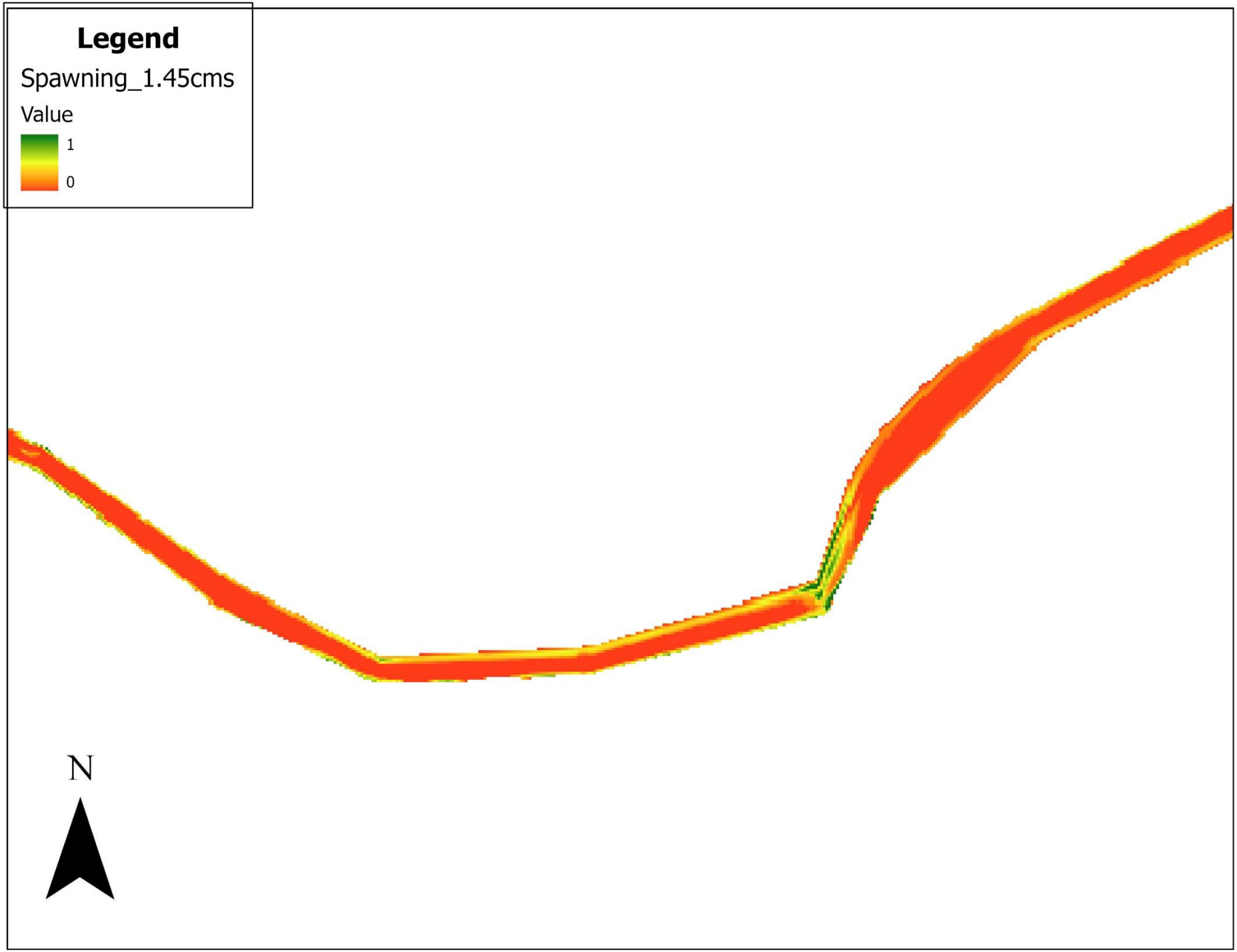

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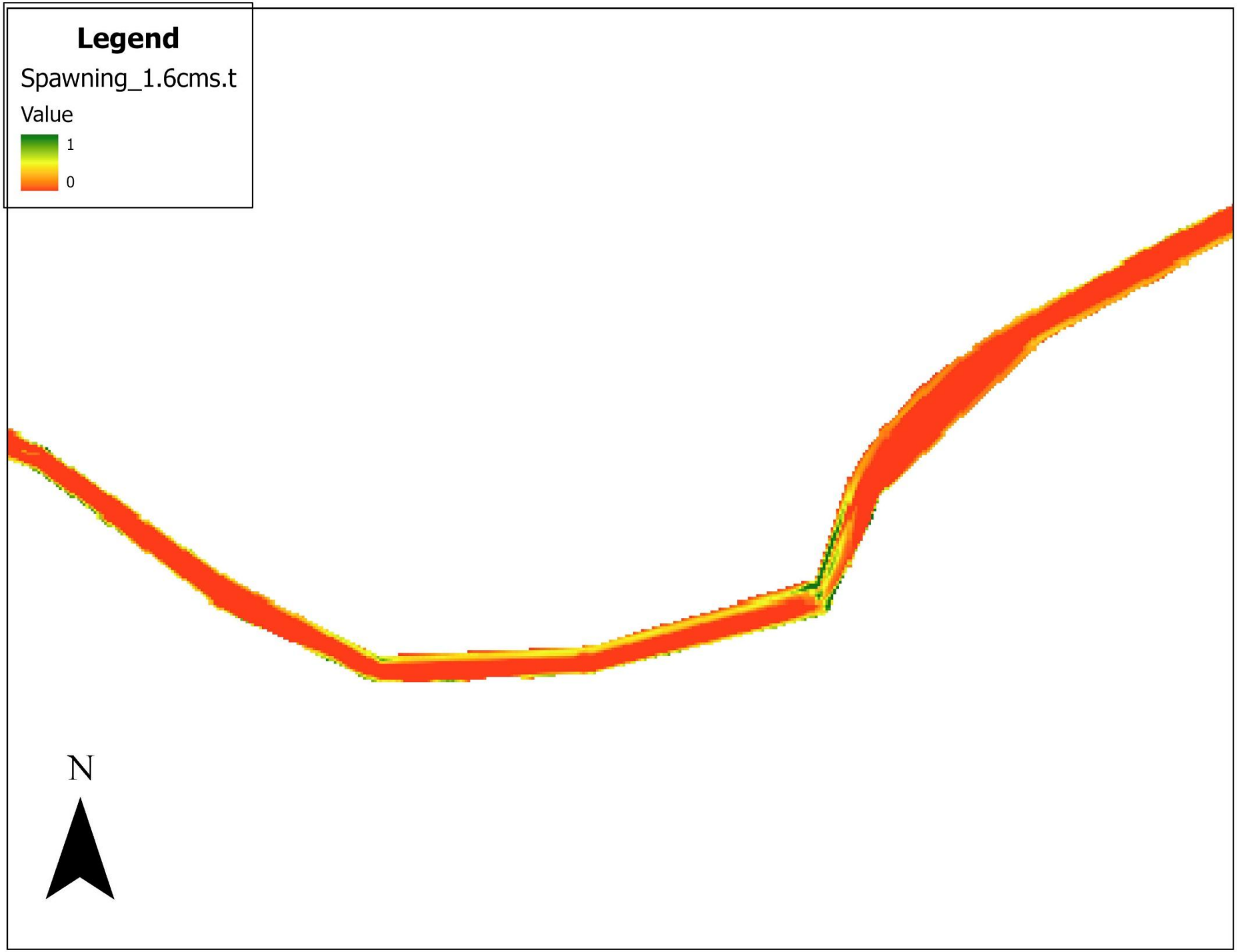

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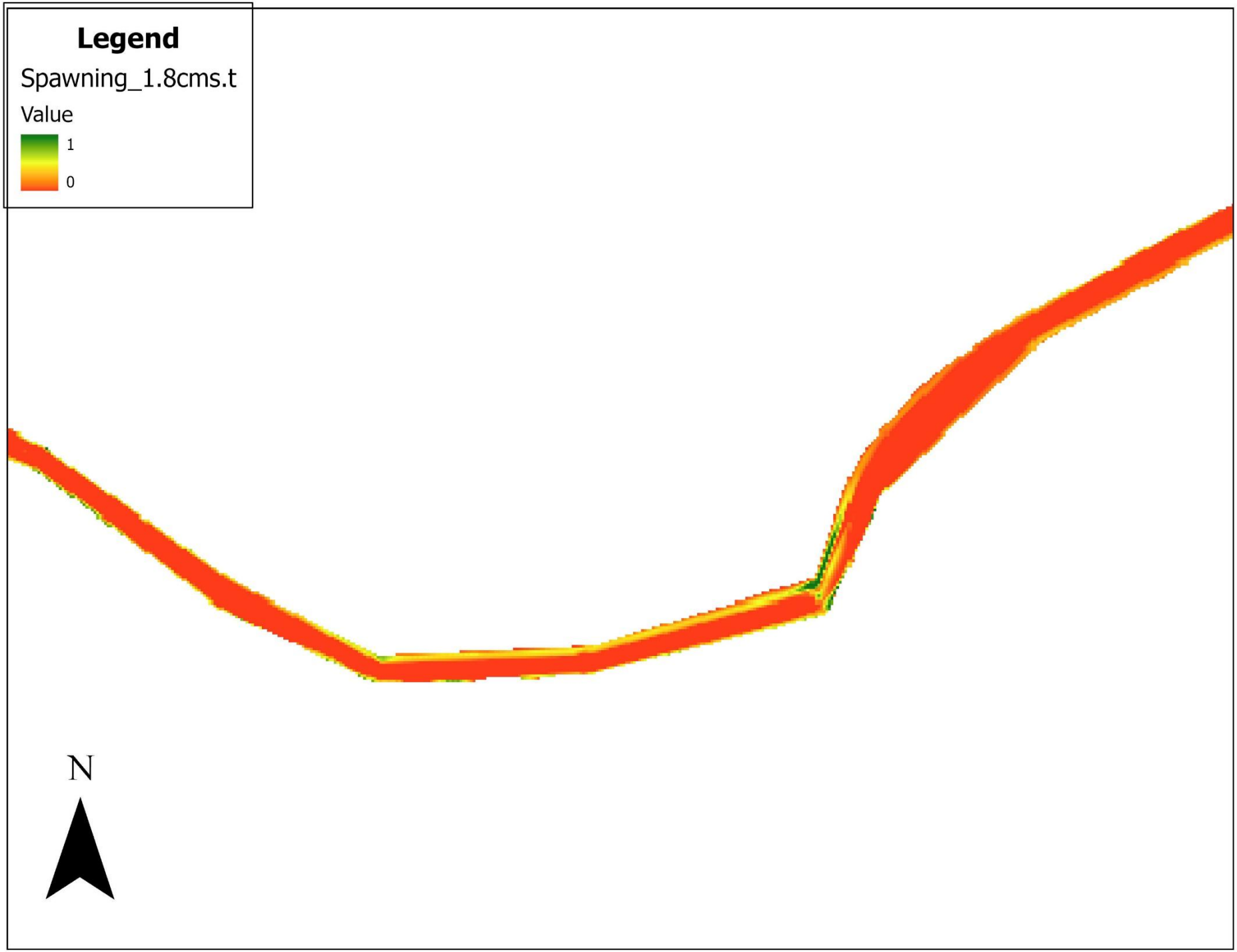

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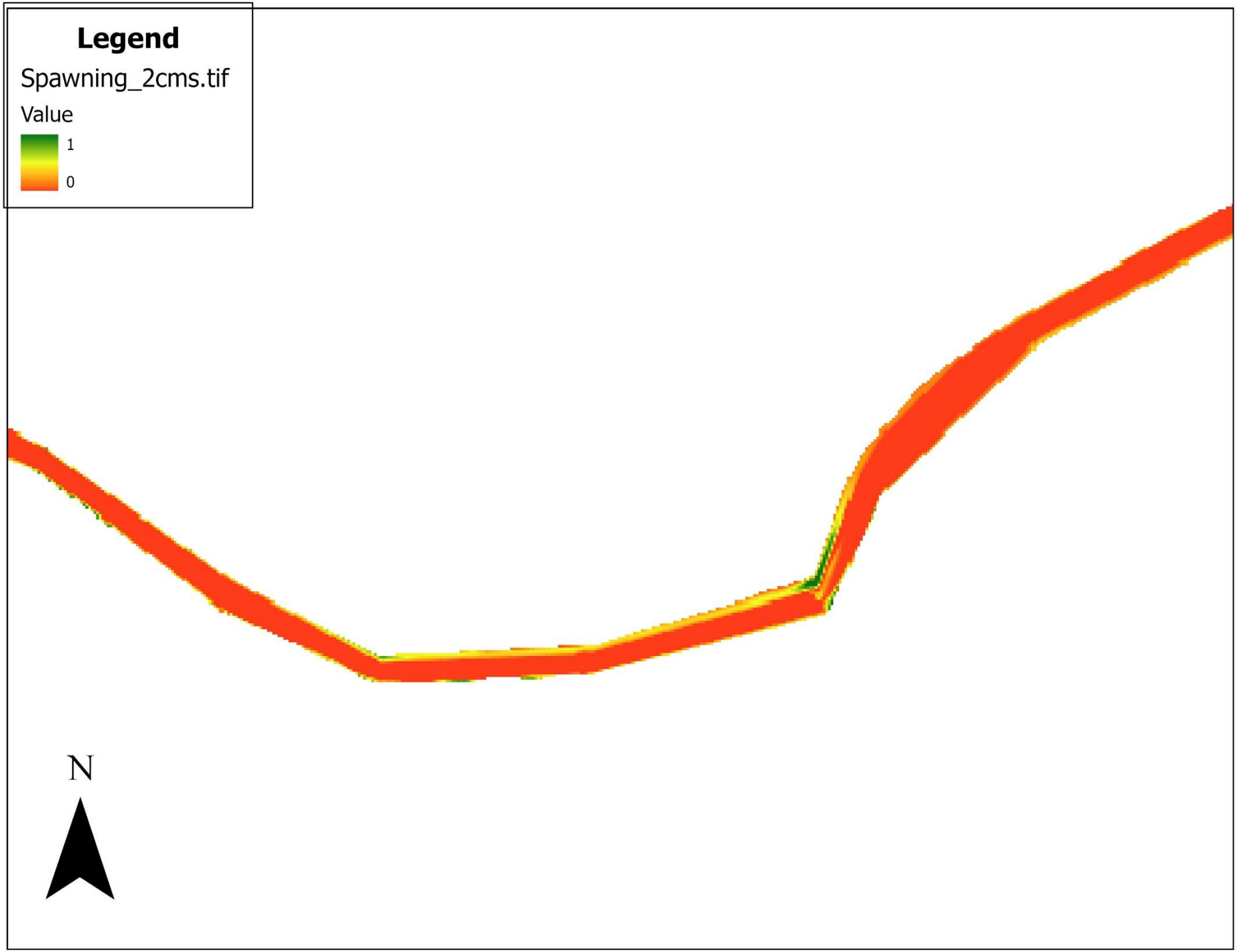

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Attachment FFH-02-1 Figure of Groundwater Discharge – Assessed Surface Water Features

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Nesbitt Creek

Thorburn Creek

North Driftwood River

West Buskegau River

Buskegau River

Regume Creek

MAHAFFY TOWNSHIP GROUND MORAINE

Unnamed Lake (LG Stockpile West)

Lower Sturgeon

Martin Lake

Gerry Lake

Jack Lake

Mel Lake

Zed Lake

Unnamed Lake (South of Zed Lake)

HIGHWAY 655

Jocko Creek

Kidd Creek

Mattagami River

Macdiarmid Creek

CITY OF TIMMINS

ND3 ND5 ND6 ND7 ND8 ND11 ND15 ND20 ND18

WB3 WB5 WB6 WB9 WB12 WB14 WB16 WB19 WB21

JC_DS JC1 JC2

5400000

475000

Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Major Road
- Minor Road
- Railway
- Watercourse
- Waterbody
- Municipal Boundary - Lower Tier
- Conservation Reserve (Regulated)
- Model Domain

Buskegau River Reaches

- WB3
- WB5
- WB6
- WB9
- WB12
- WB14
- WB16
- WB19
- WB21

Mattagami River Reaches

- JC_DS
- JC1
- JC2

North Driftwood River Reaches

- ND3
- ND5
- ND6
- ND7
- ND8
- ND18

North Driftwood River Reaches - Representative of North Driftwood Creek Diversion

- ND11
- ND15
- ND20

0 1 2 km

1:125,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location
Timmins, Ontario

160930456 REVA
Prepared by tcoghlan on 2024-09-10

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
A.10

Title
Groundwater Discharge - Assessed Surface Water Features

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Attachment FFH-02-2 Fish Habitat- Diversion Channel Feasibility

Stantec

Memo

To:	Mathieu Boucher Canada Nickel Company Inc.	From:	R. Nick Keys and Heather Amirault Stantec Consulting Ltd.
Project/File:	160930456	Date:	December 18, 2025

Reference: FFH-002 Fish Habitat- Diversion Channel Feasibility

1 Introduction

Stantec has produced this memorandum in response to the FFH-002 Fish Habitat – Diversion Channel Feasibility concern outlined in CNC's Response to IAAC Comments on The Impact Statement for the Crawford Nickel Project. This memo aims to address the comment below:

> *"Provide an assessment of the technical feasibility and challenges of achieving natural channel design principles that incorporates the proposed diversion's topography, potentially exposed earthen materials, expected flow regime, identified challenges and other relevant factors, and proposed mitigation and any adaptive management measures."*

The proposed CNC mine footprint requires realignment of the North Driftwood River (NDR) around the mine site. It is proposed to use Natural Channel Design (NCD) methods to provide a diversion solution for the NDR that promotes long-term flow conveyance and stability as well as aquatic habitat that can be included in the fish habitat offsetting plan for the project. NCD uses observations from natural watercourses to design a dynamically stable planform, longitudinal profile, and cross-section, as well as to provide natural substrate and riparian vegetation characteristics. NCD is intended to mimic natural river systems that result in self-sustaining, resilient fish habitat that requires limited maintenance. NCD is a multidisciplinary effort and includes input from geomorphologists, river restoration engineers, geotechnical and hydrogeological engineers, aquatic and terrestrial biologists, and construction specialists, among others.

2 Natural Channel Design in the North Driftwood River

The NCD approach to river restoration aims to create functional river systems by emulating the physical and ecological components of stable natural channel forms, within the constraints imposed by the surrounding landscape and infrastructure. This approach uses geomorphic survey results to determine the design configuration of aquatic habitat and key channel characteristics. To understand the existing channel, one or more reference reaches are selected for geomorphic survey and assessment. A reference reach is a section of channel with a stable planform, longitudinal profile, and cross-section, with parameters that are used to define the characteristics of the proposed channel. In the case of the North Driftwood River realignment, the 'template' for the new channel will be the existing river.

Reference: FFH-002 Fish Habitat- Diversion Channel Feasibility

The geomorphic survey of the reference reach collects physical channel data including bankfull width, channel depth, pool-to-pool spacing, meander radius of curvature, meander pattern, cross-sectional geometry, longitudinal profile, slope, and substrate type. The collection and documentation of the existing channel parameters allow the new realignment design to mimic the geomorphology and aquatic habitat of the current NDR.

Successfully implementing NCD at the scale proposed will come with challenges. However, with proper planning and execution, these challenges can be overcome. Potential issues, specific to the NDR realignment, and potential resolutions for the proposed channel work are provided in Table 1.

Table 1 Categorized Potential Issues Specific to NDR and Proposed Resolutions

Category	Potential Issue	Resolution
Valley Corridor	Valley slope – length of realignment could differ from existing river reach resulting in shallower or steeper valley than existing.	Work to match existing valley slope where feasible. Modelling will be used to characterize flows in valley & floodplain. The channel and valley will be designed based on predicted flow depths and velocities.
	Valley side slope material could be saturated or unstable.	Valley side slope material competence will be assessed by geotechnical data collection. The valley side slopes will be 6H:1V or as determined through geotechnical assessment. Various dewatering methods can be implemented during construction to help manage water and seepage flows can be used for habitat creation. Implementing a planting plan will help slope stabilization as the roots become established over time. Matching specific vegetation to the moisture conditions in the design area will be key to establishing successful vegetation.
	New channel could differ significantly from the old channel	Use reference reach approach to natural channel design: existing channel will be used as a template for the design of the realignment. Where spatial restrictions or habitat targets require deviation from the template design methodology, close collaboration with aquatic biologists will allow the channel design to incorporate diverse habitat features to promote the development of high quality fish habitat. The valley will be constructed to accommodate high flow events. The flows in the channel will have floodplain connectivity to disperse energy during high flow events. The bankfull channel will convey flows up to the ‘channel forming flow’. A low flow channel will be incorporated into the channel design to allow low flows to be concentrated to support fish passage. The channel design will incorporate sinuosity and pool-rifle sequences for habitat diversity. A native species planting plan will be implemented.
	River grading: New channel banks might experience excessive erosion.	Design channel for bankfull flow; higher flows will access the floodplain to dissipate stream energy and limit erosive impact on stream banks. Place instream structures and install bank protection structures built from natural materials to manage erosive forces in the channel. Use soil lifts and biodegradable ECB (erosion control blanket) and

Reference: FFH-002 Fish Habitat- Diversion Channel Feasibility

Category	Potential Issue	Resolution
		vegetative planting to protect and stabilize the stream banks– the roots of the vegetation will help stabilize the channel banks. Allow one or more growing seasons before introducing full river flow to newly constructed channel– allow vegetation to establish. Implement a post-construction monitoring plan to review site conditions and recommend adaptive management measures to limit potential erosion sites or repair damaged areas.
	Flood conveyance capacity could be impacted upstream.	Hydraulic modelling will be used to evaluate flow capacity and flow elevations under various high flow events. Channel and valley design will move flood flows through new valley. Channel design will maintain existing flood elevations upstream of the channel.
	Water levels upstream in Martin Lake could be impacted (lowered) and fish habitat upstream is reduced.	A detailed design of the Martin Lake outlet will be completed to maintain the lake outlet elevation at the existing lake outlet. There will be consideration of a lake outlet structure that can easily be controlled or modified to allow for adaptive management should it be determined that lake levels have been impacted by the diversion.
Soil Types	Existing material located within the valley construction area is found to be highly porous, highly erodible, or bedrock.	Plan to acquire geotechnical data in the proposed diversion channel footprint to assess local soil and geotechnical conditions. Will develop design and construction strategies based on findings of the geotechnical study. Material encountered during channel realignment could be fractured bedrock or another highly porous material (e.g. esker). Clay liners and strategic soil placement during construction are approaches that promote surface flows and reduce the probability of subsurface flow or of having river flows draining into subsoils. Erodible soils will be stabilized based on the direction of the geotechnical engineer. Strategies could include reducing valley wall slopes, benching, or applying surface protection or planting. The project team will evaluate design options to address bedrock that may be encountered during geotechnical investigations or subsequent valley grading. Options could include shifting the corridor alignment, adjusting the valley slope gradient to limit bedrock encounters, or removal of bedrock during construction.
Stability & Constructability	Channel and Valley side slopes are unstable during construction and pose safety risks.	Building the channel “in-the-dry” is a safer approach for construction crews, with no active flow within the construction area. Construct side slopes of valley at 6H:1V or as directed by the proposed Geotechnical study. Shallow side slopes will limit erosion or slope failure potential and improve safety in the work area. See Table 2 for more geotechnical and safety concerns.
	Soil lacks stability during rain events and construction progress is delayed by water management requirements	Implementing the Erosion Sediment Control Plan (ESCP) for the work area as the construction progresses will help stabilize soil and create a safe work area. Executing the planting plans as construction progresses to establish robust vegetation on valley side slopes and floodplains before connecting to the channel to the upstream tie-in. The channel will be constructed “in-the-dry” and constructed from the downstream tie-in to the upstream tie-in. Water management will be simpler while building offline from the downstream end to the

Reference: FFH-002 Fish Habitat- Diversion Channel Feasibility

Category	Potential Issue	Resolution
		upstream tie in point. This approach reduces need for active groundwater and surface water management by providing a gravity outlet. Implementing stabilization measures as construction proceeds (i.e., hydroseeding and erosion control blankets) reduces the risk of erosion and supports water quality objectives by limiting sediment movement.
	Channel is unstable and poses a risk to fail and create barriers for fish passage.	Chanel substrate will be sized based on the range of predicted shear stresses for the channel. Sediment transport continuity will be examined to target a sediment transport regime that does not generate significant channel aggradation or degradation which can affect fish passage. Channel banks will be stabilized with bank protection structures that double as habitat structures. A vegetation planting plan will also be used to stabilize the channel banks. Channel floodplain access – Flow access to the floodplain during high flow events allows energy to be dissipated, which limits erosion potential in the main river channel.
	Floodplain soils have a high erosion risk.	Floodplain structures and established vegetation will be implemented on the floodplain. The valley will be constructed to accommodate high flow events. Having a large wide floodplain will reduce shear stresses. Execution of the vegetation planting plan as the construction of the channel/valley progresses will help establish vegetation and reduce erosive shear stresses. Application of ECB's where required during off-line construction.
	Soils are susceptible to erosion during construction.	Implement an erosion and sediment control plan (ESCP) to help mitigate erosion risk during the construction phase. Implementing ECB's where appropriate during off-line construction. Construction sequencing from downstream to upstream, with established discharge criteria for water exiting the work area.
Meander Belt (Footprint)	Valley is smaller than the existing river meander belt and results in sections of channel confined by valley walls.	Implement an erosion setback allowance from the toe of the valley wall. Design will limit lateral movement of the channel by using instream and bank structures. Implement a dense planting plan along the channel banks to support channel and floodplain stability.
Expected Flow Through the Valley (Flow Regime)	Flow regime will be different compared to the existing conditions.	The future site hydrology is intended to closely match existing conditions, where feasible. Design options for the channel will be developed to best match predicted flow conditions. Flows from upstream / adjacent watersheds as well as discharge from the mine are being considered. The channel will be scaled to match the proposed conditions flow regime.

Reference: FFH-002 Fish Habitat- Diversion Channel Feasibility

Category	Potential Issue	Resolution
Fish Habitat	Fish habitat quality is lower in the realigned channel than in the existing NDR.	The NDR diversion channel will be accounted for in the fish habitat offsetting plan for the project, whereby the quality of habitat will be factored in to gains and losses. Strategies to develop high quality fish habitat include: Aquatic biologists shall be involved in the design phase to support the development of the channel design. Habitat elements are likely to include habitat types like pools, riffles and runs to create fish habitat similar to that of the reference reach. The habitat preferences of the fish species present in the NDR will be considered during design. Connected floodplain ponds and wetlands will be incorporated to provide additional rearing, overwintering, and foraging habitat. Inclusion of a low flow channel in the design to reduce fish stranding and to allow fish passage during low flow periods. Maintain a fish passable connection to Martin Lake and the other connected headwater lakes to provide overwintering habitat in the vicinity of the NDR realignment. The lack of deep pools and spawning riffles in the NDR is considered to limit fish use of the existing channel; where feasible, include these habitat features in the realignment. Offline construction, and progressive implementation of the vegetation planting plan will allow riparian areas to be vegetated prior to the introduction of river flows and prior to allowing fish to access the channel. This vegetation will provide shade and allochthonous inputs to enhance the instream habitat. Opportunities to ‘kick-start’ the channel ecosystem will be considered, including seeding the channel bed with substrate from the existing NDR or other local creeks to introduce local benthic communities and other elements of the micro-biome to the channel. Use of local sod mats or other vegetation transplants may also be considered.
Water Quality Impacts	Sediment impacts downstream habitats during construction.	Offline channel construction will limit the need to manage high river flows during construction, therefore, limiting erosion / sediment transport potential into downstream habitats. Implementing an ESC Plan will help mitigate sediment laden runoff during construction. Stabilization measures as construction progresses from downstream to upstream will be implemented (i.e. using ECB blankets and seeding to stabilize loose topsoil after grading). Construction dewatering treatment / filtration plans will be implemented as construction progresses. Progressive implementation of the riparian vegetation planting plan as work proceeds upstream to stabilize floodplain and channel banks. Environmental monitoring during construction will be implemented to review construction impacts and provide recommendations to improve water management or ESC as required to protect downstream habitats.

Reference: FFH-002 Fish Habitat- Diversion Channel Feasibility

Category	Potential Issue	Resolution
	Sediment impacts downstream habitats during operation.	Channel design will incorporate a floodplain, one function of which will be to capture sediment that is transported under high flow conditions. Bank structures, instream structures, and riparian vegetation will support bank stability and limit erosion potential within the realigned watercourse.
	Mine effluent water quality impacts fish habitat.	Per Chapter 15 of the Impact statement, (Section 15.4.3.2): Canada Nickel will treat water effluents prior to discharge to the receiving environment, as required, to meet regulatory criteria including an Environmental Compliance Approval issued by the Ministry of the Environment, Conservation and Parks (MECP) as well as criteria developed through the receiving watercourse Assimilative Capacity Study (Appendix G of the Surface Water Resources Assessment [Appendix C.5 of the Impact Statement]), in addition to the Metal and Diamond Mining Effluent Regulations (MDMER). Canada Nickel will implement water treatment through use of water treatment plants to receive discharge from the collection ponds and will use proven processes to treat the water to meet regulatory effluent criteria prior to discharge to the environment.

3 Potential Geotechnical Concerns

SRK Consulting (Canada) Inc. has identified potential geotechnical concerns and risks associated with excavation of a valley corridor to realign the NDR. A brief summary of the potential risk and issues related to the valley and river are presented in Table 2. Each topic listed describes a potential risk that could occur during construction or operation and includes potential mitigation strategies and recommendations. Geotechnical mitigation strategies will be refined through further geotechnical analysis within the proposed NDR realignment footprint. See Attachment A for the complete SRK (2025) memorandum.

Reference: FFH-002 Fish Habitat- Diversion Channel Feasibility

Table 2 Key Risks and Mitigation (Adapted from SRK 2025, Attachment A)

Topic	Description	Potential Mitigation Strategies	Recommendations
Geotechnical Stability of Excavated Slopes	Slopes excavated in saturated clay and glaciofluvial sand could be unstable during construction.	Maintain excavation slopes flatter than 6H:1V in clay and 5H:1V in glaciofluvial sands. Implement dewatering strategies to reduce risks associated with groundwater exposure in excavation slopes. Develop a standardized stabilization design for valley walls that effectively manages concentrated seepage zones.	Complete geotechnical and hydrogeological investigation program along the channel alignment to reduce uncertainties. Update stability assessments once new geotechnical information becomes available Develop a standardized stabilization design for valley walls that effectively manages concentrated seepage zones.
Internal Erosion (piping) and Material Transport	Elevated phreatic levels in the excavated slopes create high hydraulic gradients that could lead to internal erosion, resulting in localized slope instability and the transport and accumulation of fine-grained sediments at the channel base.	Reinforce side slopes to mitigate internal erosion progression. During construction, install silt fences, turbidity barriers, and consider microtopography features or similar measures along the base of the channel to manage sediment transport. Implement active dewatering to reduce the potential for internal erosion, during construction	Prepare a management plan to control total suspended solids (TSS) before downstream discharge
Long-term Seepage and Geotechnical Stability	Cessation of dewatering activities results in rebound of groundwater levels, leading to adverse impacts on geotechnical stability of valley slopes and foundations.	Reinforce the excavation side slopes and bottom in critical areas to enhance geotechnical stability.	Identify and prioritize critical areas for reinforcement based on updated geotechnical and hydrogeoogical data, supplemented by instrumentation readings and field observations during construction. Determine how seepage can be beneficial to the proposed habitat and incorporate into design and construction.

Reference: **FFH-002 Fish Habitat- Diversion Channel Feasibility**

4 Conclusion

The realignment of the NDR is a large-scale project with goals of developing a valley form that is stable over the long-term, developing a bankfull river channel that mimics the form and function of the existing river, and developing a system that provides diverse aquatic habitat. NCD is an approach to stream restoration that reduces long-term maintenance compared to other design approaches (e.g., hard engineered water conveyance flumes and ditches) and that more often results in a resilient and sustainable channel design. Potential concerns around construction of the proposed valley and channel have been considered at this phase and possible mitigation strategies and resolutions have been presented. Additional data gathering and analysis will be used to refine the design and mitigation strategies in future phases of the project. These strategies and the proposed design approach should lead to a successful implementation of NCD and long-term self-sustaining fish habitat.

Regards,

Stantec Consulting Ltd.

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Date: 2025.12.18 10:44:07-05'00'

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Mobile: 437-246-8164
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Digitally signed by Amirault, Heather
Date: 2025.12.18 10:40:35-05'00'

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Phone: ((519) 585-7453
Mobile: (519) 575-8726
heather.amirault@stantec.com

stantec.com

Attachment:
Attachment A : Attachment A SRK (2025) Memorandum

December 18, 2025
Mathieu Boucher

Reference: **FFH-002 Fish Habitat- Diversion Channel Feasibility**

Attachment A SRK (2025) Memorandum

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FINAL

Memorandum

To	Desmond Tranquilla	**Client**	Canada Nickel Corporation
From	Osvaldo N. Ledesma, Barbara Amar	**Project**	CAPR003324.03
Cc	Trevor Podaima, Arcesio Lizcano, Jordan Larkins, Ayaz Kassam, David Pensick	**Date**	December 17, 2025

Subject Geotechnical Support for the Implementation of the North Driftwood River Diversion Channel

File name: Crawford_DiversionChannel_Memo_CAPR003324_20251217_FNL.docx

1 Introduction

SRK Consulting (Canada) Inc. was retained by Canada Nickel Company (CNC) to provide technical support in responding to comments from the Impact Assessment Agency of Canada (IAAC) regarding the Impact Statement (IS) for the proposed Crawford Project, located in northeastern Ontario.

This memorandum provides an overview of key geotechnical risks and challenges associated with the excavation of the North Driftwood River (NDR) Diversion Channel floodplain. It also outlines potential mitigation measures, and recommended next steps to address existing uncertainties, based on currently limited site data.

2 Diversion Channel Design Considerations

The conceptual NDR Diversion Channel, ND4 alignment (the Diversion) was designed by Stantec (2023) and further refined during a meeting between SRK's team and Stantec on Thursday, September 4th, 2025. The conceptual design prepared by Stantec is presented in Figure 1 and Attachment 11. The key design aspects are summarized below:

- **Diversion Alignment and Geometry:**
  - The Diversion begins at the north end of Martin Lake extends along the west side of the West Stockpile and continues North following a parallel path of Highway 655. The Diversion terminates at the western boundary of the planned Rock Impoundment Facility where it ties back into the NDR. The ground surface elevation along the Diversion alignment ranges between 266.0 and 274.0 m.
  - The Diversion contains two primary features, a bankfull channel and a floodplain.
  - The Diversion has a total length of 5.9 km. The floodplain has a width of approximately 145 m, longitudinal slope of 0.09% and side slopes at 6 Horizontal to 1 Vertical (6H:1V).

- **Construction Considerations:**
  - Passive water management methods, such as gravity flow and relief wells, are preferred.
  - Construction will progress from downstream to upstream to support water management during construction.
  - Excavation depths range from 2 to 7 m.

3 Site Conditions

3.1 Site Topography

The Diversion is situated in a lowland area characterized by the following features:

- Average ground elevations range from 265 to 290 masl, slightly below the regional average of 300 masl.
- The minimum ground elevations are approximately 250 masl within the river and stream basins in the surrounding area.
- The ground surface dips towards the north and thus the NDR flows south to north.
- The site has limited drainage over clay sediments, with surface water flowing north to the Abitibi River and south to the Mattagami River.
- Bedrock exposure is limited, with outcrops observed mainly in the southern part of the site.

3.2 Stratigraphy and Groundwater Within Diversion

No boreholes or in-situ tests were conducted directly along the Diversion. The closest geotechnical data collected are located at least 350 m from the proposed Diversion (SRK 2023, SRK 2024d). This includes four boreholes (AUS24-PP-BH-16, SRK21-PF-BH-01, SRK21-PF-BH-04, SRK21-LG-BH-04) and four cone penetration tests (SRK21-PP-CPT-16, SRK21-PF-CPT-01, SRK21-PF-CPT-04, SRK21-LG-CPT-05) conducted along the 5.9 km length of the Diversion as shown in Figure 2.

Given the limited geotechnical data available along the proposed Diversion alignment, the subsurface conditions along the alignment were interpreted by integrating these datasets with SRK's surficial geological model of the site (SRK 2024a). An idealized stratigraphy profile based on this geological model is presented in Figure 3. The surficial geological model and available geotechnical information also suggest the possible presence of an esker in the area as indicated in Figure 2.

The main geotechnical units that are expected to be encountered along the Diversion alignment are described in Table 3-1.

Table 3-1: Geotechnical layers expected in the Diversion alignment

Geotechnical Layer	Description	Geological Interpretation
Matheson Till	▪ Interpreted to be composed of dense sandy silt. ▪ The hydraulic conductivity is interpreted to be higher than the clay and transition layers found above.	▪ This sandy-silt deposit was formed by the Laurentide ice sheet and is nearly continuous across the area.
Glaciofluvial Sand	▪ Observed directly below the transition material or at ground surface. ▪ No Matheson till when Glaciofluvial sand present. ▪ This layer is expected to be encountered in sections of the Diversion excavation.	▪ Deposits of glaciofluvial sand and gravel that are primarily associated with esker formations. Deposits. may also include localized subaqueous deposits formed during the retreat of the Laurentide ice sheet.
Transition	▪ Consists of silts, sands, and clays. ▪ Notably, it is considered to have higher hydraulic conductivity than the clay unit above, but likely lower hydraulic conductivity than the till unit below.	▪ The upper portion of the Matheson Till has been observed to consist of looser, glacial outwash material that transitions into early glaciolacustrine sands and silts, or interfingers with the bleeding eskers in the area. ▪ This unit, referred to as the “transition” represents a looser near-surface deposit.
Clay	▪ Saturated, soft, low permeability glaciolacustrine clay. ▪ Primarily classified as lean clay (CL), with occurrences of fat clay (CH) at specific locations. ▪ It corresponds to three different fine-grained geological units that have similar parent material and visually and texturally appear similar. ▪ This layer is expected to be encountered in sections of the Diversion excavation.	▪ Glaciolacustrine (Barlow-Ojibway): Deposits of sand, silt, and clay are related to the proglacial lake that formed during the retreat of the Matheson ice sheet. ▪ Cochrane Till: Fine-grained till deposit resulted from the readvance of the ice sheet during the Cochrane advance. ▪ Glaciolacustrine (Ojibway): Deposits of sand, silt, and clay that are associated with the proglacial lake that formed during the retreat of the Cochrane ice sheet.
Organics	▪ Primarily consisting of organics, silt, trace of rootlets and clay. Classified as organic silt or organic clay with a low liquid limit or low plasticity (OL). ▪ Along the Diversion, the deposit is generally thin, with an expected thickness of less than 0.5 m.	▪ Organics accumulate post-glaciation and continue to be formed today.

Four representative geotechnical profiles corresponding to specific Diversion locations (chainages 690, 1500, 2500, and 5300) were established through a detailed review of borehole logs, site photographs, and CPTu results. These profiles are summarized in Table 3-2 including groundwater levels determined from interpretation of pore pressure dissipation tests on CPTus. SRK’s investigation logs are presented in Attachment 2.

The geotechnical profile along the Diversion alignment ranges from thick clay deposits, up to 10 m thick, to sections where no clay is present. In areas without clay, glaciofluvial sands (esker deposits) are present at the ground surface or directly beneath a thin organic cover. These contrasting geotechnical profiles have important implications for slope stability and groundwater management during excavation of the Diversion. Where glaciolacustrine clays are present, they are typically underlain by either Matheson Till or glaciofluvial sands, each condition presenting different implications for the risk of bottom uplift failure during excavation.

The groundwater level appears to remain relatively constant along the Diversion alignment, generally ranging between elevation 267.7 and 269.3 masl. The water level at Martin Lake (upstream side of the Diversion) is approximately 268.3 masl, while on the downstream end of the Diversion it decreases to around elevation 263.0 masl. It is expected that the Diversion excavation would take place within partially to fully saturated soils comprised of clay or glaciofluvial sand.

Groundwater levels exhibit seasonal variation, fluctuating in response to recharge of the eskers during wet seasons, and typically deplete during the dry season. Frost penetration was limited to the near-surface soil horizons, specifically the top few centimeters, which are predominantly comprised of organic material mixed with silt, snow and ice, with a mean depth ranging from 0 to 60 cm (SRK 2023, 2024c).

An interpreted geotechnical profile including the expected groundwater level along the Diversion alignment is shown in Figure 4. The available geotechnical information is located in a range of 350 m offset from the alignment, and therefore the collar elevations of the soundings do not coincide with the ground surface along the Diversion. To address this, the geotechnical profile along the alignment was constructed by projecting the interpreted elevations of the interfaces between geotechnical units onto the Diversion alignment.

Table 3-2: Adopted representative profiles based on borehole and CPT interpretation

Diversion Chainage (m)	Reference Borehole/CPT	Groundwater Depth[1] (m)	Groundwater Elevation (masl)	Thickness (m)				
				Organics	Clay	Transition	Matheson Till	Glaciofluvial Sand
690	AUS24-PP-BH-16 SRK21-PP-CPT-16	7.7	269.3	0.2	10.0	-	-	17.5
1500	SRK21-PF-BH-01 SRK21-PF-CPT-01	7.1	268.7	0.3	-	-	-	25.7
2500	SRK21-PF-BH-04 SRK21-PF-CPT-04	3.0	269.1	-	9.0	-	32.0	-
5300	SRK21-LG-BH-04 SRK21-LG-CPT-05	1.3	267.7	-	13.0	2.1	23.5	-

Notes:

[1] Determined from pore water pressure dissipation tests conducted on CPT soundings performed mainly during winter conditions.

4 Risks and Mitigations

This section outlines the key risks anticipated during floodplain excavation and the corresponding mitigation measures. This section does not include risks associated with the bankfull channel which are understood to be captured in Stantec's feasibility memo.

The planned excavation will extend below the groundwater table, which has been identified as the critical factor for design. Elevated hydrostatic pressures and seepage under these conditions can induce piping, and both slope and foundation instability. The proposed mitigation strategies are mostly focused on these issues. These measures are not intended to be applied uniformly throughout the entire alignment of the Diversion, but will be adapted to local conditions, considering factors such as:

- Distribution and variability of soil layers,
- Presence and extent of eskers,
- Thickness of individual stratigraphic units,
- Groundwater level relative to the channel invert, and
- Stage of the project: during or post-construction phase.

A summary of key risks, potential mitigation strategies, and recommendations for the Diversion, during construction and post-construction, is provided in Table 4-1 and 4-2, respectively. The tables also include cross-references to sections within this memorandum where further details are provided.

Table 4-1: Key Risks and Mitigation – Construction

Topic	Description of Potential Risks	Potential Mitigation Strategies and Controls	Recommendations	Memo Section
Geotechnical stability of excavated slopes and foundation in clay	■ Slopes excavated in saturated clay may be unstable during construction. ■ Diversion bottom in clay is weak and has low bearing capacity, impacting constructability and efficiency.	■ Maintain excavation slopes flatter than 6H:1V. ■ High traffic areas along the floodplain foundation during construction may require geogrid and geosynthetics to improve foundation strength. Select clean / inert rockfill can be used to improve trafficability. If required, rockfill can later be removed. ■ Construction in winter would result in a frozen base of excavation that would improve trafficability. However, there are offsetting risks with winter construction (see winter construction topic).	■ Complete geotechnical investigation program along the Diversion alignment to reduce uncertainties. This may include geophysical surveys, such as Multichannel Analysis of Surface Waves (MASW) and Electrical Resistivity Tomography (ERT), cone penetration tests (CPTs), test pits, and boreholes. ■ Update slope stability and foundation assessments once new geotechnical information becomes available.	4.1 and 4.3
Geotechnical stability of excavated slopes and foundation in sands	■ Slopes excavated in saturated glaciofluvial sand without active groundwater dewatering are unstable during construction. ■ Diversion bottom in sand if too saturated (pumping effect due to construction vibrations if phreatic level is not low enough) and has low bearing capacity, impacting constructability and efficiency.	■ Maintain excavation slopes flatter than 5H:1V. ■ Implement active dewatering prior to excavation to ensure the phreatic surface remains below the slope faces. ■ As above for clay foundation improvement.		
Excavation bottom uplift	■ Excavation of the saturated clay unit overlying the confined glaciofluvial sand aquifer results in bottom uplift failure, driven by elevated artesian pressures at the base of the excavation.	■ Implement active (pumping) or passive (relief wells) dewatering to reduce the water pressure in the confined aquifer during the excavation.	■ Conduct a detailed hydrogeological investigation along the Diversion alignment to characterize the capacity and response of the confined glaciofluvial aquifer. The program should integrate instrumentation (e.g., vibrating-wire piezometers) with pumping and recovery tests to evaluate hydraulic conductivity, aquifer pressures, and potential drawdown requirements for dewatering. ■ Use updated geotechnical and hydrogeological information along the Diversion alignment to evaluate the zones susceptible to excavation bottom uplift.	4.2
Internal erosion (piping) and material transport	■ For excavation in sand: Elevated phreatic levels in the excavated slopes create high hydraulic gradients that lead to internal erosion during construction, resulting in localized slope instability and the transport and accumulation of fine-grained sediments at the base of the Diversion. ■ For excavation in clay: Elevated phreatic levels will have lower gradients than the sand; however, the material is more susceptible to erosion. This results in transport and accumulation of fine-grained sediments at the base of the floodplain.	■ Implement active dewatering to reduce the potential for internal erosion. ■ Utilize erosion and sediment control measures (e.g. silt fences, turbidity barriers, and microtopography features) along the slope and base of the floodplain toe to manage sediment transport. This will also promote vegetation establishment. ■ Reinforce side slopes with appropriate filters (granular or geotextile) that comply with the filter criteria to mitigate the progression of internal erosion of floodplain side slopes and bottom. ■ Install French-drains to manage areas that have higher and sustained seepage rates.	■ Assess material availability to determine the feasibility of supplying and installing the required filter materials. ■ Prepare a management plan to prevent elevated phreatic levels and to control total suspended solids (TSS) before downstream discharge.	4.3
Seepage and surface water management	■ Surface water from precipitation results in erosion, poor slope and foundation conditions, and constructability issues. ■ For excavation in sand: Significant water seepage occurs during excavation, particularly when intersecting the esker, leading to uncontrolled inflows if not properly collected and managed.	■ Complete the excavation in stages to minimize the volume of water that needs to be managed. ■ Implement surface water control using ditches, sumps/pumps, water bars, and microtopography along the slope. Intent is to reduce flow length and velocities. ■ Manage surface water at the floodplain crest (tie-in to natural ground) to prevent uncontrolled ingress and ensure that any inflow is conveyed without causing erosion on the slopes, with controlled and protected discharge points into the Diversion. ■ Construction will proceed downstream to upstream, with relief wells or coarse aggregate zones managing artesian groundwater by draining it downstream, ensuring effective water flow control. ■ Utilize cut-off ditches to reduce water in bankfull channel excavation. This could include a ditch excavated along the toe of the floodplain side slopes to maintain groundwater level 1 m below the base of bankfull channel.	■ Conduct hydrogeological assessment to estimate expected seepage rates during construction. ■ Plan for flood events during construction, which may include adequately sized sumps and pumps. ■ Develop construction surface water management plan.	4.3

Topic	Description of Potential Risks	Potential Mitigation Strategies and Controls	Recommendations	Memo Section
Construction during winter conditions (if there is construction in winter)	■ If construction is not continuous during freezing conditions the clay and sand can freeze and become difficult to excavate. ■ Snow removal in excavation areas would be required. ■ Excavated material that becomes frozen will require strategic management as it cannot be placed and nominally compacted in borrow areas. ■ Seepage faces freeze during winter and later result in soil erosion and/or sloughing during spring freshet. ■ Freeze-thaw action and frost heave along slopes. Note, this can also occur regardless of winter construction but less likely as pore pressures would dissipate during summer excavation.	■ Execution plan could include continuous (24-hour) operation during winter conditions. Heating and hoarding (or ground thawing units) could be incorporated when required. ■ Non-structural dump zones can be incorporated in the overburden stockpile designs. ■ Adaptive management can be done during summer to repair areas with significant sloughing and/or frost heave. It is common practice to allow excavated slopes to reach a steady state condition (i.e. assess where seepage and surface water concentrate) and then implement adaptive measures.	■ Develop a winter specific execution plan for Diversion excavation during winter conditions. ■ Identify areas with higher seepage rates and inspect these areas after thaw. ■ Develop an adaptive management plan.	N/A

Table 4-2: Key Risks and Mitigation – Post-Construction (Operating Diversion)

Topic	Description of Potential Risks	Potential Mitigation Strategies and Controls	Recommendations	Memo Section
Internal erosion (piping) and material transport	■ For excavation in sand and clay: Elevated phreatic levels in the excavated slopes create high hydraulic gradients that lead to internal erosion during operation, resulting in localized slope instability and the transport and accumulation of fine-grained sediments at the base of Diversion. *Note, this will have a lower risk than during construction as the pore pressures will have dissipated during construction (i.e. the Diversion excavation has relieved the pressure).	■ Reinforce side slopes with geotextiles and appropriate filters that comply with the filter criteria to mitigate the progression of internal erosion of the Diversion slopes and bottom. ■ Utilize appropriate erosion and sediment control measures (e.g., silt fences, turbidity barriers, and microtopography features) along the base of the floodplain side slopes to manage sediment transport. Install French-drains to manage areas that have higher and sustained seepage rates.	■ Assess material availability to determine the feasibility of supplying and installing the required filter materials. Prepare a management plan to control total suspended solids (TSS) before downstream discharge.	4.3
Surface water erosion	■ For excavation in sand and clay: Erosion and scour during normal and high flow events undercut side slopes, leading to sloughing and progressive slope failure.	■ Maintain or supplement surface water management features discussed in Table 4-1. ■ Implement restoration planting plan on side slopes so that root system can mitigate erosion potential. ■ Implement erosion protection on exposed slopes, such as placement of a growth media covered by vegetation above the filter, rolled erosion control blankets (e.g., American Excelsior), a combination of MacMat and vegetation (e.g., Maccaferri) or PROPEX Armormax erosion control systems (Solmax), to limit surface erosion.	■ Perform streamflow analysis to define erosion protection requirements in the Diversion. ■ Perform hydraulic modeling (shear stress analysis) to support Diversion design. ■ Perform different trials to identify the optimal combination of materials to support soil bio-engineering techniques.	4.4
Impact of Open Pit dewatering	■ Open-pit dewatering reduces groundwater contributions to the river, leading to reduced baseflow, compromising Diversion performance.	■ Maintain river flow by pumping water collected in the open pit back into the Diversion (provided water quality is adequate). ■ Assess the quality of the water: if it does not meet the required standards, water treatment must be performed before discharge.	Conduct hydrogeological assessment to evaluate the likelihood of this risk.	N/A
Long-term seepage and geotechnical stability	■ For excavation in sand and clay: Cessation of dewatering activities results in rebound of groundwater levels, leading to adverse impacts on geotechnical stability of channel slopes and foundations.	■ Reinforce the floodplain side slopes and bottom in critical areas using filters (granular or geotextile) and channel erosion and sediment control best management practices to enhance geotechnical stability.	■ Identify and prioritize critical areas for reinforcement based on updated geotechnical and hydrological data, supplemented by instrumentation readings and field observations during construction.	N/A

4.1 Geotechnical Stability of Excavated Slopes

A simplified slope stability assessment was carried out for short-term construction conditions, assuming no deep dewatering. The analysis was performed considering an infinite subaerial slope with horizontal seepage (Duncan, 2014). Two stratigraphic scenarios were evaluated: (i) excavation entirely in clay and (ii) excavation entirely in glaciofluvial sand.

The geotechnical parameters adopted for the stability calculations were derived from SRK's interpretation of the available site investigation data (SRK 2024b, SRK 2024c). The adopted stability criterion for temporary excavations was a minimum Factor of Safety (FoS) of 1.3.

The adopted parameters and the calculated FoS for various slope geometries are summarized in Table 4-3.

Results indicate that for clay, a slope as flat as 6H:1V is required to achieve FoS ≥ 1.3, whereas in glaciofluvial sand, a 5H:1V slope is sufficient to meet the criterion.

Table 4-3: Summary of Factor of Safety Results and Required Excavation Slopes

Geotechnical Unit	Friction Angle, ϕ (°)	Unit Weight, γ (kN/m³)	FoS @ 3H:1V	FoS @ 5H:1V	FoS @ 6H:1V	Required Slope for FoS ≥ 1.3
Clay	26.0	18.0	< 1.0	1.3	1.6	6H:1V
Glaciofluvial Sand	31.0	18.0	< 1.0	1.1	1.3	5H:1V

4.2 Excavation Bottom Uplift

Excavation through clay that overlies a confined aquifer can lead to uplift or heave of the excavation bottom. This occurs when the upward water pressure at the contact between the clay and the underlying aquifer exceeds the downward stress provided by the clay plug. Under such conditions, the excavation floor may heave, crack, or deform, which can compromise excavation stability and constructability. It is noted that a geotechnical field program will be conducted to determine if there is a pressurized aquifer below the clay. If there are no excess pore pressures, then this will not be a risk.

The FoS against excavation uplift is calculated as $FoS = \gamma \cdot (z_{exc} - z_{aq})/\gamma_w \cdot \left(z_{GW} - z_{aq}\right)$, where γ is the total unit weight of clay, z_{exc} is the elevation of the excavation bottom, z_{aq} is the elevation of the top of the aquifer and z_{GW} is the elevation of the groundwater level.

The calculated FoS against excavation-bottom uplift for chainages where a confined aquifer underlies the glaciolacustrine clay are summarized in Table 4-4. Results are reported alongside the required groundwater elevation to achieve the design criterion (FoS ≥ 1.3) so the needed drawdown (if any) is explicit.

The required groundwater drawdown for the evaluated stratigraphic profiles and estimated groundwater levels is between elevations 267.2 and 268.6 masl, corresponding to a reduction in

groundwater level of approximately 0.5 to 2.0 m. This drawdown can potentially be achieved by the following methods, as shown schematically in Figure 5:

- **Installation of relief wells along the excavation bottom**: These wells do not require active pumping, as the uplift pressure naturally drives water toward the excavation bottom. A collection system is then used to remove this water from the excavation area. The wells are designed to pass through the clay layer and reach the underlying aquifer, relieving its artesian pressure. In other words, the dewatering wells target the underlying aquifer.
- **Installation of deep wells with active pumping**: This approach requires active pumping to lower the groundwater in the underlying pervious layer. Deep wells must pass through the clay layer and are equipped with submerged turbine pumps, which lower the groundwater level and manage the extracted water outside the excavation, thereby preventing the development of uplift pressures

Table 4-4: Excavation Bottom Uplift Assessment

Channel Chainage (m)	Excavation Bottom Elevation (masl)	Top of Aquifer Elevation (masl)	Groundwater Elevation (masl)	FoS Against Uplift	Required Groundwater Elevation to achieve FoS > 1.3 (masl)
690	268.0	266.5	269.3	0.98	268.6
2,500	266.0	263.0	269.1	0.90	267.2
5,300	263.5	254.3	267.7	1.26	267.3

4.3 Excessive Seepage

Significant seepage is expected during excavation, particularly where the alignment intersects the esker. Excessive seepage has the potential to cause localized slope instability, transport of solids, and sloughing along the excavation slopes.

To reduce these risks, the groundwater table should be maintained at least 1.0 m below both the excavation slopes and the excavation bottom to provide “dry” working conditions. In silty soils, further drawdown may be required, typically 1.5 to 3.0 m below ground surface. This will prevent upward water flow and pumping to the surface, which could soften the excavation bottom and create wet, spongy conditions that negatively affect constructability.

Achieving these drawdown targets will require active dewatering. Recommended methods include the installation of deep wells upslope of open excavations, complemented by ditches and sumps within the excavation to intercept and remove seepage water. Proper management and conveyance of the collected water will be necessary to maintain a stable, dry working environment and to ensure safe excavation conditions.

4.4 Erosion in the Floodplain

Erosion risk of the floodplain includes two primary mechanisms: inflows from upslope into the diversion, and during flood conditions when the bankfull channel is overwhelmed and the floodplain is activated.

Concentrated inflows into the Diversion will occur as surface water, groundwater or a combination, which may cause erosion along the floodplain slopes and lead to sedimentation within the Diversion. Areas with expected high inflows to the Diversion, whether through surface water or groundwater, should be assessed and appropriate erosion protection incorporated. Ongoing monitoring and maintenance should be performed in early years of operations, as flow paths and vegetation establish.

During flood conditions when the floodplain is activated, there is a risk of erosion within the floodplain. This could be due to variable roughness of the floodplain, with some areas prone to higher velocities that could promote channelization within the floodplain. Undercutting of floodplain slopes may also occur. These risks are more prevalent during early operations when vegetation is still being established. Following flood events, drawdown within the floodplain could lead to the instability of slopes.

5 Conclusions

This memorandum summarizes the key geotechnical risks and challenges associated with the planned excavation of the North Driftwood River Diversion Channel, outlines potential mitigation strategies and provides recommendations to address existing uncertainties.

Excavation will extend below the groundwater level, which has been identified as the critical factor for design. Under these conditions, elevated hydrostatic pressures and seepage may induce piping, slope instability, and foundation instability.

The mitigation strategies presented herein are not intended to be applied uniformly across the entire channel alignment, but will be tailored to local ground conditions. To reduce uncertainties and support the selection of appropriate mitigation measures, a geotechnical investigation program is required along the alignment. Components of this will include, but not be limited to, the following:

- **Subsurface characterization**: Boreholes, test pits, cone penetration tests (CPT), complementary geophysical surveys (e.g., MASW, ERT), and laboratory testing on collected samples to improve definition of soil stratigraphy and material properties.
- **Hydrogeological assessment**: Pumping and recovery tests combined with instrumentation (e.g., vibrating-wire piezometers) to characterize the confined glaciofluvial aquifer, including hydraulic conductivity, pore pressures, and potential drawdown requirements for dewatering.

The results of this program will provide the basis for selecting the most effective mitigation measures for each Diversion section. Additional information will also be gathered during the execution of the excavation, which will be used to validate design assumptions and adjust the mitigation measures as required.

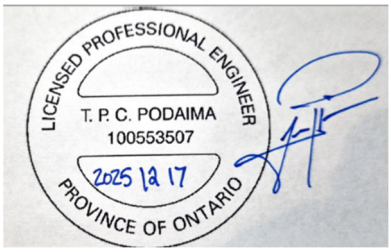
Regards,
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Barbara Amar
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Attachments:

Figures

Attachment 1	Conceptual Channel Design (Stantec 2023)
Attachment 2	SRK's Previous Investigation Logs

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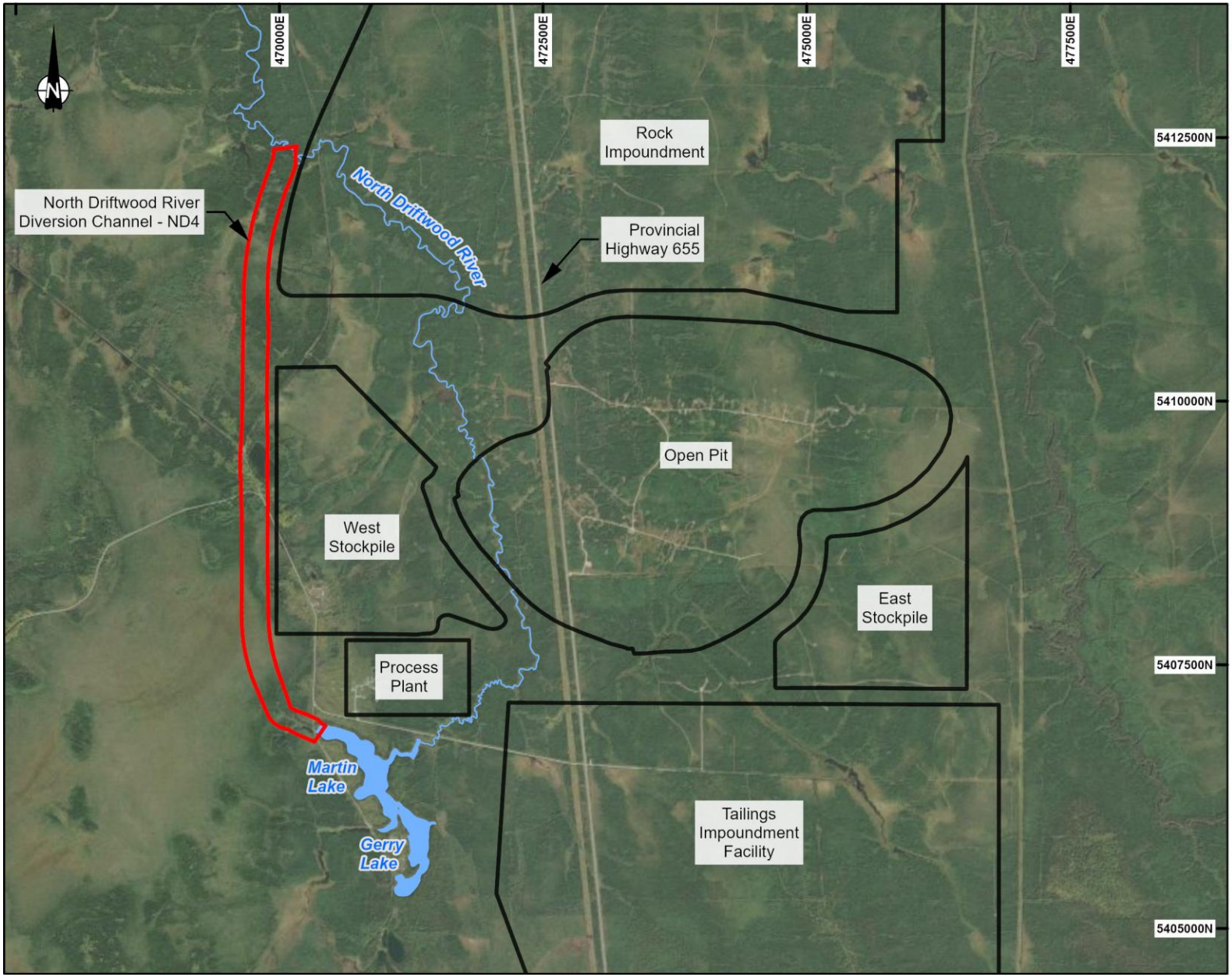
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Figures



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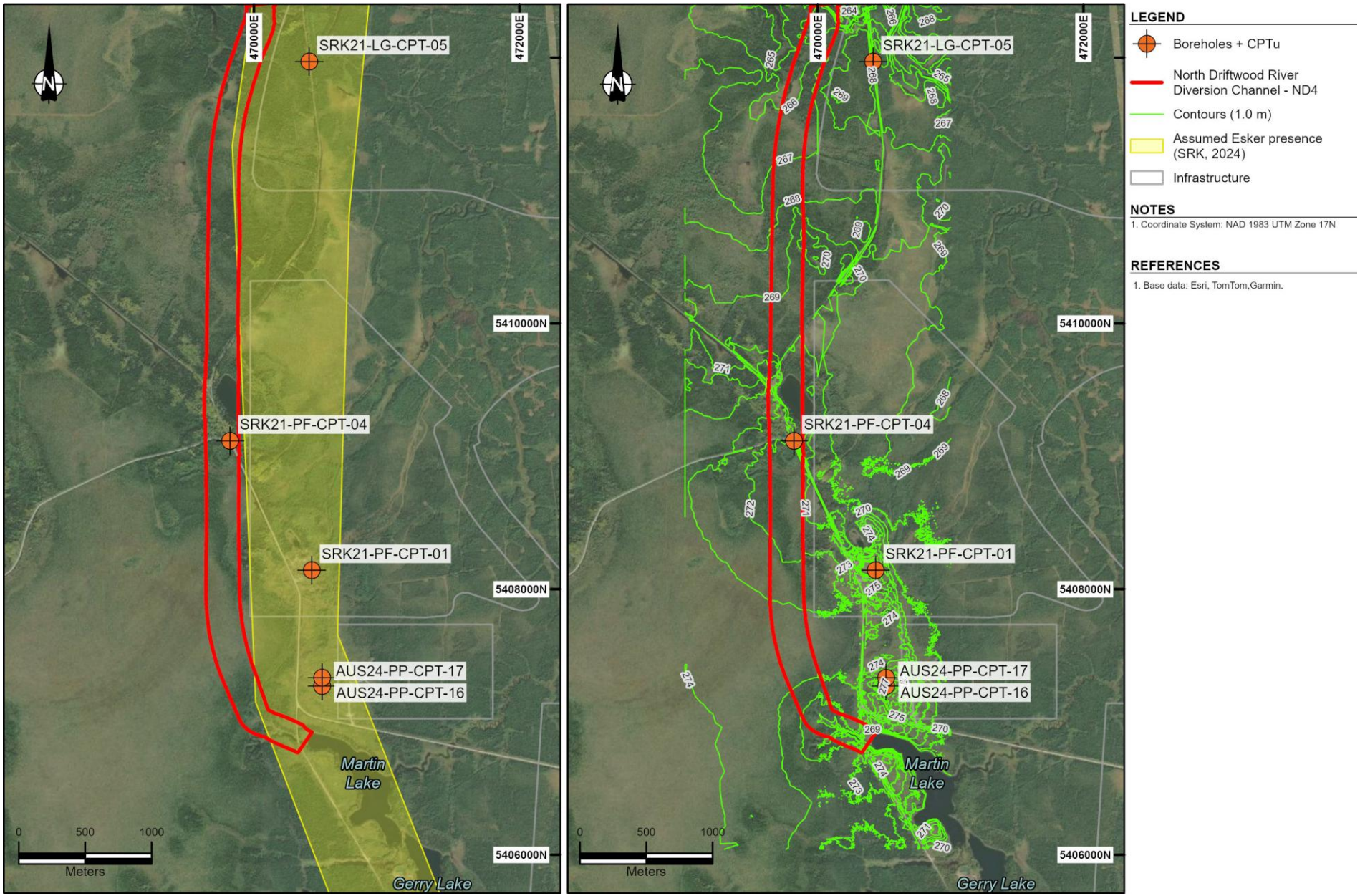
North Driftwood River Diversion Channel

Channel location within site layout

Project: CAPR003324.3

Impact Assessment & Permitting Support

Date:	Approved:	Figure:
Dec 2025	ONL	1



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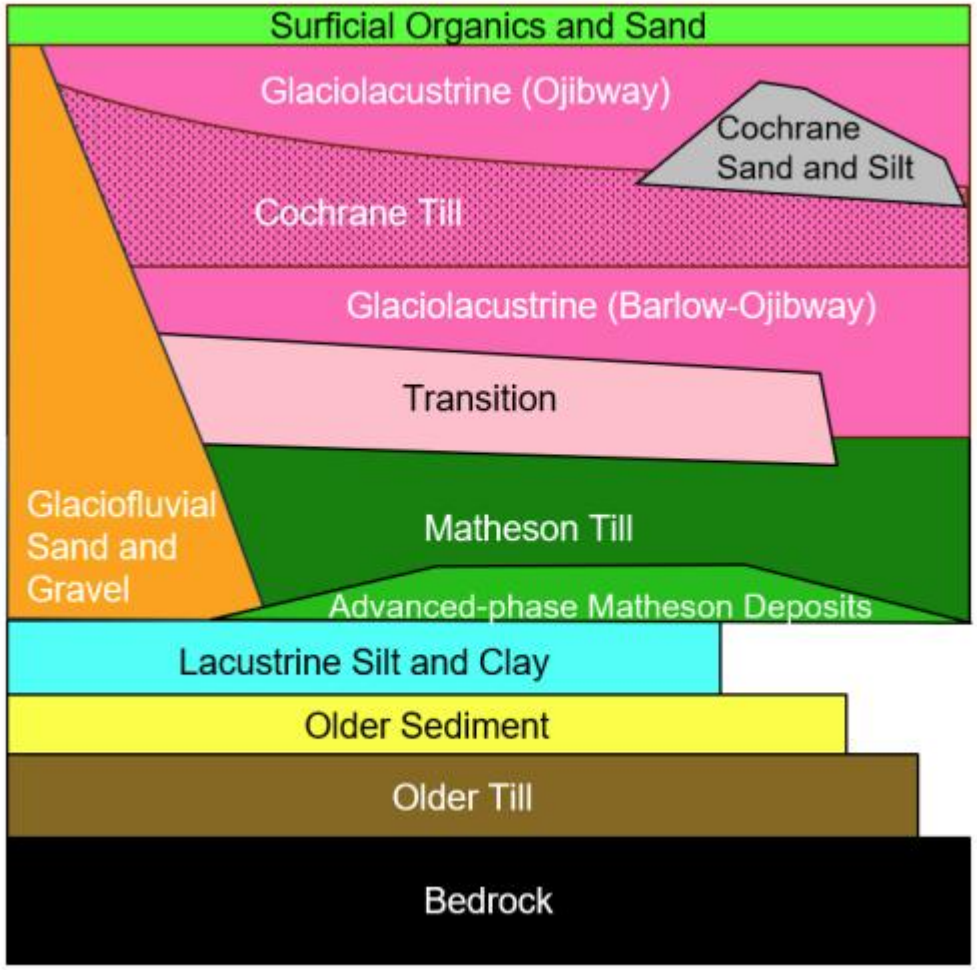
Project: CAPR003324.3

Impact Assessment & Permitting Support

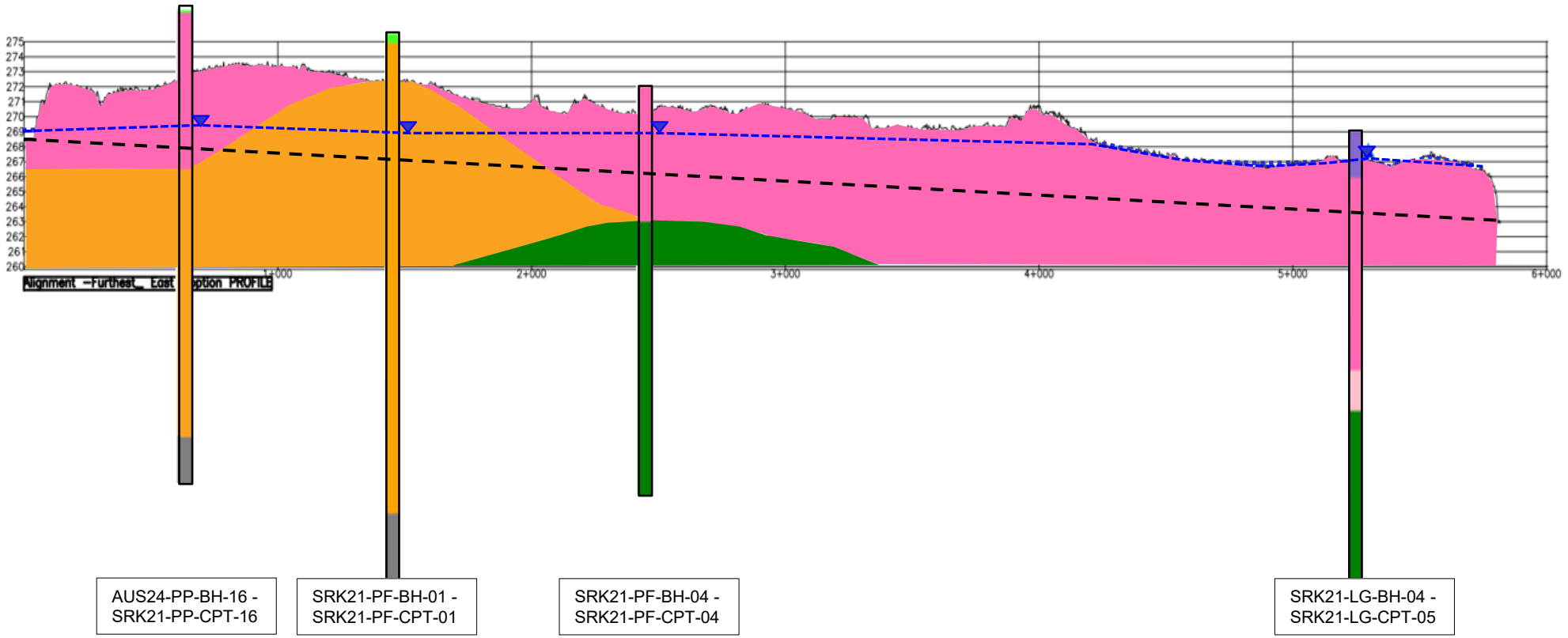
North Driftwood River Diversion Channel

Available geotechnical information

Date:	Approved:	Figure:
Dec 2025	ONL	2



srk consulting	CANADA NICKEL COMPANY	North Driftwood River Diversion Channel
Project: CAPR003324.3	Impact Assessment & Permitting Support	**Idealized stratigraphy profile (SRK, 2024a)**
		Date: Dec 2025 / Approved: ONL / Figure: **3**



Legends

- Groundwater level
- Channel bottom
- Supposed groundwater surface
- Organics
- Clay
- Glaciofluvial Sand
- Matheson Sand and Silt
- Cochrane Sand and Silt
- Transition
- Bedrock

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Project: CAPR003324.3

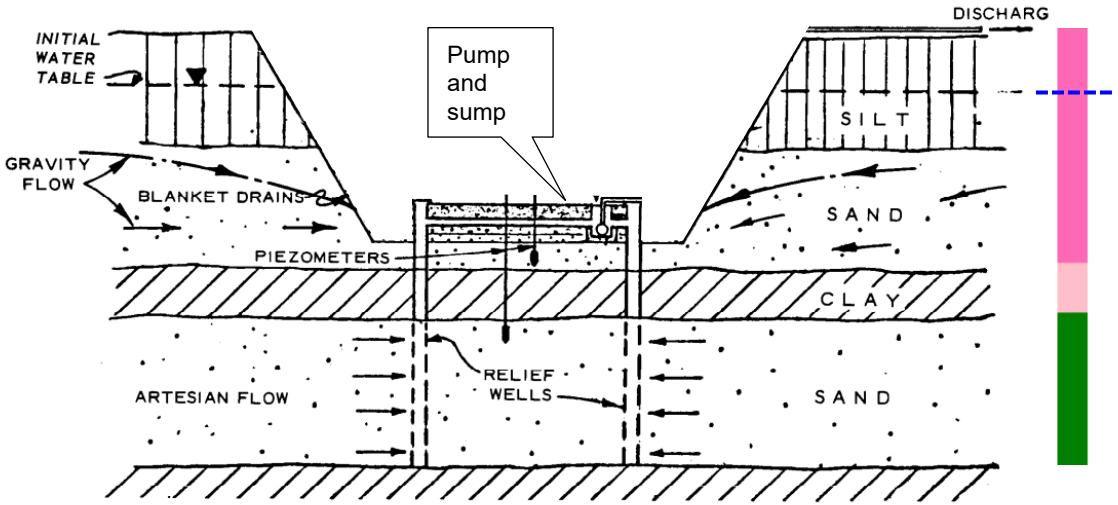
Impact Assessment & Permitting Support

North Driftwood River Diversion Channel

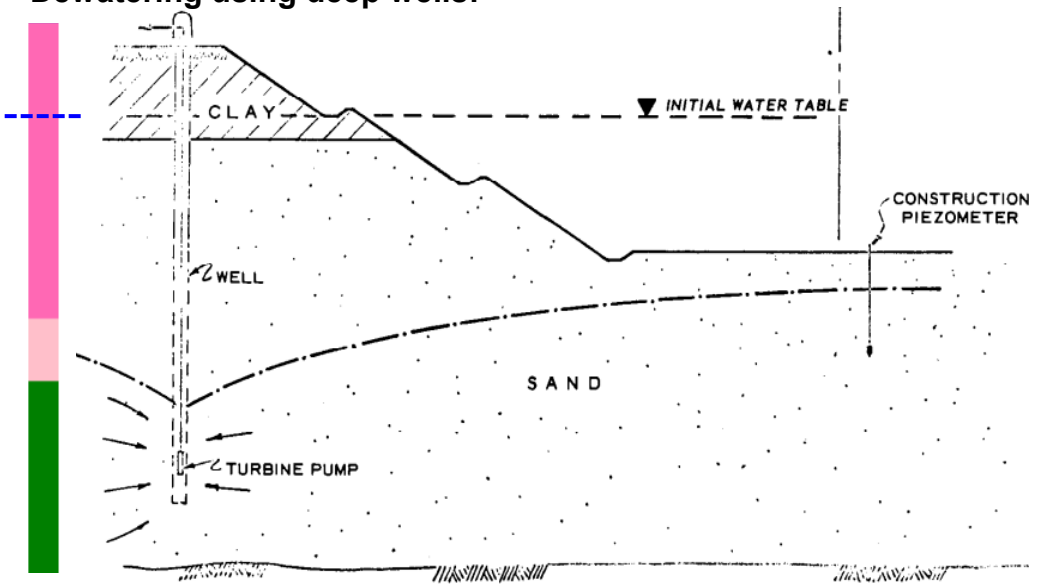
Estimated Stratigraphy Along the Channel Alignment

Date:	Approved:	Figure:
Dec 2025	ONL	4

Installation of relief wells at the excavation bottom:



Dewatering using deep wells:

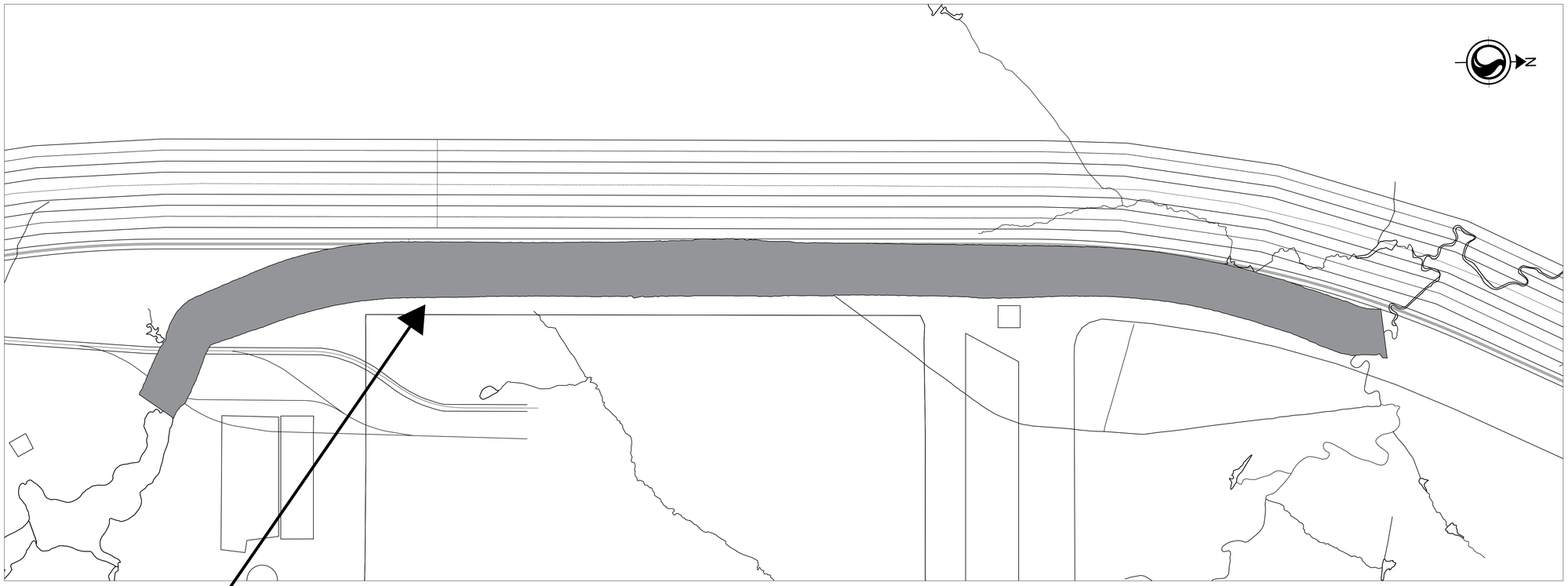


References
- Groundwater table
- Clay
- Matheson Sand and Silt

Source: US Army Corps of Engineers, 1983

srk consulting	CANADA NICKEL COMPANY	North Driftwood River Diversion Channel
Project: CAPR003324.3	Impact Assessment & Permitting Support	**Proposed Drawdown Methods**
		Date: Dec 2025 / Approved: ONL / Figure: 5

Attachment 1 Conceptual Channel Design (Stantec 2023)



5.9km long Valley
145 m Wide Flat valley
Assumed 30% of valley bottom can be developed into Fish Habitat.

5900m x 145m x 0.3
= 257,000m2

257,000 m2 can be developed into fish habitat.

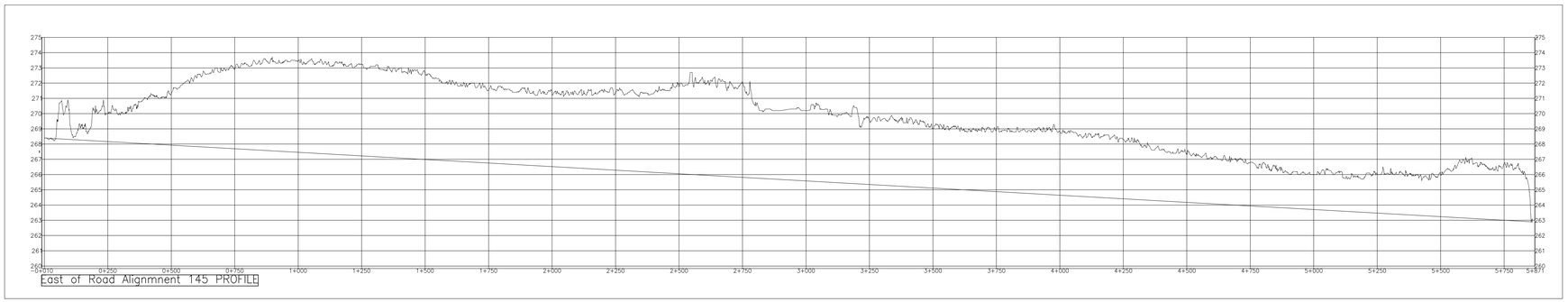
Approximate Cut Volume:

145 m Wide Valley and 5.9 km long
6H:1V side slopes

AutoCad Cut/Fill

= 4,300,000 m3 Cut

1:10000H 1:125V



Stantec

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Key Map NTS.

Client/Project
CANADA NICKEL COMPANY

CRAWFORD NICKEL PROJECT

Title
145 m Valley Option

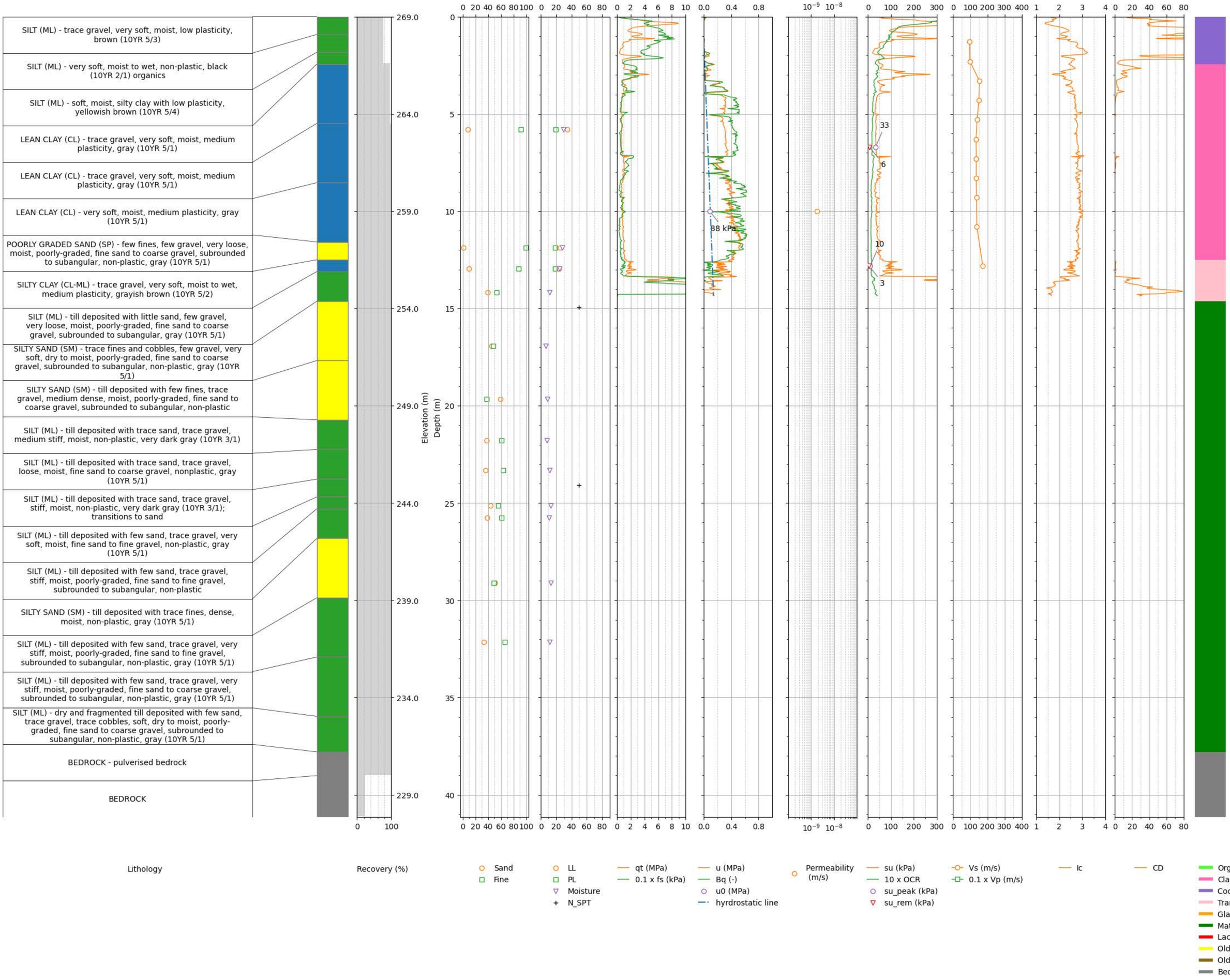
Project No. 160901195
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Revision 1
Sheet 1 of 1
Drawing No. C-200

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ORIGINAL SHEET - ARCH D

Attachment 2 SRK's Previous Investigation Logs

Borehole: SRK21-LG-BH-04; CPT: SRK21-LG-CPT-05



Borehole: SRK21-PF-BH-01; CPT: SRK21-PF-CPT-01

SILT (ML) - organics with some sand, few gravel, soft, moist, poorly-graded, fine sand to coarse sand, rounded, low plasticity, homogeneous, brown (10YR 5/3)

POORLY GRADED SAND (SP) - sand (fill material) with loose, dry, poorly-graded, fine sand to medium sand, rounded, homogeneous, light yellowish brown (10YR 6/4)

WELL-GRADED SAND (SW) - sand with trace gravel, loose, moist, well-graded, fine sand to coarse sand, subrounded to subangular, homogeneous, light yellowish brown (10YR 6/4)

WELL-GRADED SAND (SW) - sand with trace fines, trace gravel, loose, moist, well-graded, fine sand to coarse sand, subangular to angular, weak cementation, lensed, light brownish gray (10YR 6/2)

WELL-GRADED SAND (SW) - glaciofluvial sand with trace gravel, loose, moist to wet, well-graded, medium sand to coarse sand, subrounded to subangular, homogeneous, yellowish brown (10YR 5/4)

WELL-GRADED SAND (SW) - glaciofluvial sand with trace gravel, trace cobbles, medium dense, moist, well-graded, medium sand to fine gravel, subangular to angular, homogeneous, light yellowish brown (10YR 6/4)

POORLY GRADED SAND (SP) - glaciofluvial sand with trace gravel, loose, moist, poorly-graded, fine sand to coarse sand, subrounded to subangular, homogeneous, light brownish gray (10YR 6/2)

POORLY GRADED SAND (SP) - glaciofluvial sand with few gravel, loose, moist to wet, poorly-graded, medium sand to fine gravel, subrounded to subangular, homogeneous, light yellowish brown (10YR 6/4)

POORLY GRADED SAND (SP) - very loose, moist to wet, poorly-graded, fine sand to medium sand, rounded to subrounded, homogeneous glaciofluvial sand

BEDROCK

275.8
270.8
265.8
260.8
255.8
250.8

Elevation (m)
Depth (m)

0 5 10 15 20 25

34 kPa
86 kPa
139 kPa
192 kPa

10^{-9} 10^{-8}

Lithology
Recovery (%)
Sand
Fine
LL
PL
Moisture
N_SPT
qt (MPa)
0.1 x fs (kPa)
u (MPa)
Bq (-)
u0 (MPa)
hyrdrostatic line
Permeability (m/s)
su (kPa)
10 x OCR
su_peak (kPa)
su_rem (kPa)
Vs (m/s)
0.1 x Vp (m/s)
Ic
CD
Organics
Clay
Cochrane Sand and Silt
Transition
Glaciofluvial Sand
Matheson Sand and Silt
Lacustrine Silt and Clay
Older Sediment
Older Till
Bedrock

Borehole: SRK21-PF-BH-04; CPT: SRK21-PF-CPT-04

POORLY GRADED SAND (SP) - some gravel, few cobbles, loose, dry, subrounded to subangular, very pale brown (10YR 7/3)

FAT CLAY (CH) - clay with some organics and few sand, medium stiff, dry to moist, poorly-graded, fine sand to medium sand, rounded to subrounded, medium plasticity, very dark gray (10YR 3/1)

FAT CLAY (CH) - few gravel, medium stiff, moist, high plasticity, pale brown (10YR 6/3)

FAT CLAY (CH) - trace gravel, soft, moist, high plasticity, gray (10YR 5/1)

LEAN CLAY (CL) - soft, moist, high plasticity, gray (10YR 5/1)

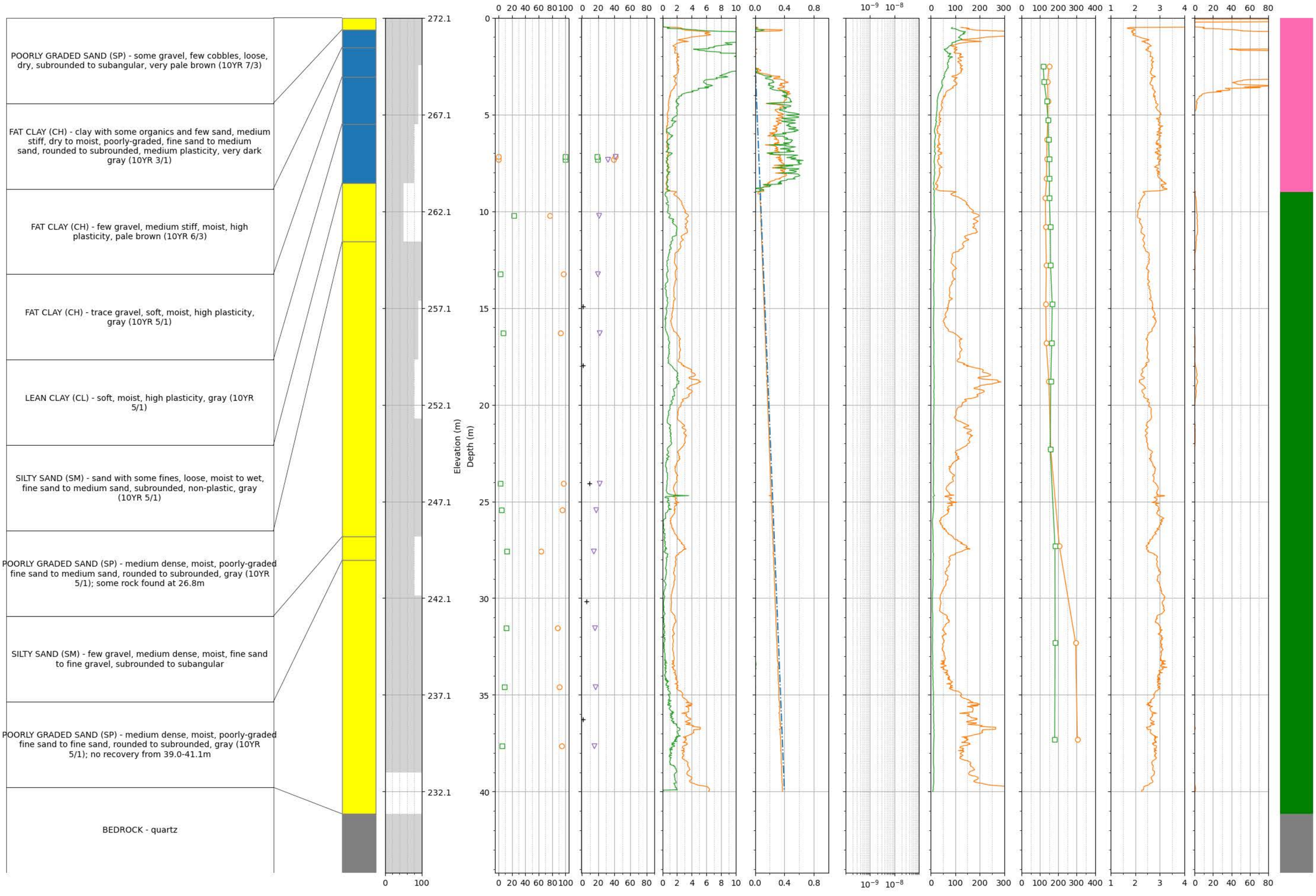
SILTY SAND (SM) - sand with some fines, loose, moist to wet, fine sand to medium sand, subrounded, non-plastic, gray (10YR 5/1)

POORLY GRADED SAND (SP) - medium dense, moist, poorly-graded fine sand to medium sand, rounded to subrounded, gray (10YR 5/1); some rock found at 26.8m

SILTY SAND (SM) - few gravel, medium dense, moist, fine sand to fine gravel, subrounded to subangular

POORLY GRADED SAND (SP) - medium dense, moist, poorly-graded fine sand to fine sand, rounded to subrounded, gray (10YR 5/1); no recovery from 39.0-41.1m

BEDROCK - quartz



Lithology

Recovery (%)

Sand
Fine

LL
PL
Moisture
N_SPT

qt (MPa)
0.1 x fs (kPa)

u (MPa)
Bq (-)
u0 (MPa)
hyrdrostatic line

Permeability (m/s)

su (kPa)
10 x OCR
su_peak (kPa)
su_rem (kPa)

Vs (m/s)
0.1 x Vp (m/s)

Ic

CD

Organics
Clay
Cochrane Sand and Silt
Transition
Glaciofluvial Sand
Matheson Sand and Silt
Lacustrine Silt and Clay
Older Sediment
Older Till
Bedrock

Attachment FFH-03 Habitat Balance and Equivalency for Crawford Nickel Project Fish Habitat Offset Plan

Stantec

Attachment FFH-03: Habitat Balance and Equivalency for Crawford Nickel Project Fish Habitat Offset Plan

1 Introduction

Construction and operation of the Crawford Nickel Mine (the Project) will result in the unavoidable harmful alteration, disruption, or destruction (HADD) of fish habitat and may result in the death of fish by means other than fishing. Canada Nickel Company (CNC) has prepared a conceptual fish habitat offsetting plan to counterbalance these unavoidable habitat losses and potential fish losses. This plan was submitted to support the Impact Statement which was assessed in accordance with the *Impact Assessment Act,* 2019 and reviewed by the Impact Assessment Agency of Canada (IAAC). After review, IAAC provided comments and information requirements related to the assessment of fish habitat loss and associated offsetting requirements. IAAC comment “FFH-03” was related to Fish Habitat Offsetting and identified three actions that were required to resolve IAAC comment FFH-03. This memorandum, along with a separate memo detailing the assessment of in-stream flow needs in river mainstems is intended to address IAAC comment FFH-03.

The purpose of this memorandum is to provide IAAC and the Department of Fisheries and Oceans (DFO) with an updated habitat balance that compares habitat losses caused by the Project and expected habitat gains from the fish habitat offset plan using a relative habitat value approach. This approach allows the equivalency of habitat losses and gains to be compared and assessed. This is required because the types of habitats harmfully altered or destroyed because of the Project and the types of habitats gained from the offset plan are “out-of-kind” (i.e., provide unlike habitat benefits for fish populations not directly affected by the Project).

This memorandum provides:

- Updates to predicted fish habitat loss with respect to habitat alteration from flow changes
- An initial, coarse assessment of anticipated quantitative gains for each offsetting measure
- A comparison of potential offsetting gains to estimated fish habitat loss
- A description of how out-of-kind comparisons were made
- A discussion on the likelihood that the proposed measures will adequately offset predicted losses.

While habitat losses regulated under Schedule 2 of the Metal and Diamond Mining Effluent Regulations (MDMER) and Section 35 of the *Fisheries Act* differ in their regulatory triggers and underlying intent, both require the implementation of offsetting measures to address residual adverse effects on fish and fish habitat. In this assessment, losses were quantified separately for each regulatory pathway but combined to assess relative habitat value. The offsetting strategy was developed to so that regulatory requirements under both frameworks can be met in a transparent and precautionary manner.

2 Fish Habitat Loss Updates

This assessment of affected habitat is based on the information provided in the IS (Stantec 2024) plus extensive additional field data collected in 2024. This assessment of fish habitat adversely affected by the Project represents a more precise, updated estimation than that presented in the IS. There are three primary causes for the reduction in affected habitat that was presented in the IS, which are as follows:

1) During the IS, three options were considered for the location of the North Driftwood River diversion channel. The assessment of potential effects on fish conducted during the IS considered the full extent of potential disturbance from each of these scenarios. For this updated assessment of fish habitat requiring offsetting, the channel option with the smallest footprint (and hence the least disturbance to existing fish habitat) has been considered in the assessment of potential effects on fish.

2) Extensive fisheries field work was undertaken in 2024 to build upon the baseline data collected to support the IS and to inform potential future monitoring programs. As a result of this additional work, CNC has gained a better understanding of the extent of fish habitat. By example, some habitats that were conservatively assumed to be fish habitat in the IS, were subsequently identified as not fish habitat. In other cases, conservative assumptions on bank full widths were updated with more accurate field data.

3) Overall, this assessment of fish habitat requiring offsetting provides a higher level of detail and resolution than what was more conservatively estimated in the IS.

It is anticipated that between now and when the project is permitted, additional refinements may again be made to reflect continued input from stakeholders.

The Project will affect several types of freshwater habitats, including headwater streams, small tributaries, portions of larger streams, and numerous shallow ponds. To characterize typical channel dimensions, Stantec biologists collected field measurements in 2024 from a representative sample of first-, second-, and third-order streams across the study area. Together with the data presented in the IS, mean wetted widths from these measurements were used to estimate bank full width values for each stream order. The width of the fourth-order stream (North Driftwood River) was determined using the mean of bankfull-width measurements collected at four fluvial geomorphology assessment transects.

- First-order headwater streams (estimated 0.28 m bank full width) make up the largest share of linear habitat loss. These channels are typically shallow, intermittent, and usually freeze to the substrate in winter. They provide limited seasonal habitat for small-bodied species such as Finescale Dace, Brook Stickleback, and Fathead Minnow.
- Second-order tributaries (estimated 1.49 m bank full width) provide similar functions but with slightly more flow permanence. They offer seasonal spawning and rearing habitat for forage-fish guild species but generally lack overwintering capacity.
- Losses also include segments of third-order streams (estimated 4.40 m bank full width), which support a more diverse forage-fish community and may provide moderate spawning and rearing habitat for White Sucker or Northern Pike. Overwintering potential is still limited, occurring where depths and dissolved oxygen allow.
- Roughly 12 km of the North Driftwood River will be overprinted or lost, where the river flows through the project footprint. This habitat provides higher-quality spawning, rearing, and adult habitat for species such as Northern Pike and White Sucker.
- The majority of area-based losses occur in ponds and beaver-influenced waterbodies ranging from approximately 0.01 to 6.5 ha in surface area.

Predicted changes in flow are not anticipated to be instantaneous. Changes in flow that are not offset are anticipated to occur as the project develops and be reflective of construction timing and flow seasonality. Water will be managed to avoid instantaneous changes in flow (i.e., changes greater than 10% that occur within seconds or minutes) in habitats that are not offset. Therefore, predicted changes in flow are considered representative of the mean annual flow, or conditions at any point within time as compared to that same time in a typical season.

Predicted fish habitat loss with respect to habitat alteration from flow changes has been updated since receipt of the IAAC comments. Two different methods have been adopted to characterize fish habitat alteration due to changes in flow. For higher value fish habitat found in river mainstems, CNC has completed an initial assessment. The methods and preliminary results of the in-stream flow needs assessment are described in the main comment response document (see FFH-01 response).

2.1 Watercourses

The quality and sensitivity of fish and fish habitat within the Local Assessment Area (LAA) varies considerably, from ephemeral first order watercourses that provide indirect fish habitat, to permanently flowing rearing habitat for locally important game and sustenance species such as Walleye and White Sucker in river mainstems. Several hundred smaller watercourses and drainage features are also present throughout the LAA. Due to the limited practicality and feasibility of modelling changes in flow in each of these watercourses, a simplified approach to estimating changes in flow was used for less sensitive fish habitat features. For smaller watercourses, flow reductions have been estimated based on current mine plans by estimating the percent reduction in drainage area and assuming a proportional reduction in stream flow. To facilitate the estimation of flow reduction, watersheds for first, second, and third order streams were delineated manually and digitized into a GIS database. GIS tools were then used to estimate net change in watershed area. Flow reduction due to watershed reduction is generally estimated as follows:

$\Delta Q = (((A_1-A_2)/A_1)+((A_3-A_4)/A_3))/2$

Where:

ΔQ = % change in flow

A_1 = Baseline Watershed Area

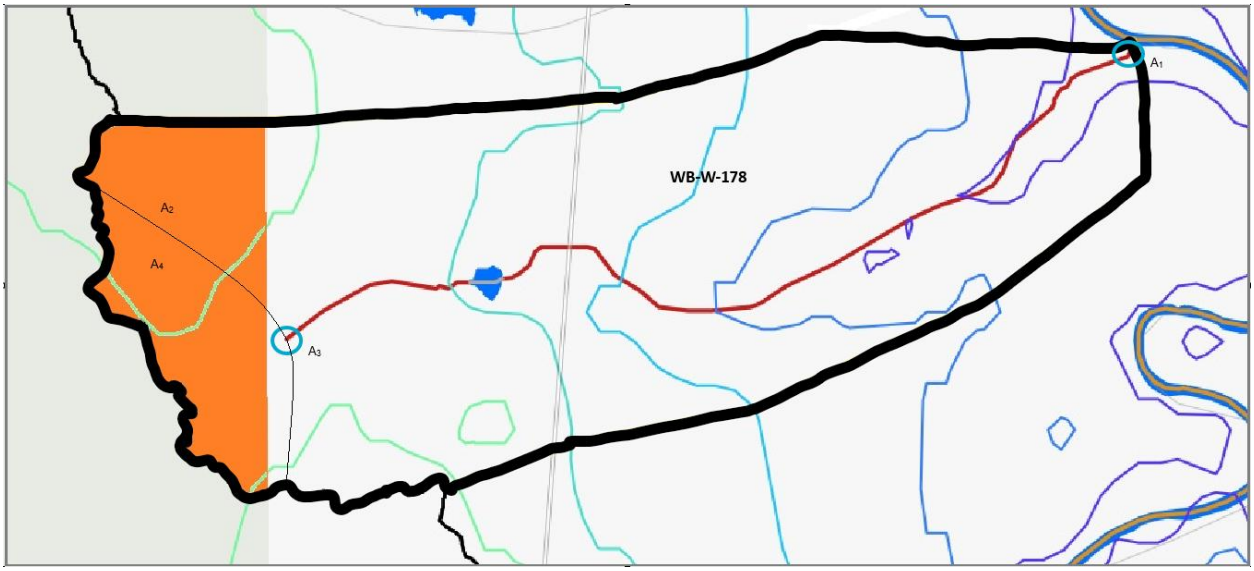
A_2 = Total watershed area lost within A_1

A_3 = Total watershed area upstream of a point on the watercourse that is closest to A_2

A_4 = Total watershed area lost within A_3

By example, Watercourse WB-W-178 is a first order watercourse that drains directly into the West Buskegau River and flow from the upper portion of the watershed will be intercepted and contained within the contact water collection and treatment system. In Figure 2.1, watercourse WB-W-178 (shown in red) is labelled, with the corresponding drainage area bordered by a thick black line. The upper portion of the WB-W-178 watershed area that will be contained within the contact water collection and treatment system is shaded orange. In this example, flow from the upper 13.4% of the watershed will be intercepted within the PA, as calculated from the watershed outlet point (i.e., at the confluence with the West Buskegau River, A_1). However, flow reduction in the upper watershed will be more pronounced. As calculated from a point on the watercourse that is closest to overprinted/lost area (A_3), the predicted reduction in drainage area is approximately 85.0%. The estimated average reduction in flow throughout the length of the affected steam reach would therefore be the midpoint of 13.4% and 85.0%, or 49.2%.

Figure 2.1 Watercourse WB-W-178 Flow Reduction Example



In some cases, this method was not appropriate (e.g., due to watershed shape, or location of the PA within the watershed). In such cases, a customized method was used with aim of determining the estimated average reduction in flow throughout the length of the affected steam reach.

In cases where there are tributaries entering a watercourse, the estimate of change in flow has been completed for several sections of the affected watercourse, to estimate changes in flow along the length of the watercourse.

2.2 Waterbodies

Habitat loss for ponds and other lentic waterbodies was estimated using a modified approach tailored to the hydrologic and ecological characteristics of these systems. For each pond, the full pond-specific sub-watershed was delineated in GIS to quantify the total portion of contributing area that will be overprinted by Project components. The percent overprint was calculated as:

Habitat Loss = (A_2 / A_1) x 0.25

Where:

A_1 = Baseline Watershed Area

A_2 = Total watershed area lost within A_1

An additional reduction factor (0.25) was applied to account for less certainty in translating proportional watershed losses to functional habitat loss in small lentic systems. This adjustment reflects the understanding that ponds are supported by a combination of surface runoff, groundwater inputs, and internal water storage, and that reductions in contributing area do not necessarily result in a proportional loss of ponded habitat area. Given the variability in pond hydrology, bathymetry, and connectivity, and in the absence of detailed site-specific hydrologic modelling for numerous small waterbodies, the reduction factor was applied as a precautionary measure to avoid overestimating habitat loss.

A summary of fish habitat that is anticipated to require offsetting is provided in Attachment 2, as follows:

Attachment 2-1 - Lentic habitats requiring offsetting

Attachment 2-2 – Lotic habitats requiring offsetting

For each watercourse or waterbody listed in Attachment 2, the following information is provided:

- Watercourse/waterbody name
- Watercourse/waterbody coordinates (midpoint, in UTM)
- Stream Order (for lotic habitats)
- Existing watercourse/waterbody habitat area (ha)
- Project component affecting fish habitat (e.g., water management, TMF, WRSA)
- Impact (e.g., overprint or flow reduction)
- Unadjusted habitat area requiring offsetting (ha)
- Relative habitat value score
- Total adjusted habitat area (ha)

Table 2-1 provides a summary of habitat requiring offsetting by habitat type. Table 2-1 also categorizes habitat requiring offsetting by regulatory process. Attachment 2.3 shows the location of fish habitat requiring offsetting by regulatory process (i.e., MDMER Schedule 2 overprint, Fisheries Act lost habitat, or Fisheries Act altered habitat).

Table 2-1: Habitats Requiring Offsetting by Habitat Type

Pond Habitats Requiring Offsetting

Pond Size	Area Overprinted (ha) (Schedule 2)	Area Lost or Altered (ha) (*Fisheries Act*)	Adjusted Habitat Area (Schedule 2)	Adjusted Habitat (*Fisheries Act*)	Total Adjusted Habitat
Large (> 1 ha)	50.6	4.6	28.0	2.4	30.4
Small (<1 ha)	28.4	3.6	15.5	1.9	17.4
Grand Total	**79.0**	**8.2**	**43.5**	**4.3**	**47.8**

Watercourse Habitats Requiring Offsetting

Stream Order	Area Overprinted (ha) (Schedule 2)	Area Lost or Altered (ha) (*Fisheries Act*)	Adjusted Habitat Area (Schedule 2)	Adjusted Habitat (*Fisheries Act*)	Total Adjusted Habitat
1	1.4	0.4	0.3	0.1	0.5
2	3.7	0.7	1.9	0.3	2.2
3	8.1	3.6	8.1	3.6	11.7
4	5.6	5.1	11.2	10.1	21.3
Grand Total	**18.8**	**9.8**	**21.5**	**14.1**	**35.7**

Table 2-2 provides a summary of habitat requiring offsetting based on impact category. Impact category has been broadly categorized as either a loss or alteration. The majority of altered is due to overprinting. The majority of altered habitat is due to predicted changes in flow, typically because of a change in watershed area. Details on the project activity affecting each pond and watercourse are provided in Attachments 2-1 and 2-2, respectively.

Table 2-2: Summary of Habitats Requiring Offsetting by Impact Type and Offset Requirement

Impact Type	Unadjusted Area (ha)	RHV Adjusted Area (ha) *
Schedule 2 Overprint	97.8	65.0
Fisheries Act Loss/Overprint	14.6	15.9
Fisheries Act Alteration	3.4	2.6
Totals	115.8	83.5

* Methods for determining Relative Habitat Value (RHV) adjusted area are described in Section 4

3 Fish Habitat Offsets

CNC met with IAAC and DFO on October 23, 2024 to discuss the offsetting presented in the IS, and additional potential offsets suggested by CNC. The primary intent of the meeting was to assess how each of the offsetting options aligns with DFO's guiding principles. From this discussion, CNC has developed the following short list of offsetting options. It is recognized that a variety of offsetting methods will likely be employed to offset predicted effects on fish habitat. CNC will continue to investigate and/or advance the following options, recognizing the need for ongoing Indigenous engagement.

New or enhanced habitats are likely to account for most the offsetting habitat. It is recognized that like-for-like habitat creation is (for the most part) not feasible, nor desirable since most habitats requiring offsetting provide limited habitat diversity and support few, tolerant fish species. A priority for new habitat creation or the enhancement of existing habitats will therefore be to improve habitat value while also reducing disturbance to existing terrestrial and aquatic ecosystems. The following is a revised list of the conceptual fish habitat offsetting measures listed in Table 5.1 of Appendix M of the IS. As requested, an initial coarse assessment of anticipated quantitative gains for each of these measures is provide below. Potential gains for each measure are also compared to the estimated fish habitat loss.

- North Driftwood Diversion Channel (channel)
    - The area of the channel contained within the bank full width of the newly constructed North Driftwood River. Natural channel design principles will be employed.
- North Driftwood Diversion Channel (floodplain)
    - Ponds and water features that provide fish habitat will be incorporated into the floodplain. These features will be connected to the main channel seasonally, or under different high flow scenarios.
- Lake Creation
    - Creation of new lake to provide self sustaining habitat for a variety of local native fish species
- Lake Extension
    - Expanding existing lake habitat to provide to address potentially limiting habitats and diversify habitat structure
- Improvements to habitat connectivity – e.g., culvert replacements in abandoned forestry roads
- Conversion of mine water collection ponds to lakes in closure

- Fisheries Research:
    - Lake Sturgeon research
    - In-stream flow needs research
    - Other fisheries research (local)

4 Relative Habitat Value Methods

4.1 Relative Habitat Value

Relative habitat values are ranked, ordinal values (ranging between 0 and 2) that were assigned to the different types of habitats lost and gained based on:

1. The complexity of the physical habitat present (e.g., substrate composition, cover types, depth ranges, flow characteristics).
2. Water quality parameters that limit habitat use by fish during all, or portions of the year (i.e., water temperature, dissolved oxygen concentration).
3. The abundance and diversity of the fish community present.

The assignment of relative habitat values to each habitat type was based on the understanding that certain habitat types contribute more to fish productivity per unit area than other habitat types. The assignment of relative habitat values was informed by:

- Baseline information collected from habitat assessments and fish community surveys conducted in 2021 and 2023 by WSP and in 2024 by Stantec for the Project's Environmental Impact Assessment Application (WSP 2021, WSP 2023, Stantec 2024)
- Baseline information collected from habitat assessments and fish community surveys conducted in the North Driftwood and West Buskegau watersheds in 2025 (Stantec 2025; unpublished field data)
- Published species-specific literature documenting habitat preferences of fish species present in the North Driftwood and West Buskegau watersheds (e.g. Casselman and Lewis 1996; Harvey 2009; Twomey et al. 1984; Curry and Spacie 1984; Krieger et al. 1983; Paragamian 1989; Chiu and Abrahams 2010; Booher and Walters 2021; Ruthven 2023)
- Published literature regarding habitat productivity for different fish species potentially affected by the Project and/or benefitting from proposed offsets (i.e., Hubert and Rahel 1989; Randall et al. 1995; Raabe 2020)
- Published literature regarding benefits of fish passage restoration to fish populations (i.e., Nislow et al. 2011; Evans et al. 2015; Knoth et al. 2022; Gido et al. 2022)

- Published literature regarding the physical, chemical, and biological services provided to stream ecosystems by natural channel processes (i.e., Montgomery and Buffington 1993; Montgomery 1999; Leopold and Maddock 1953; Vannote et al. 1980; Merritt et al. 2017).
- Published literature regarding the high physical, chemical and biological services provided by lentic systems, including nutrient retention, habitat provision, fish production, and biodiversity support (Schallenberg et al. 2013;).

The rationale for the relative habitat values assigned to each habitat type is presented in Table 4-1.

Relative habitat value adjusted areas were calculated as the product of the unadjusted area and the relative habitat value assigned to a specific area of affected fish habitat or a specific area of habitat offset using the formula:

$$Relative\ habitat\ value\ adjusted\ area = Unadjusted\ habitat\ area \times Relative\ habitat\ value$$

Relative habitat value–adjusted area and unadjusted habitat are measured in square meters (m²). The relative habitat value is an ordinal score between 0 and 2, assigned to each habitat type or offsetting measure in the list.

Table 4-1 Relative Habitat Values Assigned to the Types of Habitats Affected by the Project and Potentially Gained by the Fish Habitat Offsetting Plan

Habitat Type	Description	Fish Community Diversity	Relative Habitat Value	Rationale
Harmfully altered, disrupted, or destroyed (HADD) fish habitat at the Crawford Nickel Mine				
First-Order Headwater Streams	Narrow (0.28 m mean bank full width), intermittent headwater channels at the uppermost extent of the drainage network. Likely shallow and prone to freezing to the bottom during winter.	• Forage fish	0.25	• Seasonal flow only • Shallow depths • No overwintering habitat • Limited fish presence/abundance • Limited species diversity • Low habitat complexity
Second-Order Streams	Small streams (1.49 m mean bank full width) formed at confluences of first-order channels. Likely shallow, with moderate flow variability and minimal overwintering habitat.	• Forage fish	0.5	• Seasonal to perennial flow • Shallow depths • No overwintering habitat • Limited fish presence/abundance • Limited species diversity • Low habitat complexity
Third-Order Streams	Moderate-sized streams (4.4 m mean bank full width) arising from confluences of second-order streams. Supports spawning, rearing, and adult habitat for forage fish, and limited use by White Sucker.	• Forage fish • White Sucker • Northern Pike	1	• Some perennial flow • Moderate depths • Some instream cover • Limited overwintering for tolerant species • Primarily forage-fish habitat • may support large-bodied fish seasonally, or juvenile rearing
Fourth-Order Streams (River)	Larger river habitat (9+ m average width), including the mainstem of the North Driftwood River and the West Buskegau River. Provides higher habitat complexity and stable flows.	• Forage fish • White Sucker, Northen Pike, Yellow Perch. Walleye in West Buskegau. Longnose Sucker in North Driftwood River	2	• Greater channel width and depth • Increased hydraulic stability • Suitable for several small (forage fish) and large-bodied (White Sucker, Northern Pike, Yellow Perch, Burbot) fish species • Overwintering potential • Diverse instream habitats (runs, riffles, pools)
Shallow Headwater Ponds (< 1 ha)	Small (0–1 ha), shallow ponds or beaver-created impoundments in headwater areas. Predominantly soft substrates and variable water levels.	• Forage fish	0.5	• High vegetation cover • Good summer rearing habitat • Limited connectivity • Dissolved oxygen limiting - High risk of winterkill • Limited depth

Habitat Type	Description	Fish Community Diversity	Relative Habitat Value	Rationale
Large Ponds (> 1 ha)	Ponds >1 ha with seasonal or perennial outlet connectivity. Likely to support some overwintering of low DO tolerant forage fish.	• Forage fish • Rearing habitat for large-bodied White Sucker, Northern Pike.	0.75	• Greater water volume • Some overwintering potential • Dissolved oxygen limiting • Vegetated littoral zones • Some connectivity to perennially flowing streams • Stable water levels
Fish Habitat Offsets				
North Driftwood Diversion Channel and Floodplain	Large, constructed diversion channel re-routing the overprinted North Driftwood River (4th order watercourse), including a sinuous bankfull channel, backwater oxbows, side-channels, riparian ponds/wetlands, and native riparian plantings. The anticipated total habitat creation is 257,000 m^2 (26 ha).	Likely Species: • Northern Pike • White Sucker • Longnose Sucker • Yellow Perch • Forage fish guild (Fathead Minnow, Dace spp., Brook Stickleback, Shiners) • Burbot	1.75	Creates the highest functional uplift of all offset options due to large spatial scale, high channel complexity, and multi-habitat assemblage (main channel, floodplain ponds, oxbows, backwaters). This habitat creation is anticipated to provide spawning, rearing, adult, and partial overwintering habitat for both small and large bodied fish species that inhabit the North Driftwood River. Inputs from riparian ponds are anticipated to enhance system productivity. The channel will provide connectivity between the upper and lower reaches of the North Driftwood River.
Lake creation	Creation of a ~250,000 m^2 (25 ha) lake; includes opportunities to expand lacustrine habitat for multiple species. Several candidate sites exist in either the North Driftwood River watershed or the West Buskegau River Watershed, near the PA.	Likely Species: • Northern Pike • White Sucker • Yellow Perch • Burbot • Forage fish guild (Fathead Minnow, Dace spp., Brook Stickleback, Shiners)	2	High functional value through creation of a self-sustaining lake ecosystem. Several options potentially available including one connected to a Walleye-bearing 4th-order river. This habitat would provide overwintering areas, productive littoral zones, forage fish production, and long-term fish community enhancement.

Habitat Type	Description	Fish Community Diversity	Relative Habitat Value	Rationale
Lake extension (Gerry Lake Littoral Habitat Expansion)	Expansion of ~25,000 m² (2.5 ha) of new shallow littoral habitat adjacent to an existing deep lake lacking nearshore productivity.	Likely Species: • Northern Pike • White Sucker • Yellow Perch • Forage fish guild (Fathead Minnow, Dace spp., Brook Stickleback, Shiners)	2	Littoral habitat is considered limited in Gerry Lake. The proposed expansion would create productive shallow-water habitat (<2 m) that supports enhanced spawning and rearing opportunities, increased macrophyte growth, and higher benthic invertebrate production. By increasing the surface area-to-volume ratio, the extension may also improve overall oxygen dynamics through greater macrophyte-driven oxygen production and enhanced wind-induced mixing. This increased mixing could promote deeper penetration of the oxygenated thermocline during stratification, thus improving oxygen distribution and habitat suitability into deeper portions of the lake.
Offsite Habitat Connectivity	Replacement/remediation of perched or undersized culverts in watercourses within the vicinity, but outside of the project area to restore upstream fish passage to small streams and ponds. Some candidate locations have been identified, including near Martin and Gerry Lakes.	Likely Species: • Forage fish guild (primary beneficiaries) • White Sucker • Northern Pike • Walleye • Brook Trout	1.5	Connectivity restoration can be a valuable and effective offset measure. Doing so can potentially re-open large upstream habitat areas for spawning and rearing. Provides persistent system-level benefits independent of annual flow variation. Quantification of habitat will be dependent on the area of habitat opened multiplied by the relative habitat value. Discussions with provincial fisheries biologists will be required to identify areas for habitat restoration within the vicinity of the project area or farther afield.
Pond Conversion to Lake – Tailings Management Facility (TMF) (Northeast)	Lentic waterbody associated with the Tailings Management Facility; not specifically designed for fish use (i.e. littoral habitat) but can be modified to incorporate habitat features at after decommissioning.	Likely Species: • Yellow Perch • Forage fish guild (Fathead Minnow, Dace spp., Brook Stickleback, Shiners)	0.75	Included as an offsetting option recognizing potential long-term habitat value. RHV similar to the mean RHV of lost habitats. Habitat development is expected to be delayed and slow, and uncertainty is high due to potential mining influences. Conservative reductions reflect delayed habitat function and limited confidence in sustained fish use.
Pond Conversion to Lake – Tailings	Same as TMF NW Pond	Same as TMF NW Pond	0.75	Same as TMF NW Pond

Habitat Type	Description	Fish Community Diversity	Relative Habitat Value	Rationale
Management Facility (TMF) (Northwest)				
Pond Conversion to Lake – Pond 1	Same as TMF NW Pond	Same as TMF NW Pond	0.75	Same as TMF NW Pond
Research opportunities	Research initiatives contributing to improved understanding and management of regional fish species, including lake sturgeon and instream flow research. Potentially up to 20% of overall offsetting credit for such complementary measures. In-kind opportunities will be justified, transparent, and accountable.	Likely Species: • Lake Sturgeon • Walleye • Research contributing to policy-level benefits for the regional fish community • Research related to in-stream flow needs.	NA	Funding for fisheries research will provide indirect population-level benefits through improved management decisions, species-at-risk understanding, and monitoring capacity. As per DFO policy (DFO 2025), complimentary measures that account for more than 10% will: • address an identified research need • include a habitat restoration component or another concrete offsetting measure that is being tested to determine its capacity to deliver on-the-ground results • have a hypothesis or research question related to better understanding and achieving a restoration or offsetting objective • describe how data will be collected, and how it will be analysed and used for subsequent decision making • be scientifically defensible

4.2 Time Lags and Uncertainty

DFO's "Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat under the Fisheries Act" (DFO 2025) requires proponents to account for time lags between when harmful impacts to fish habitat occur and when measures to offset are functioning effectively and for any uncertainties that may exist about the ability of offsets to counterbalance unavoidable habitat impacts. Time lags and uncertainties may be addressed by increasing the amount of offsetting required to counterbalance the unavoidable habitat losses or equivalency analysis may be used to account for time lags and uncertainties. However, any equivalency analysis used should be accompanied by a clear rationale demonstrating its appropriateness for the offsets in question (DFO 2025).

Each offset proposed by CNC to counterbalance the unavoidable impacts to fish habitat cause by the Project will have associated time lags and inherent uncertainties. Assumed time lags are presented in Table 4-2. Briefly, these are:

- Time Lags
    - New or modified habitats require time to stabilize physically (banks, substrates, sediment) and biologically (vegetation, invertebrates, fish communities).
    - Vegetation and littoral zones take several growing seasons to become functional.
    - Thermal and oxygen conditions in new basins or channels may fluctuate before settling into stable patterns.
- Uncertainties
    - Hydraulic conditions (velocity, shear, sediment transport) may differ from design predictions and affect habitat performance.
    - Sediment deposition or scour can reduce habitat suitability, especially on spawning reefs.
    - Biological responses—colonization, spawning, recruitment—are variable and not guaranteed.
    - Long-term performance of large habitat creations or modifications is difficult to predict and may require adaptive management.

To account for these time lags and uncertainties, CNC has assigned multipliers that will be used to "discount" the potential habitat gains from the offsetting options. The rationale for these multipliers is presented in Table 4-2.

Time lag multipliers were calculated as the product of a 3% annual discount rate and the expected number of years before the offset is functioning effectively for fish:

$$Time\ lag\ multiplier = 3\%\ annual\ discount\ rate\ \times \#\ of\ years\ of\ lag$$

Time lag adjusted habitat area for each habitat gain associated with offsetting was then calculated using the formula:

$$Time\ lag\ adjusted\ area_i = Relative\ habitat\ adjusted\ area_i \times time\ lag\ multiplier_i$$

Uncertainty multipliers are not time dependent. Uncertainty adjusted habitat area for each habitat gain associated with offsetting was calculated using the formula:

$$Uncertainty\ adjusted\ area_i = Relative\ habitat\ adjusted\ area_i \times Uncertainty\ multiplier_i$$

Total adjusted habitat areas for each habitat gain associated with offsetting was calculated using the formula:

$$\begin{aligned} &Total\ habitat\ adjusted\ area_i \\ &\quad = (Unadjusted\ habitat\ area_i \times Relative\ habitat\ value_i) \\ &\quad - (Time\ lag\ adjusted\ area_i + Uncertainty\ adjusted\ area_i) \end{aligned}$$

Table 4-2 Time Lag and Uncertainty Multipliers Assigned to Fish Habitat Offsets

Offset Type	Time Lag Multiplier	Rationale	Uncertainty Multiplier	Rationale
North Driftwood Diversion Channel	3% x 5 years = 15%	Large channel reconstructions are likely to require 5–10 yrs to design, permit, construct, and implement post-construction geomorphic assessment, riparian establishment, and full fish community establishment. Biotic responses consistently lag physical construction (Roni et al. 2008; Palmer et al. 2010).	10%	Stream and floodplain restorations exhibit moderate performance uncertainty due to variability in channel adjustment, sediment dynamics, ice processes, and vegetation recruitment (Bernhardt & Palmer 2011; Roni et al. 2008). Despite these uncertainties in the quality of the habitat, there is no uncertainty in the prospect of fish inhabiting the diversion channel. The North Driftwood River supports a diverse community of small and large bodied fish species.
Lake Creation	3% x 10 years = 30%	Created lentic systems may take several years to design, permit, construct, stabilize thermal structure, oxygen regimes, macrophyte communities, and fish populations (Gallardo et al; 2011).	10%	Uncertainties associated with new-basin development include groundwater balance, depth profiles, thermal and oxygen regimes, spawning shoal suitability, and long-term recruitment dynamics. However, studies of newly established lake habitat show that fish can rapidly colonize and develop structured communities when hydraulic connectivity to source populations is present (Kristensen et al. 2020; van Leeuwen et al. 2023). Because the proposed lake will maintain open hydraulic connectivity to the West Buskegau River, fish access is not expected to be limiting, and colonization is anticipated once suitable physicochemical conditions are established. Nonetheless, the timing and trajectory of full community development remain uncertain and depend on basin stabilization and habitat maturation.
Lake Extension (Gerry Lake Littoral Habitat Expansion)	3% x 5 years = 15%	Structural enhancement of littoral habitat (macrophytes, cover, complexity) is known to influence fish community composition and habitat use in lakes (Keast & Fox 1990; Mayo & Jackson 2006). Additionally, restoration and rehabilitation of aquatic habitat (particularly in stream or floodplain contexts) can lead to increased fish abundance (van Leeuwen et al. 2023), though success is variable and long-term monitoring is often lacking (Roni et al. 2008).	10%	Studies demonstrate that increased littoral structural complexity — through vegetation or substrate heterogeneity — generally enhances prey resources and can support higher fish production (Crowder & Cooper 1982; Rennie & Jackson 2005). Gerry Lake currently supports a diverse fish community, which is predicted to increase in abundance resulting from an increase in highly productive littoral habitat within the lake.

Offset Type	Time Lag Multiplier	Rationale	Uncertainty Multiplier	Rationale
Offsite Habitat Connectivity	3% x 1 year	Various studies have shown that fish will colonize, increase genetic diversity, and redistribute to habitats upstream of restored road crossings within 1 to 3 years (Evans et al. 2015; Erkinaro et al. 2017; Wood et al. 2018; Knoth et al. 2022; Gido et al. 2023).	25%	Populations of Northern Pike, Walleye, Yellow Perch, Burbot, White Sucker, Lake Chub, and various minnow species exist in the lakes and streams within the watersheds near the Project Area. Various studies have shown that: • Location (i.e., upstream or downstream) and crossing type (i.e., passable or impassable) accounted for a significant proportion of the variation in the abundance and species richness of stream fishes; stream sections located above impassable culverts had fewer than half the number of species and less that half the total fish abundance compared to stream sections downstream of impassable culverts (Nislow et al. 2011) • Culvert replacements increased the similarity of fish assemblages upstream and downstream of road crossings in western Michigan between 9% and 25% within 3 years post-restoration, suggesting improved stream connectivity and redistribution of stream fishes (Evans et al. 2015) • Culvert modifications increased genetic diversity, effective population size, and decreased genetic differentiation of rainbow trout compared to reference populations, indicating an influx of individuals from a downstream population (Knoth et al. 2022) • Naturally flowing streams enable rapid recovery of fish densities following drought (or other natural or man-made disturbance) and culvert removals increase connectivity between intermittent and perennial reaches (and their various habitats) and, in doing so, benefit fish populations by increasing their reliance to disturbance (Gido et al. 2023) These studies indicate that restoring connectivity and fish passage within the vicinity of the Project Area has the potential to improve the long-term resiliency of fish populations to disease, natural disturbances (e.g., forest fires, extreme floods, extreme droughts, beaver dams), and/or man-made disturbances (e.g. fishing pressure, road sediment, mine exploration activities)

Offset Type	Time Lag Multiplier	Rationale	Uncertainty Multiplier	Rationale
Pond Conversion to Lake – TMF NE	3% x 20 years = 60%	The time lag is based on CNC estimates of when this pond would no longer be actively used for mining operations and would become available to fish.	50%	A conservative uncertainty multiplier was applied to account for: • Limitations to functionality of fish habitat if not primarily designed as fish habitat • Location of ponds within the mine development area and potential influences of current or past mining activity • Public confidence around uncertainties regarding water quality predictions • Public confidence around uncertainties regarding potential biomagnification of metals in biota.
Pond Conversion to Lake – TMF NW	3% x 30 years = 90%	Same as rationale for TMF NE Pond.	50%	Same as rationale for TMF NE Pond.
Pond Conversion to Lake – Pond 1	3% x 30 years = 90%	Same as rationale for TMF NE Pond.	50%	Same as rationale for TMF NE Pond.
Research opportunities	NA	Benefits from research initiatives (e.g., sturgeon biology or instream flow studies) accrue indirectly, primarily through contributions to the scientific and management knowledge base. Any resulting policy or management improvements would be expected to occur well beyond the near-term project window. Because this offsetting measure is not tied to the creation or enhancement of a spatial habitat area but instead represents a percentage of the total monetary value of the primary offsetting measures, the time-lag multiplier is not applied.	NA	Same as the time lag rationale.

5 Equivalency

5.1.1 Habitat Losses

The total areas of fish habitat requiring offsetting due to the construction and operation of the Project—expressed as unadjusted area, relative habitat value–adjusted area under Schedule 2 of the MDMER, relative habitat value–adjusted area under Section 35 of the *Fisheries Act* (HADD), and total adjusted habitat—are summarized in Table 5-1.

5.1.2 Habitat Gains

The total areas of unadjusted, relative habitat value adjusted, time lag and uncertainty adjusted, and total adjusted fish habitat gained by the offset measures included in CNC's updated fish habitat offset plan are summarized in Table 5-2.

Table 5-1 Unadjusted Area, Relative Habitat Value Adjusted Area (Schedule 2 MDMER), Relative Habitat Value Adjusted Area (Section 35 of the Fisheries Act), and Total Adjusted Area of Habitat Loss due to Project Activities

Habitat Type	Unadjusted Area (ha)	Relative Habitat Value	Relative Habitat Value Adjusted Area (Schedule 2 MDMER) (ha)	Relative Habitat Value Adjusted Area (Section 35 *Fisheries Act*) (ha)	Total Adjusted Area (ha)
First order streams	1.8	0.25	0.3	0.1	0.5
Second order streams	4.4	0.50	1.9	0.3	2.2
Third order streams	11.7	1.00	8.1	3.6	11.7
Fourth order streams[1]	10.7	2.00	11.2	10.1	21.3
Small ponds (< 1 ha)	31.9	0.50	15.5	1.9	17.4
Large ponds (> 1 ha)	55.3	0.75	28.0	2.4	30.4
Total	115.8	-	65.0	18.4	83.5

[1]North Driftwood River mainstem

Table 5-2 Relative Habitat Value Weighted Habitat Gains, Adjusted by Time Lags and Uncertainty, Provided by the Fish Habitat Offset Measures

Habitat Type	Unadjusted Area (ha)	Relative Habitat Value	Total Relative Habitat Area (ha)	Time Lag Multiplier	Uncertainty Multiplier	Total Adjusted Area (ha)
North Driftwood River Diversion Channel and Floodplain	25	1.75	43.8	15%	10%	33.5
Lake creation	25	2	50	30%	10%	31.5
Lake extension (Gerry Lake Littoral Habitat Expansion)	2.5	2	5	15%	10%	3.8
Offsite Habitat Connectivity	4	1.5	6	3%	25%	4.4
Pond Conversion to Lake – TMF NE	41.6	0.75	31.2	60%	50%	6.2
Pond Conversion to Lake – TMF NW	47.8	0.75	35.9	90%	50%	1.8
Pond Conversion to Lake – Pond 1	47.2	0.75	35.4	90%	50%	1.8
Research Opportunities[1]	-	-		-	-	16.6
Total	193.1	-	207.3	-	-	99.6

[1] Valued at up to 20% of total adjusted habitat loss as a Complementary Measure

5.2 Habitat Balance

These proposed offset measures are estimated to counterbalance the unavoidable habitat losses caused by the Project at a ratio of 1.7:1 (gain to loss) based on unadjusted area and 1.2:1 (gain to loss) based on relative habitat values, after adjustments are applied to account for time lags to functionality and uncertainty in habitat performance (Table 5). Habitat losses were discounted to reflect the relatively low productivity, limited species diversity, and constrained seasonal function of the first-, second-, and third-order streams and small headwater ponds that comprise the majority of fish habitat affected by Project activities. These habitats are generally shallow, may be intermittent or freeze to the substrate in winter, and provide limited spawning, rearing, or overwintering capacity for most species local and regional importance to fisheries, including those relied upon for Indigenous food and subsistence purposes.

Habitat gains provided by the North Driftwood River diversion channel, lake creation and extension, and improvements to habitat connectivity through culvert replacements in the vicinity of the Project area are anticipated to provide comparatively large, stable, and hydraulically diverse aquatic habitats capable of supporting multiple life stages of fish over the long term. The objective of these offsetting measures is to improve fish habitat quality, thereby supporting increased fish productivity and contributing to the maintenance of self-sustaining fish populations, consistent with the principles outlined in DFO's "Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat" (DFO 2025). Indigenous Nations engaged to date for the Project will continue to be involved throughout the refinement, selection, and implementation of offsetting measures, including the consideration of Indigenous knowledge, where available, to help inform habitat design, location, and long-term effectiveness.

Despite these anticipated benefits, habitat gains were conservatively discounted to account for uncertainty related to habitat construction performance, ecological establishment, and the time required for physical and biological processes (e.g., substrate stabilization, vegetation establishment, and fish colonization) to reach full functional equivalency with natural reference conditions. This precautionary approach is consistent with DFO guidance for addressing uncertainty and temporal lag in offsetting design and ensures that the proposed measures provide a high level of confidence in achieving no net loss of fish habitat productivity.

Table 5-3 Habitat Balance Comparing Habitat Losses and Gains for the Project

	Habitat Loss Area (ha)	Habitat Gain Area (ha)	Ratio
Unadjusted	115.7	193.1	1.7
Relative Habitat Value Adjusted	83.5	207.3	2.5
Complimentary Measures	-	16.7[a]	-
Relative Habitat Value, Time Lag and Uncertainty Adjusted	83.5	99.7	1.2

[a] Complimentary Measures not measured in hectares but are estimated to account for up to 20% of habitat gains.

6 Precautionary Approach

A precautionary approach was applied throughout the assessment of fish habitat losses associated with the Project. Aquatic features identified within the Project footprint that had the potential to function as fish habitat were conservatively assumed to constitute fish habitat for the purposes of impact quantification. This included numerous first- and second-order drainage features and small, shallow ponds that were observed to be ephemeral or intermittent during field investigations, and which may remain dry for much of the year depending on annual precipitation patterns. By treating these features as fish habitat regardless of flow permanence or documented fish use, the assessment intentionally errs on the side of overestimating habitat losses.

A similarly conservative approach was applied to the estimation of habitat loss in habitat affected by flow reduction but not directly overprinted by Project components. For watercourses, habitat loss was estimated in proportion to the reduction in contributing watershed area. For pond habitat, an additional reduction factor of 0.25 was applied to account for an assumed greater reliance on groundwater and internal water storage; however, even with this adjustment, the resulting habitat loss estimates are considered conservative. In many cases, small to moderate reductions in contributing watershed area are unlikely to result in measurable changes in wetted area or habitat function in these lotic or lentic systems.

Collectively, these assumptions are expected to overestimate, rather than underestimate, the magnitude of residual adverse effects on fish habitat. This work provides a high level of confidence that the calculated habitat losses encompass the potential losses that may occur over the course of mine development and that the proposed offsetting measures can counterbalance anticipated effects on fish and fish habitat.

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Attachment 2.1 Lentic habitats requiring offsetting

Attachment 2-1 - Lentic habitats requiring offsetting

Waterbody Name	Section ID	UTM Northing (NAD83, Zone 17)	UTM Easting (NAD83, Zone 17)	Area (m2)	Waterbody Size	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Intake/Discharge	Buildings/Infrastructure	Area Lost or Overprinted (ha) (Schedule 2)	Area Lost or Overprinted (ha) (HADD)	Area affected by Flow Reduction (ha)	Watershed Reduction (%)	Schedule 2 Loss (ha)	FA Section 35 Overprint (ha)	FA Section 35 Flow Reduction (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat - Overprinted (FA Section 35) (ha)	Adjusted Habitat - Flow Reduction (FA Section 35)	Total Adjusted Habitat (ha)
JC-P-07	618	472413	5401669	18224	Large	1.822							Y				0.000	0.000	1.822	0.22	0.000	0.000	0.102	0.102	0.75	0.000	0.000	0.077	0.077
JC-P-08	708	472085	5401699	6016	Small	0.602							Y				0.000	0.000	0.602	0.20	0.000	0.000	0.030	0.030	0.75	0.000	0.000	0.022	0.022
JC-P-09	422	471974	5401117	1068	Small	0.107							Y				0.000	0.000	0.107	0.17	0.000	0.000	0.004	0.004	0.50	0.000	0.000	0.002	0.002
JC-P-10	734	471925	5400935	2393	Small	0.239							Y				0.000	0.000	0.239	0.16	0.000	0.000	0.010	0.010	0.50	0.000	0.000	0.005	0.005
JC-P-11	659	471620	5400505	721	Small	0.072							Y				0.000	0.000	0.072	0.15	0.000	0.000	0.003	0.003	0.50	0.000	0.000	0.001	0.001
JC-P-25	173	472800	5401978	3952	Small	0.395							Y				0.000	0.000	0.395	0.25	0.000	0.000	0.024	0.024	0.50	0.000	0.000	0.012	0.012
ND-P-001	1145	476578	5402340	5906	Small	0.591	Y										0.591	0.000	0.000		0.591	0.000	0.000	0.591	0.50	0.295	0.000	0.000	0.295
ND-P-002	21	476752	5403088	3321	Small	0.332	Y										0.332	0.000	0.000		0.332	0.000	0.000	0.332	0.50	0.166	0.000	0.000	0.166
ND-P-004	436	475438	5406426	47070	Large	4.707	Y										4.707	0.000	0.000		4.707	0.000	0.000	4.707	0.50	2.353	0.000	0.000	2.353
ND-P-009	88	471883	5416493	1620	Small	0.162							Y				0.000	0.000	0.162	0.65	0.000	0.000	0.026	0.026	0.75	0.000	0.000	0.020	0.020
ND-P-010	1157	471353	5416680	2747	Small	0.275							Y				0.000	0.000	0.275	0.34	0.000	0.000	0.024	0.024	0.50	0.000	0.000	0.012	0.012
ND-P-011	868	470272	5416064	13626	Large	1.363							Y				0.000	0.000	1.363	0.40	0.000	0.000	0.138	0.138	0.50	0.000	0.000	0.069	0.069
ND-P-012	90	471392	5414602	767	Small	0.077		Y									0.077	0.000	0.000		0.077	0.000	0.000	0.077	0.75	0.058	0.000	0.000	0.058
ND-P-013	93	470758	5414607	153	Small	0.015							Y				0.000	0.000	0.015	0.89	0.000	0.000	0.003	0.003	0.50	0.000	0.000	0.002	0.002
ND-P-014	92	470657	5414593	730	Small	0.073							Y				0.000	0.000	0.073	0.87	0.000	0.000	0.016	0.016	0.50	0.000	0.000	0.008	0.008
ND-P-015	97	470109	5414866	804	Small	0.080							Y				0.000	0.000	0.080	0.66	0.000	0.000	0.013	0.013	0.50	0.000	0.000	0.007	0.007
ND-P-016	180	471158	5415950	4048	Small	0.405							Y				0.000	0.000	0.405	0.12	0.000	0.000	0.012	0.012	0.50	0.000	0.000	0.006	0.006
ND-P-017	94	470950	5414324	257	Small	0.026							Y				0.000	0.000	0.026	0.82	0.000	0.000	0.005	0.005	0.50	0.000	0.000	0.003	0.003
ND-P-018	91	470806	5413825	2283	Small	0.228		Y	Y								0.228	0.000	0.000		0.228	0.000	0.000	0.228	0.50	0.114	0.000	0.000	0.114
ND-P-026	966	469909	5414317	36036	Large	3.604							Y				0.000	0.000	3.604	0.18	0.000	0.000	0.166	0.166	0.50	0.000	0.000	0.083	0.083
ND-P-027	567	469761	5414254	672	Small	0.067							Y				0.000	0.000	0.067	0.18	0.000	0.000	0.003	0.003	0.75	0.000	0.000	0.002	0.002
ND-P-028	802	469906	5414017	755	Small	0.076							Y				0.000	0.000	0.076	0.16	0.000	0.000	0.003	0.003	0.50	0.000	0.000	0.002	0.002
ND-P-029	706	469974	5413992	15927	Large	1.593							Y				0.000	0.000	1.593	0.21	0.000	0.000	0.084	0.084	0.50	0.000	0.000	0.042	0.042
ND-P-030	96	470179	5413329	9990	Small	0.999							Y				0.000	0.000	0.999	0.07	0.000	0.000	0.016	0.016	0.75	0.000	0.000	0.012	0.012
ND-P-038	122	469447	5411127	15624	Large	1.562							Y				0.000	0.000	1.562	0.36	0.000	0.000	0.141	0.141	0.50	0.000	0.000	0.070	0.070
ND-P-040	123	469544	5410775	5922	Small	0.592							Y				0.000	0.000	0.592	0.51	0.000	0.000	0.075	0.075	0.75	0.000	0.000	0.057	0.057
ND-P-041	555	469768	5411752	7031	Small	0.703								Y			0.000	0.703	0.000		0.000	0.703	0.000	0.703	0.50	0.000	0.352	0.000	0.352
ND-P-042	126	469739	5411586	1367	Small	0.137								Y			0.000	0.137	0.000		0.000	0.137	0.000	0.137	0.50	0.000	0.068	0.000	0.068
ND-P-045	1308	469832	5409444	36424	Large	3.642								Y			0.000	3.642	0.000		0.000	3.642	0.000	3.642	0.50	0.000	1.821	0.000	1.821
ND-P-046	98	470568	5412511	8210	Small	0.821		Y									0.821	0.000	0.000		0.821	0.000	0.000	0.821	0.75	0.616	0.000	0.000	0.616
ND-P-047	1216	470758	5412590	5963	Small	0.596		Y									0.596	0.000	0.000		0.596	0.000	0.000	0.596	0.50	0.298	0.000	0.000	0.298
ND-P-048	102	470876	5412657	3249	Small	0.325		Y									0.325	0.000	0.000		0.325	0.000	0.000	0.325	0.50	0.162	0.000	0.000	0.162
ND-P-049	103	471044	5412810	166	Small	0.017		Y									0.017	0.000	0.000		0.017	0.000	0.000	0.017	0.50	0.008	0.000	0.000	0.008
ND-P-050	104	471064	5412858	67	Small	0.007		Y									0.007	0.000	0.000		0.007	0.000	0.000	0.007	0.50	0.003	0.000	0.000	0.003
ND-P-051	1273	470940	5412710	7895	Small	0.790		Y									0.790	0.000	0.000		0.790	0.000	0.000	0.790	0.50	0.395	0.000	0.000	0.395
ND-P-052	1269	470665	5411715	18638	Large	1.864		Y									1.864	0.000	0.000		1.864	0.000	0.000	1.864	0.50	0.932	0.000	0.000	0.932
ND-P-053	99	470822	5411931	2944	Small	0.294		Y									0.294	0.000	0.000		0.294	0.000	0.000	0.294	0.75	0.221	0.000	0.000	0.221
ND-P-054	100	471022	5412132	82	Small	0.008		Y									0.008	0.000	0.000		0.008	0.000	0.000	0.008	0.50	0.004	0.000	0.000	0.004
ND-P-055	101	471063	5412261	1963	Small	0.196		Y									0.196	0.000	0.000		0.196	0.000	0.000	0.196	0.50	0.098	0.000	0.000	0.098
ND-P-056	799	471133	5412470	26594	Large	2.659		Y									2.659	0.000	0.000		2.659	0.000	0.000	2.659	0.50	1.330	0.000	0.000	1.330
ND-P-057	1091	471437	5412379	1764	Small	0.176		Y									0.176	0.000	0.000		0.176	0.000	0.000	0.176	0.75	0.132	0.000	0.000	0.132
ND-P-058	105	471969	5412537	1631	Small	0.163		Y									0.163	0.000	0.000		0.163	0.000	0.000	0.163	0.50	0.082	0.000	0.000	0.082
ND-P-059	106	471968	5412689	1616	Small	0.162		Y									0.162	0.000	0.000		0.162	0.000	0.000	0.162	0.50	0.081	0.000	0.000	0.081
ND-P-060	433	472382	5412780	3790	Small	0.379		Y									0.379	0.000	0.000		0.379	0.000	0.000	0.379	0.50	0.190	0.000	0.000	0.190
ND-P-061	107	471539	5411751	131	Small	0.013		Y									0.013	0.000	0.000		0.013	0.000	0.000	0.013	0.50	0.007	0.000	0.000	0.007
ND-P-062	108	471537	5411801	242	Small	0.024		Y									0.024	0.000	0.000		0.024	0.000	0.000	0.024	0.50	0.012	0.000	0.000	0.012
ND-P-063	131	471887	5411305	1419	Small	0.142		Y									0.142	0.000	0.000		0.142	0.000	0.000	0.142	0.50	0.071	0.000	0.000	0.071
ND-P-064	132	472037	5411320	260	Small	0.026		Y									0.026	0.000	0.000		0.026	0.000	0.000	0.026	0.50	0.013	0.000	0.000	0.013
ND-P-065	804	472133	5411317	1044	Small	0.104		Y									0.104	0.000	0.000		0.104	0.000	0.000	0.104	0.50	0.052	0.000	0.000	0.052
ND-P-066	643	472131	5411359	358	Small	0.036		Y									0.036	0.000	0.000		0.036	0.000	0.000	0.036	0.50	0.018	0.000	0.000	0.018
ND-P-067	855	472144	5411453	3641	Small	0.364		Y									0.364	0.000	0.000		0.364	0.000	0.000	0.364	0.50	0.182	0.000	0.000	0.182
ND-P-068	111	472313	5411768	1145	Small	0.115		Y									0.115	0.000	0.000		0.115	0.000	0.000	0.115	0.50	0.057	0.000	0.000	0.057
ND-P-069	112	472447	5411828	4098	Small	0.410		Y									0.410	0.000	0.000		0.410	0.000	0.000	0.410	0.50	0.205	0.000	0.000	0.205

Attachment 2-1 - Lentic habitats requiring offsetting

Waterbody Name	Section ID	UTM Northing (NAD83, Zone 17)	UTM Easting (NAD83, Zone 17)	Area (m2)	Waterbody Size	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Intake/Discharge	Buildings/Infrastructure	Area Lost or Overprinted (ha) (Schedule 2)	Area Lost or Overprinted (ha) (HADD)	Area affected by Flow Reduction (ha)	Watershed Reduction (%)	Schedule 2 Loss (ha)	FA Section 35 Overprint (ha)	FA Section 35 Flow Reduction (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat - Overprinted (FA Section 35) (ha)	Adjusted Habitat - Flow Reduction (FA Section 35)	Total Adjusted Habitat (ha)
ND-P-070	709	472522	5411888	8772	Small	0.877		Y									0.877	0.000	0.000		0.877	0.000	0.000	0.877	0.50	0.439	0.000	0.000	0.439
ND-P-071	878	472594	5411964	854	Small	0.085		Y									0.085	0.000	0.000		0.085	0.000	0.000	0.085	0.50	0.043	0.000	0.000	0.043
ND-P-072	556	472634	5412008	901	Small	0.090		Y									0.090	0.000	0.000		0.090	0.000	0.000	0.090	0.50	0.045	0.000	0.000	0.045
ND-P-073	437	472693	5412045	7311	Small	0.731		Y									0.731	0.000	0.000		0.731	0.000	0.000	0.731	0.50	0.366	0.000	0.000	0.366
ND-P-074	1036	472872	5412016	8585	Small	0.859		Y									0.859	0.000	0.000		0.859	0.000	0.000	0.859	0.50	0.429	0.000	0.000	0.429
ND-P-075	521	472735	5412203	7580	Small	0.758		Y									0.758	0.000	0.000		0.758	0.000	0.000	0.758	0.50	0.379	0.000	0.000	0.379
ND-P-076	911	472088	5410847	7228	Small	0.723		Y									0.723	0.000	0.000		0.723	0.000	0.000	0.723	0.50	0.361	0.000	0.000	0.361
ND-P-077	109	472018	5410916	121	Small	0.012		Y									0.012	0.000	0.000		0.012	0.000	0.000	0.012	0.50	0.006	0.000	0.000	0.006
ND-P-078	110	472178	5410777	268	Small	0.027		Y									0.027	0.000	0.000		0.027	0.000	0.000	0.027	0.50	0.013	0.000	0.000	0.013
ND-P-079	910	472870	5411412	11189	Large	1.119		Y									1.119	0.000	0.000		1.119	0.000	0.000	1.119	0.50	0.559	0.000	0.000	0.559
ND-P-080	46	473015	5410428	393	Small	0.039						Y					0.000	0.039	0.000		0.000	0.039	0.000	0.039	0.75	0.000	0.029	0.000	0.029
ND-P-081	1276	473068	5409938	361	Small	0.036						Y					0.000	0.036	0.000		0.000	0.036	0.000	0.036	0.50	0.000	0.018	0.000	0.018
ND-P-082	44	472558	5410327	1146	Small	0.115						Y					0.000	0.115	0.000		0.000	0.115	0.000	0.115	0.50	0.000	0.057	0.000	0.057
ND-P-083	136	471255	5410267	2682	Small	0.268				Y							0.268	0.000	0.000		0.268	0.000	0.000	0.268	0.50	0.134	0.000	0.000	0.134
ND-P-085	1289	470364	5408263	1360	Small	0.136				Y							0.136	0.000	0.000		0.136	0.000	0.000	0.136	0.50	0.068	0.000	0.000	0.068
ND-P-086	142	470289	5408249	425	Small	0.043				Y							0.043	0.000	0.000		0.043	0.000	0.000	0.043	0.50	0.021	0.000	0.000	0.021
ND-P-087	1040	470302	5408370	7535	Small	0.753				Y							0.753	0.000	0.000		0.753	0.000	0.000	0.753	0.50	0.377	0.000	0.000	0.377
ND-P-088	113	470360	5408157	7322	Small	0.732				Y							0.732	0.000	0.000		0.732	0.000	0.000	0.732	0.50	0.366	0.000	0.000	0.366
ND-P-089	115	470040	5408671	3903	Small	0.390				Y							0.390	0.000	0.000		0.390	0.000	0.000	0.390	0.50	0.195	0.000	0.000	0.195
ND-P-090	116	470041	5408608	6897	Small	0.690				Y							0.690	0.000	0.000		0.690	0.000	0.000	0.690	0.50	0.345	0.000	0.000	0.345
ND-P-091	141	471067	5409547	248	Small	0.025				Y							0.025	0.000	0.000		0.025	0.000	0.000	0.025	0.50	0.012	0.000	0.000	0.012
ND-P-092	138	471353	5409955	2380	Small	0.238				Y							0.238	0.000	0.000		0.238	0.000	0.000	0.238	0.50	0.119	0.000	0.000	0.119
ND-P-093	139	471420	5410028	1147	Small	0.115				Y							0.115	0.000	0.000		0.115	0.000	0.000	0.115	0.50	0.057	0.000	0.000	0.057
ND-P-094	140	471453	5410058	697	Small	0.070				Y							0.070	0.000	0.000		0.070	0.000	0.000	0.070	0.50	0.035	0.000	0.000	0.035
ND-P-095	42	471785	5409407	231	Small	0.023				Y							0.023	0.000	0.000		0.023	0.000	0.000	0.023	0.50	0.012	0.000	0.000	0.012
ND-P-095	137	471267	5409838	8468	Small	0.847				Y							0.847	0.000	0.000		0.847	0.000	0.000	0.847	0.50	0.423	0.000	0.000	0.423
ND-P-096	143	471977	5409503	388	Small	0.039						Y					0.039	0.000	0.000		0.039	0.000	0.000	0.039	0.50	0.019	0.000	0.000	0.019
ND-P-098	9	472405	5406551	45544	Large	4.554	Y										4.554	0.000	0.000		4.554	0.000	0.000	4.554	0.50	2.277	0.000	0.000	2.277
ND-P-099	145	471470	5406670	581	Small	0.058											0.000	0.000	0.058	0.55	0.000	0.000	0.008	0.008	0.75	0.000	0.000	0.006	0.006
ND-P-101	552	470171	5406928	4729	Small	0.473								Y			0.000	0.473	0.000		0.000	0.473	0.000	0.473	0.50	0.000	0.236	0.000	0.236
ND-P-102	17	470041	5407012	588	Small	0.059								Y			0.000	0.059	0.000		0.000	0.059	0.000	0.059	0.50	0.000	0.029	0.000	0.029
ND-P-114	14	471842	5404869	24673	Large	2.467							Y				0.000	0.000	2.467	0.37	0.000	0.000	0.229	0.229	0.50	0.000	0.000	0.115	0.115
ND-P-115	15	471761	5405267	11402	Large	1.140							Y				0.000	0.000	1.140	0.32	0.000	0.000	0.091	0.091	0.75	0.000	0.000	0.068	0.068
ND-P-116	18	471508	5405965	2645	Small	0.265							Y				0.000	0.000	0.265	0.24	0.000	0.000	0.016	0.016	0.75	0.000	0.000	0.012	0.012
ND-P-120	152	472808	5404893	2476	Small	0.248	Y										0.248	0.000	0.000		0.248	0.000	0.000	0.248	0.50	0.124	0.000	0.000	0.124
ND-P-121	11	474335	5402873	13148	Large	1.315	Y										1.315	0.000	0.000		1.315	0.000	0.000	1.315	0.50	0.657	0.000	0.000	0.657
ND-P-122	689	474287	5403139	1981	Small	0.198	Y										0.198	0.000	0.000		0.198	0.000	0.000	0.198	0.75	0.149	0.000	0.000	0.149
ND-P-123	4	473777	5406130	7356	Small	0.736	Y										0.736	0.000	0.000		0.736	0.000	0.000	0.736	0.50	0.368	0.000	0.000	0.368
ND-P-124	5	473230	5406483	21144	Large	2.114	Y										2.114	0.000	0.000		2.114	0.000	0.000	2.114	0.50	1.057	0.000	0.000	1.057
ND-P-125	6	473657	5406490	629	Small	0.063	Y										0.063	0.000	0.000		0.063	0.000	0.000	0.063	0.75	0.047	0.000	0.000	0.047
ND-P-126	8	473149	5406547	1047	Small	0.105	Y										0.105	0.000	0.000		0.105	0.000	0.000	0.105	0.50	0.052	0.000	0.000	0.052
ND-P-127	7	473004	5406888	6122	Small	0.612	Y										0.612	0.000	0.000		0.612	0.000	0.000	0.612	0.50	0.306	0.000	0.000	0.306
ND-P-128	191	476087	5403389	120	Small	0.012	Y										0.012	0.000	0.000		0.012	0.000	0.000	0.012	0.50	0.006	0.000	0.000	0.006
ND-P-132	95	471099	5414361	6210	Small	0.621		Y									0.621	0.000	0.000		0.621	0.000	0.000	0.621	0.50	0.311	0.000	0.000	0.311
ND-P-133	179	476588	5404965	1299	Small	0.130	Y										0.130	0.000	0.000		0.130	0.000	0.000	0.130	0.50	0.065	0.000	0.000	0.065
ND-P-135	20	476699	5403380	21637	Large	2.164	Y										2.164	0.000	0.000		2.164	0.000	0.000	2.164	0.50	1.082	0.000	0.000	1.082
ND-P-137	1282	476122	5403460	2105	Small	0.210	Y										0.210	0.000	0.000		0.210	0.000	0.000	0.210	0.75	0.158	0.000	0.000	0.158
ND-P-138	692	475914	5403115	21643	Large	2.164	Y										2.164	0.000	0.000		2.164	0.000	0.000	2.164	0.50	1.082	0.000	0.000	1.082
ND-P-139	1287	470304	5406873	620	Small	0.062								Y			0.000	0.062	0.000		0.000	0.062	0.000	0.062	0.75	0.000	0.047	0.000	0.047
ND-P-141	19	474209	5408809	4935	Small	0.493						Y					0.000	0.493	0.000		0.000	0.493	0.000	0.493	0.50	0.000	0.247	0.000	0.247
ND-P-142	45	473113	5409265	1183	Small	0.118						Y					0.000	0.118	0.000		0.000	0.118	0.000	0.118	0.50	0.000	0.059	0.000	0.059
ND-P-143	43	472474	5410411	307	Small	0.031										Y	0.000	0.031	0.000		0.000	0.031	0.000	0.031	0.50	0.000	0.015	0.000	0.015
ND-P-144	114	470243	5408808	236	Small	0.024				Y							0.024	0.000	0.000		0.024	0.000	0.000	0.024	0.50	0.012	0.000	0.000	0.012

Attachment 2-1 - Lentic habitats requiring offsetting

Waterbody Name	Section ID	UTM Northing (NAD83, Zone 17)	UTM Easting (NAD83, Zone 17)	Area (m2)	Waterbody Size	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Intake/Discharge	Buildings/Infrastructure	Area Lost or Overprinted (ha) (Schedule 2)	Area Lost or Overprinted (ha) (HADD)	Area affected by Flow Reduction (ha)	Watershed Reduction (%)	Schedule 2 Loss (ha)	FA Section 35 Overprint (ha)	FA Section 35 Flow Reduction (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat - Overprinted (FA Section 35) (ha)	Adjusted Habitat - Flow Reduction (FA Section 35)	Total Adjusted Habitat (ha)
ND-P-145	89	471910	5415954	384	Small	0.038		Y									0.038	0.000	0.000		0.038	0.000	0.000	0.038	0.50	0.019	0.000	0.000	0.019
ND-P-146	153	472756	5405703	2585	Small	0.259	Y										0.259	0.000	0.000		0.259	0.000	0.000	0.259	0.50	0.129	0.000	0.000	0.129
ND-P-151	188	470704	5411319	111	Small	0.011		Y									0.011	0.000	0.000		0.011	0.000	0.000	0.011	0.50	0.006	0.000	0.000	0.006
ND-P-152	801	472465	5411414	457	Small	0.046		Y									0.046	0.000	0.000		0.046	0.000	0.000	0.046	0.50	0.023	0.000	0.000	0.023
ND-P-153	1271	472535	5411472	448	Small	0.045		Y									0.045	0.000	0.000		0.045	0.000	0.000	0.045	0.50	0.022	0.000	0.000	0.022
ND-P-154	13	472798	5403308	211	Small	0.021	Y										0.021	0.000	0.000		0.021	0.000	0.000	0.021	0.50	0.011	0.000	0.000	0.011
ND-P-155	1279	473800	5406507	1969	Small	0.197	Y										0.197	0.000	0.000		0.197	0.000	0.000	0.197	0.50	0.098	0.000	0.000	0.098
ND-P-156	71	473894	5415641	121	Small	0.012		Y									0.012	0.000	0.000		0.012	0.000	0.000	0.012	0.50	0.006	0.000	0.000	0.006
WB-P-011	871	472249	5415242	2127	Small	0.213		Y									0.213	0.000	0.000		0.213	0.000	0.000	0.213	0.50	0.106	0.000	0.000	0.106
WB-P-114	65	475612	5412106	5629	Small	0.563					Y						0.563	0.000	0.000		0.563	0.000	0.000	0.563	0.50	0.281	0.000	0.000	0.281
WB-P-127	309	477002	5408683	1599	Small	0.160									Y		0.000	0.160	0.000		0.000	0.160	0.000	0.160	0.50	0.000	0.080	0.000	0.080
WB-P-128	23	476941	5408839	1823	Small	0.182			Y								0.182	0.000	0.000		0.182	0.000	0.000	0.182	0.50	0.091	0.000	0.000	0.091
WB-P-129	310	475799	5407690	357	Small	0.036				Y							0.036	0.000	0.000		0.036	0.000	0.000	0.036	0.50	0.018	0.000	0.000	0.018
WB-P-130	26	475800	5409935	689	Small	0.069						Y					0.000	0.069	0.000		0.000	0.069	0.000	0.069	0.50	0.000	0.034	0.000	0.034
WB-P-131	1277	475267	5410258	400	Small	0.040						Y					0.000	0.040	0.000		0.000	0.040	0.000	0.040	0.50	0.000	0.020	0.000	0.020
WB-P-132	766	474838	5411559	8645	Small	0.864					Y						0.864	0.000	0.000		0.864	0.000	0.000	0.864	0.50	0.432	0.000	0.000	0.432
WB-P-133	25	476939	5409147	557	Small	0.056							Y				0.000	0.000	0.056	0.98	0.000	0.000	0.014	0.014	0.50	0.000	0.000	0.007	0.007
WB-P-139	58	474391	5413989	285	Small	0.029					Y						0.029	0.000	0.000		0.029	0.000	0.000	0.029	0.50	0.014	0.000	0.000	0.014
WB-P-140	876	475836	5412190	10794	Large	1.079			Y		Y						1.079	0.000	0.000		1.079	0.000	0.000	1.079	0.50	0.540	0.000	0.000	0.540
WB-P-143	385	474605	5412462	10879	Large	1.088					Y						1.088	0.000	0.000		1.088	0.000	0.000	1.088	0.75	0.816	0.000	0.000	0.816
WB-P-144	50	474526	5412295	26613	Large	2.661					Y						2.661	0.000	0.000		2.661	0.000	0.000	2.661	0.75	1.996	0.000	0.000	1.996
WB-P-145	1088	474824	5412100	10159	Large	1.016					Y						1.016	0.000	0.000		1.016	0.000	0.000	1.016	0.75	0.762	0.000	0.000	0.762
WB-P-146	725	475175	5412062	10456	Large	1.046					Y						1.046	0.000	0.000		1.046	0.000	0.000	1.046	0.75	0.784	0.000	0.000	0.784
WB-P-147	29	476002	5411895	8496	Small	0.850			Y								0.850	0.000	0.000		0.850	0.000	0.000	0.850	0.75	0.637	0.000	0.000	0.637
WB-P-148	64	475254	5411582	3555	Small	0.355					Y						0.355	0.000	0.000		0.355	0.000	0.000	0.355	0.50	0.178	0.000	0.000	0.178
WB-P-149	48	473777	5411058	177	Small	0.018										Y	0.000	0.018	0.000		0.000	0.018	0.000	0.018	0.50	0.000	0.009	0.000	0.009
WB-P-150	318	475405	5411797	990	Small	0.099					Y						0.099	0.000	0.000		0.099	0.000	0.000	0.099	0.50	0.049	0.000	0.000	0.049
WB-P-151	319	475357	5411950	238	Small	0.024					Y						0.024	0.000	0.000		0.024	0.000	0.000	0.024	0.50	0.012	0.000	0.000	0.012
WB-P-152	28	476006	5411549	16957	Large	1.696			Y								1.696	0.000	0.000		1.696	0.000	0.000	1.696	0.50	0.848	0.000	0.000	0.848
WB-P-153	482	476165	5410361	3973	Small	0.397										Y	0.000	0.397	0.000		0.000	0.397	0.000	0.397	0.75	0.000	0.298	0.000	0.298
WB-P-154	27	475935	5410091	488	Small	0.049						Y					0.000	0.049	0.000		0.000	0.049	0.000	0.049	0.50	0.000	0.024	0.000	0.024
WB-P-156	1217	476180	5412471	7351	Small	0.735			Y		Y						0.735	0.000	0.000		0.735	0.000	0.000	0.735	0.50	0.368	0.000	0.000	0.368
WB-P-157	54	474479	5413929	2873	Small	0.287					Y						0.287	0.000	0.000		0.287	0.000	0.000	0.287	0.50	0.144	0.000	0.000	0.144
WB-P-158	57	474676	5413614	1255	Small	0.125					Y						0.125	0.000	0.000		0.125	0.000	0.000	0.125	0.50	0.063	0.000	0.000	0.063
WB-P-159	53	474883	5413576	1814	Small	0.181					Y						0.181	0.000	0.000		0.181	0.000	0.000	0.181	0.50	0.091	0.000	0.000	0.091
WB-P-160	62	474668	5413214	1707	Small	0.171					Y						0.171	0.000	0.000		0.171	0.000	0.000	0.171	0.50	0.085	0.000	0.000	0.085
WB-P-161	63	474785	5413191	454	Small	0.045					Y						0.045	0.000	0.000		0.045	0.000	0.000	0.045	0.50	0.023	0.000	0.000	0.023
WB-P-162	1190	475188	5413219	28259	Large	2.826					Y						2.826	0.000	0.000		2.826	0.000	0.000	2.826	0.50	1.413	0.000	0.000	1.413
WB-P-163	51	475420	5413229	1868	Small	0.187					Y						0.187	0.000	0.000		0.187	0.000	0.000	0.187	0.75	0.140	0.000	0.000	0.140
WB-P-164	52	475827	5413025	470	Small	0.047					Y						0.047	0.000	0.000		0.047	0.000	0.000	0.047	0.50	0.023	0.000	0.000	0.023
WB-P-165	875	475973	5412708	12617	Large	1.262					Y						1.262	0.000	0.000		1.262	0.000	0.000	1.262	0.50	0.631	0.000	0.000	0.631
WB-P-166	317	476102	5412633	1227	Small	0.123					Y						0.123	0.000	0.000		0.123	0.000	0.000	0.123	0.75	0.092	0.000	0.000	0.092
WB-P-167	316	476349	5412726	2848	Small	0.285			Y		Y						0.285	0.000	0.000		0.285	0.000	0.000	0.285	0.50	0.142	0.000	0.000	0.142
WB-P-168	320	476711	5413292	1000	Small	0.100							Y				0.000	0.000	0.100	0.78	0.000	0.000	0.019	0.019	0.50	0.000	0.000	0.010	0.010
WB-P-169	73	474401	5416724	766	Small	0.077					Y						0.177	0.000	0.000		0.177	0.000	0.000	0.177	0.50	0.089	0.000	0.000	0.089
WB-P-170	134	476459	5413594	468	Small	0.047							Y				0.000	0.000	0.047	0.78	0.000	0.000	0.009	0.009	0.50	0.000	0.000	0.005	0.005
WB-P-171	133	476124	5414014	301	Small	0.030					Y						0.030	0.000	0.000		0.030	0.000	0.000	0.030	0.50	0.015	0.000	0.000	0.015
WB-P-172	67	476010	5414412	1962	Small	0.196					Y						0.454	0.000	0.000		0.454	0.000	0.000	0.454	0.50	0.227	0.000	0.000	0.227
WB-P-173	68	475980	5414488	2665	Small	0.266					Y						0.616	0.000	0.000		0.616	0.000	0.000	0.616	0.50	0.308	0.000	0.000	0.308
WB-P-174	135	475854	5414686	458	Small	0.046					Y						0.106	0.000	0.000		0.106	0.000	0.000	0.106	0.50	0.053	0.000	0.000	0.053
WB-P-175	69	475765	5415099	1141	Small	0.114					Y						0.264	0.000	0.000		0.264	0.000	0.000	0.264	0.50	0.132	0.000	0.000	0.132
WB-P-177	1220	474455	5416598	15700	Large	1.570					Y						3.633	0.000	0.000		3.633	0.000	0.000	3.633	0.50	1.816	0.000	0.000	1.816
WB-P-178	321	474882	5416782	12458	Large	1.246					Y						2.883	0.000	0.000		2.883	0.000	0.000	2.883	0.75	2.162	0.000	0.000	2.162

Attachment 2-1 - Lentic habitats requiring offsetting

Waterbody Name	Section ID	UTM Northing (NAD83, Zone 17)	UTM Easting (NAD83, Zone 17)	Area (m2)	Waterbody Size	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Intake/Discharge	Buildings/Infrastructure	Area Lost or Overprinted (ha) (Schedule 2)	Area Lost or Overprinted (ha) (HADD)	Area affected by Flow Reduction (ha)	Watershed Reduction (%)	Schedule 2 Loss (ha)	FA Section 35 Overprint (ha)	FA Section 35 Flow Reduction (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat - Overprinted (FA Section 35) (ha)	Adjusted Habitat - Flow Reduction (FA Section 35)	Total Adjusted Habitat (ha)
WB-P-179	72	474645	5416724	257	Small	0.026					Y						0.059	0.000	0.000		0.059	0.000	0.000	0.059	0.75	0.045	0.000	0.000	0.045
WB-P-180	75	473768	5416737	1030	Small	0.103		Y									0.238	0.000	0.000		0.238	0.000	0.000	0.238	0.50	0.119	0.000	0.000	0.119
WB-P-181	76	472644	5416733	1072	Small	0.107		Y									0.248	0.000	0.000		0.248	0.000	0.000	0.248	0.50	0.124	0.000	0.000	0.124
WB-P-182	74	473228	5416958	304	Small	0.030		Y									0.070	0.000	0.000		0.070	0.000	0.000	0.070	0.50	0.035	0.000	0.000	0.035
WB-P-183	66	475238	5414419	3713	Small	0.371					Y						0.858	0.000	0.000		0.858	0.000	0.000	0.858	0.50	0.429	0.000	0.000	0.429
WB-P-190	77	476667	5415680	1103	Small	0.110							Y				0.000	0.000	0.110	0.36	0.000	0.000	0.010	0.010	0.50	0.000	0.000	0.005	0.005
WB-P-191	78	476609	5416042	3766	Small	0.377							Y				0.000	0.000	0.377	0.59	0.000	0.000	0.055	0.055	0.50	0.000	0.000	0.028	0.028
WB-P-192	79	477232	5416284	8482	Small	0.848							Y				0.000	0.000	0.848	0.34	0.000	0.000	0.072	0.072	0.50	0.000	0.000	0.036	0.036
WB-P-221	24	476987	5408842	818	Small	0.082									Y		0.000	0.082	0.000		0.000	0.082	0.000	0.082	0.50	0.000	0.041	0.000	0.041
WB-P-222	938	476042	5412907	31208	Large	3.121					Y						3.121	0.000	0.000		3.121	0.000	0.000	3.121	0.50	1.560	0.000	0.000	1.560
WB-P-223	59	474406	5413966	169	Small	0.017					Y						0.017	0.000	0.000		0.017	0.000	0.000	0.017	0.75	0.013	0.000	0.000	0.013
WB-P-224	60	474512	5413883	193	Small	0.019					Y						0.019	0.000	0.000		0.019	0.000	0.000	0.019	0.50	0.010	0.000	0.000	0.010
WB-P-225	55	474637	5413856	887	Small	0.089					Y						0.089	0.000	0.000		0.089	0.000	0.000	0.089	0.50	0.044	0.000	0.000	0.044
WB-P-226	56	474694	5413795	828	Small	0.083					Y						0.083	0.000	0.000		0.083	0.000	0.000	0.083	0.50	0.041	0.000	0.000	0.041
WB-P-227	61	474885	5413786	534	Small	0.053					Y						0.053	0.000	0.000		0.053	0.000	0.000	0.053	0.50	0.027	0.000	0.000	0.027
WB-P-229	49	474559	5411488	147	Small	0.015					Y						0.015	0.000	0.000		0.015	0.000	0.000	0.015	0.50	0.007	0.000	0.000	0.007
WB-P-230	70	474869	5415117	4505	Small	0.450					Y						1.042	0.000	0.000		1.042	0.000	0.000	1.042	0.50	0.521	0.000	0.000	0.521
WB-P-231	1208	474515	5411248	56092	Large	5.609					Y						5.609	0.000	0.000		5.609	0.000	0.000	5.609	0.50	2.805	0.000	0.000	2.805

Attachment 2.2 Lotic habitats requiring offsetting

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
JC-W-10	5401679	472233	3	4.4	41	0.018							Y							
JC-W-10	5400242	471290	3	4.4	981	0.432							Y							
JC-W-10	5401400	471920	3	4.4	786	0.346							Y							
JC-W-10	5401029	472031	3	4.4	260	0.114							Y							
JC-W-10	5399731	471236	3	4.4	453	0.199							Y							
JC-W-10	5401693	473175	3	4.4	844	0.372							Y							
JC-W-10	5400693	471743	3	4.4	873	0.384							Y							
JC-W-10	5401709	472288	3	4.4	111	0.049							Y							
JC-W-10	5401413	473377	3	4.4	142	0.063							Y							
JC-W-10	5401855	472704	3	4.4	345	0.152							Y							
JC-W-21	5401751	473260	2	1.49	136	0.020							Y		Y					
JC-W-21	5401766	473441	1	0.28	106	0.003	Y		Y											
JC-W-21	5401751	473365	2	1.49	86	0.013			Y				Y							
JC-W-22	5401781	473406	1	0.28	58	0.002	Y		Y											
JC-W-24	5401311	473670	1	0.28	233	0.007							Y							
JC-W-24	5401381	473503	2	1.49	164	0.024							Y							
JC-W-25	5401438	473633	1	0.28	180	0.005							Y							
JC-W-26	5401015	473595	1	0.28	79	0.002							Y							
JC-W-26	5400986	473700	1	0.28	149	0.004							Y							
NDR-S-01	5402697	476775	1	0.28	773	0.022	Y													
NDR-S-01	5407683	473576	3	4.4	334	0.147						Y								
NDR-S-01	5407145	472226	4	15.02	488	0.733	Y													
NDR-S-01	5407015	472683	3	4.4	534	0.235	Y													
NDR-S-01	5404531	476795	3	4.4	935	0.411	Y													
NDR-S-01	5406991	472383	3	4.4	605	0.266	Y													
NDR-S-01	5405319	476434	3	4.4	898	0.395	Y													

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
NDR-S-01	5403172	476742	1	0.28	110	0.003	Y													
NDR-S-01	5403800	476646	2	1.49	334	0.050	Y													
NDR-S-01	5406990	472514	3	4.4	65	0.029	Y													
NDR-S-01	5403567	476729	2	1.49	200	0.030	Y													
NDR-S-01	5404062	476733	3	4.4	315	0.139	Y													
NDR-S-01	5403232	476743	2	1.49	28	0.004	Y													
NDR-S-01	5404904	476621	3	4.4	24	0.011	Y													
NDR-S-01	5407481	474075	3	4.4	2621	1.153	Y		Y			Y						Y		
NDR-S-01	5407377	473272	3	4.4	1133	0.499	Y		Y									Y		
NDR-Trib-01	5406949	471713	3	4.4	512	0.225	Y													
NDR-Trib-01	5406883	471528	3	4.4	154	0.068	Y													
NDR-Trib-01	5407317	472067	3	4.4	1076	0.473	Y											Y		
ND-W-005	5416586	471604	2	1.49	619	0.092							Y						Y	25
ND-W-005	5417070	471049	2	1.49	1017	0.151							Y							
ND-W-005	5416719	471940	1	0.28	464	0.013							Y							
ND-W-006	5414927	471998	3	4.4	210	0.092		Y												
ND-W-006	5414927	471998	1	0.28	120	0.003		Y												
ND-W-006	5414927	471998	2	1.49	120	0.018		Y												
ND-W-006	5414600	470780	3	4.4	248	0.109							Y						Y	25
ND-W-006	5414773	470144	3	4.4	216	0.095							Y							
ND-W-006	5416231	470061	3	4.4	152	0.067							Y							
ND-W-006	5415866	470295	3	4.4	122	0.054							Y							
ND-W-006	5415770	470274	3	4.4	118	0.052							Y							
ND-W-006	5415629	470270	3	4.4	206	0.091							Y							
ND-W-006	5414863	471762	3	4.4	332	0.146		Y												
ND-W-006	5415186	470229	3	4.4	869	0.382							Y							

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
ND-W-006	5414474	471276	3	4.4	738	0.325		Y												
ND-W-006	5414587	470214	3	4.4	273	0.120							Y							
ND-W-006	5414547	470472	3	4.4	431	0.190							Y							
ND-W-006	5414823	471492	3	4.4	511	0.225		Y												
ND-W-007	5415696	470702	1	0.28	1014	0.028							Y							
ND-W-009	5415299	470545	1	0.28	920	0.026							Y							
ND-W-010	5414163	470775	1	0.28	729	0.020							Y			Y			Y	25
ND-W-011	5414431	470779	2	1.49	429	0.064							Y			Y			Y	25
ND-W-011	5414601	470623	3	4.4	6	0.002		Y												
ND-W-012	5414317	471008	1	0.28	116	0.003							Y							
ND-W-012	5414315	471180	1	0.28	26	0.001		Y												
ND-W-013	5414595	472197	1	0.28	140	0.004		Y												
ND-W-014	5414774	472115	1	0.28	205	0.006		Y												
ND-W-014	5414774	472115	1	0.28	321	0.009		Y												
ND-W-015	5415078	472061	1	0.28	290	0.008		Y												
ND-W-015	5414816	472087	1	0.28	237	0.007		Y												
ND-W-016	5412731	470506	1	0.28	322	0.009		Y												
ND-W-024	5413191	470311	2	1.49	234	0.035							Y							
ND-W-024	5413061	470424	1	0.28	138	0.004							Y							
ND-W-026	5413610	470260	1	0.28	816	0.023							Y							
ND-W-030	5412022	469719	3	4.4	649	0.286							Y	Y						
ND-W-032	5410512	469620	1	0.28	198	0.006							Y							
ND-W-034	5411370	469914	1	0.28	212	0.006		Y						Y						
ND-W-034	5411509	469817	2	1.49	180	0.027								Y						
ND-W-034	5411644	469736	1	0.28	62	0.002								Y						
ND-W-035	5412069	469803	1	0.28	80	0.002								Y		Y			Y	25

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
ND-W-038	5411470	470465	1	0.28	664	0.019		Y												
ND-W-038	5411017	470463	1	0.28	247	0.007		Y	Y											
ND-W-038	5409907	469851	1	0.28	1382	0.039		Y	Y	Y				Y						
ND-W-038	5412284	470280	1	0.28	193	0.005		Y												
ND-W-039	5411763	470455	1	0.28	1269	0.036		Y												
ND-W-039	5410513	470332	1	0.28	1657	0.046		Y	Y	Y				Y						
ND-W-039	5412024	470397	1	0.28	480	0.013		Y												
ND-W-039	5409651	469749	1	0.28	120	0.003								Y						
ND-W-040	5411204	470249	1	0.28	478	0.013		Y												
ND-W-040	5411298	470018	1	0.28	68	0.002		Y												
ND-W-041	5409885	469932	1	0.28	134	0.004			Y											
ND-W-042	5413480	472163	1	0.28	143	0.004		Y												
ND-W-042	5412836	471052	2	1.49	45	0.007		Y												
ND-W-042	5413219	471534	1	0.28	1706	0.048		Y												
ND-W-042	5412856	471087	1	0.28	36	0.001		Y												
ND-W-042	5413550	472269	1	0.28	206	0.006		Y												
ND-W-042	5412624	470834	2	1.49	60	0.009		Y												
ND-W-042	5412684	470923	2	1.49	13	0.002		Y												
ND-W-042	5412857	471069	2	1.49	3	0.000		Y												
ND-W-042	5412801	471026	2	1.49	22	0.003		Y												
ND-W-042	5412465	470531	2	1.49	82	0.012		Y												
ND-W-042	5412564	470700	2	1.49	12	0.002		Y												
ND-W-043	5412905	471115	1	0.28	151	0.004		Y												
ND-W-044	5412802	470951	1	0.28	111	0.003		Y												
ND-W-045	5412796	470914	1	0.28	73	0.002		Y												
ND-W-046	5412826	470867	1	0.28	97	0.003		Y												

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
ND-W-047	5412728	470687	1	0.28	206	0.006		Y												
ND-W-048	5411857	470703	2	1.49	276	0.041		Y												
ND-W-048	5411619	470604	1	0.28	90	0.003		Y												
ND-W-049	5411813	470512	1	0.28	99	0.003		Y												
ND-W-050	5411665	470798	1	0.28	42	0.001		Y												
ND-W-051	5412373	471377	2	1.49	59	0.009		Y												
ND-W-051	5412354	471544	2	1.49	123	0.018		Y												
ND-W-051	5412101	470991	2	1.49	344	0.051		Y												
ND-W-051	5412330	471106	2	1.49	140	0.021		Y												
ND-W-051	5411887	470813	2	1.49	44	0.007		Y												
ND-W-051	5412321	471803	1	0.28	333	0.009		Y												
ND-W-051	5412321	471803	2	1.49	404	0.060		Y												
ND-W-052	5412115	470889	1	0.28	187	0.005		Y												
ND-W-052	5412527	471618	1	0.28	369	0.010		Y												
ND-W-053	5412885	472487	1	0.28	233	0.007		Y												
ND-W-053	5412686	472129	2	1.49	502	0.075		Y												
ND-W-053	5412766	472336	1	0.28	72	0.002		Y												
ND-W-053	5412797	472419	1	0.28	33	0.001		Y												
ND-W-054	5412826	472306	1	0.28	114	0.003		Y												
ND-W-054	5413013	472286	1	0.28	263	0.007		Y												
ND-W-055	5412564	472329	1	0.28	193	0.005		Y												
ND-W-056	5412616	471970	2	1.49	50	0.007		Y												
ND-W-056	5412408	471984	2	1.49	229	0.034		Y												
ND-W-057	5411403	471218	1	0.28	451	0.013		Y												
ND-W-058	5411697	471426	1	0.28	261	0.007		Y												
ND-W-058	5411618	471296	1	0.28	55	0.002		Y												

Attachment 2-2 – Lotic habitats requiring offsetting

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ND-W-058	5411853	471544	1	0.28	88	0.002		Y												
ND-W-058	5411776	471532	1	0.28	34	0.001		Y												
ND-W-059	5412013	472648	2	1.49	7	0.001		Y												
ND-W-059	5412285	472822	1	0.28	61	0.002		Y												
ND-W-059	5412285	472822	2	1.49	101	0.015		Y												
ND-W-059	5411371	472079	3	4.4	122	0.054		Y												
ND-W-059	5411988	472616	2	1.49	31	0.005		Y												
ND-W-059	5412138	472734	2	1.49	90	0.013		Y												
ND-W-059	5411605	472268	2	1.49	298	0.044		Y												
ND-W-059	5411303	471757	3	4.4	217	0.095		Y												
ND-W-059	5411314	471973	3	4.4	123	0.054		Y												
ND-W-059	5411778	472380	2	1.49	111	0.016		Y												
ND-W-059	5411843	472485	2	1.49	35	0.005		Y												
ND-W-059	5411955	472582	2	1.49	3	0.000		Y												
ND-W-059	5412370	472966	1	0.28	142	0.004		Y												
ND-W-060	5412368	472859	1	0.28	93	0.003		Y												
ND-W-061	5412248	472591	1	0.28	54	0.002		Y												
ND-W-062	5412245	472650	1	0.28	59	0.002		Y												
ND-W-063	5412328	472699	1	0.28	239	0.007		Y												
ND-W-064	5412186	472923	1	0.28	108	0.003		Y												
ND-W-065	5412074	472929	1	0.28	167	0.005		Y												
ND-W-066	5412034	472813	1	0.28	51	0.001		Y												
ND-W-066	5411844	472867	1	0.28	68	0.002		Y												
ND-W-067	5412081	472595	1	0.28	79	0.002		Y												
ND-W-068	5411453	472498	1	0.28	82	0.002		Y												
ND-W-068	5411643	472510	1	0.28	308	0.009		Y												

Attachment 2-2 – Lotic habitats requiring offsetting

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ND-W-069	5411488	472115	1	0.28	57	0.002		Y												
ND-W-070	5411480	472087	1	0.28	73	0.002		Y												
ND-W-071	5411460	472070	1	0.28	55	0.002		Y												
ND-W-072	5411416	472170	1	0.28	69	0.002		Y												
ND-W-073	5411321	472195	1	0.28	62	0.002		Y												
ND-W-074	5411287	472148	1	0.28	45	0.001		Y												
ND-W-075	5411236	472149	1	0.28	53	0.001		Y												
ND-W-076	5411211	472149	1	0.28	36	0.001		Y												
ND-W-077	5411178	472140	1	0.28	30	0.001		Y												
ND-W-077	5411178	472140	2	1.49	83	0.012		Y												
ND-W-077	5411259	472127	2	1.49	23	0.003		Y												
ND-W-078	5411494	471956	1	0.28	169	0.005		Y												
ND-W-079	5411424	471869	2	1.49	189	0.028		Y												
ND-W-079	5411590	471887	1	0.28	147	0.004		Y												
ND-W-080	5411331	471854	1	0.28	36	0.001		Y												
ND-W-081	5411334	472825	2	1.49	100	0.015		Y												
ND-W-081	5410770	472380	2	1.49	333	0.050												Y		
ND-W-081	5410992	471923	2	1.49	243	0.036		Y												
ND-W-081	5411121	472602	2	1.49	845	0.126		Y												
ND-W-081	5411475	472965	1	0.28	81	0.002		Y												
ND-W-081	5410743	472211	2	1.49	74	0.011		Y	Y											
ND-W-081	5410772	472160	1	0.28	28	0.001		Y												
ND-W-081	5410900	472032	2	1.49	36	0.005		Y												
ND-W-082	5411527	472854	1	0.28	75	0.002		Y												
ND-W-083	5410805	472565	1	0.28	92	0.003		Y	Y											
ND-W-084	5410828	472174	1	0.28	77	0.002		Y												

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
ND-W-085	5410877	472140	1	0.28	58	0.002		Y												
ND-W-086	5410897	472142	1	0.28	58	0.002		Y												
ND-W-087	5410789	471953	1	0.28	206	0.006		Y										Y		
ND-W-087	5410815	471822	1	0.28	191	0.005			Y											
ND-W-089	5410642	471236	1	0.28	113	0.003			Y											
ND-W-090	5410448	471256	1	0.28	182	0.005			Y											
ND-W-091	5410262	471339	1	0.28	163	0.005				Y										
ND-W-091	5410229	471213	1	0.28	72	0.002				Y										
ND-W-092	5408252	470312	1	0.28	147	0.004				Y										
ND-W-092	5409088	470753	2	1.49	1244	0.185				Y										
ND-W-092	5408621	470305	2	1.49	378	0.056				Y										
ND-W-092	5409625	471148	2	1.49	267	0.040				Y										
ND-W-092	5410090	471523	2	1.49	206	0.031				Y										
ND-W-092	5410047	471417	2	1.49	16	0.002				Y										
ND-W-092	5409997	471371	2	1.49	6	0.001				Y										
ND-W-092	5409872	471325	2	1.49	40	0.006				Y										
ND-W-093	5408430	470228	1	0.28	49	0.001				Y										
ND-W-094	5408736	470258	1	0.28	126	0.004				Y										
ND-W-095	5408734	470158	2	1.49	213	0.032				Y										
ND-W-095	5408655	470034	2	1.49	13	0.002				Y										
ND-W-096	5408514	469938	1	0.28	101	0.003			Y											
ND-W-096	5408564	469962	1	0.28	23	0.001				Y										
ND-W-097	5408625	469913	1	0.28	96	0.003			Y											
ND-W-098	5408837	470261	1	0.28	76	0.002				Y										
ND-W-098	5408868	470219	1	0.28	96	0.003				Y										
ND-W-099	5408882	470259	1	0.28	60	0.002				Y										

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
ND-W-100	5408830	470320	1	0.28	76	0.002				Y										
ND-W-101	5408886	470325	1	0.28	93	0.003				Y										
ND-W-102	5409238	470840	1	0.28	111	0.003				Y										
ND-W-103	5409092	470797	1	0.28	127	0.004				Y										
ND-W-104	5409703	471136	1	0.28	130	0.004				Y										
ND-W-105	5409796	471154	1	0.28	180	0.005				Y										
ND-W-106	5409865	471135	1	0.28	232	0.007				Y										
ND-W-107	5410100	471261	1	0.28	104	0.003				Y										
ND-W-108	5410173	471825	1	0.28	193	0.005			Y											
ND-W-108	5410115	471724	2	1.49	103	0.015				Y										
ND-W-109	5410122	471858	1	0.28	178	0.005			Y											
ND-W-110	5409938	471880	1	0.28	373	0.010				Y										
ND-W-111	5409369	471759	1	0.28	72	0.002						Y								
ND-W-111	5409447	471804	1	0.28	77	0.002						Y								
ND-W-112	5409523	472408	1	0.28	869	0.024						Y								
ND-W-112	5409473	471955	2	1.49	69	0.010						Y								
ND-W-112	5409492	472023	2	1.49	70	0.010						Y								
ND-W-113	5409419	472107	1	0.28	190	0.005						Y								
ND-W-114	5409052	472431	2	1.49	557	0.083						Y								
ND-W-114	5409053	472684	1	0.28	58	0.002						Y								
ND-W-114	5409049	472139	2	1.49	77	0.011						Y								
ND-W-115	5409103	472687	1	0.28	45	0.001						Y								
ND-W-116	5408981	472252	1	0.28	196	0.005						Y								
ND-W-117	5409090	472181	1	0.28	204	0.006						Y								
ND-W-117	5409065	472062	2	1.49	94	0.014						Y								
ND-W-118	5409130	471794	1	0.28	411	0.011						Y								

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
ND-W-118	5409038	471963	2	1.49	112	0.017						Y								
ND-W-119	5409030	471818	1	0.28	204	0.006						Y								
ND-W-120	5408986	471937	1	0.28	108	0.003						Y								
ND-W-121	5408796	471972	1	0.28	149	0.004						Y								
ND-W-122	5408607	472233	1	0.28	250	0.007						Y								
ND-W-123	5408130	472130	1	0.28	170	0.005												Y		
ND-W-124	5406887	471903	1	0.28	111	0.003	Y													
ND-W-124	5406958	471883	2	1.49	48	0.007	Y													
ND-W-125	5406926	471924	1	0.28	78	0.002	Y													
ND-W-126	5406848	471621	1	0.28	123	0.003	Y													
ND-W-127	5406721	471688	1	0.28	62	0.002	Y													
ND-W-128	5406613	471484	1	0.28	79	0.002							Y							
ND-W-128	5406680	471480	1	0.28	9	0.000							Y							
ND-W-130	5406865	471201	1	0.28	259	0.007							Y							
ND-W-135	5406813	469957	1	0.28	153	0.004								Y						
ND-W-135	5406873	470092	2	1.49	1	0.000								Y						
ND-W-136	5406855	470006	1	0.28	51	0.001								Y						
ND-W-137	5406984	469957	1	0.28	28	0.001								Y						
ND-W-137	5406993	469987	1	0.28	37	0.001								Y						
ND-W-138	5407112	469987	1	0.28	98	0.003								Y						
ND-W-138	5406916	470235	2	1.49	111	0.017								Y						
ND-W-138	5407051	470016	1	0.28	64	0.002								Y						
ND-W-138	5406874	470393	2	1.49	25	0.004								Y						
ND-W-138	5406995	470060	2	1.49	40	0.006								Y						
ND-W-138	5406857	470354	2	1.49	63	0.009								Y						
ND-W-152	5405273	473234	2	1.49	339	0.050	Y													

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
ND-W-152	5406069	472726	3	4.4	659	0.290	Y													
ND-W-152	5406824	472324	3	4.4	537	0.236	Y													
ND-W-152	5403032	474314	2	1.49	205	0.031	Y													
ND-W-152	5405620	472958	2	1.49	663	0.099	Y													
ND-W-152	5404575	473466	2	1.49	1234	0.184	Y													
ND-W-152	5403580	473878	2	1.49	1761	0.262	Y													
ND-W-152	5402799	474264	1	0.28	125	0.004	Y													
ND-W-152	5405104	473374	2	1.49	156	0.023	Y													
ND-W-153	5402825	474251	1	0.28	46	0.001	Y													
ND-W-154	5403148	474369	1	0.28	79	0.002	Y													
ND-W-155	5403127	474215	1	0.28	58	0.002	Y													
ND-W-156	5404944	473568	2	1.49	353	0.053	Y													
ND-W-156	5403151	474224	1	0.28	64	0.002	Y													
ND-W-157	5404603	474015	1	0.28	880	0.025	Y													
ND-W-157	5404209	474706	1	0.28	1330	0.037	Y													
ND-W-157	5404844	473743	1	0.28	75	0.002	Y													
ND-W-158	5404506	473029	1	0.28	101	0.003	Y													
ND-W-158	5405459	472723	1	0.28	149	0.004	Y													
ND-W-158	5405459	472723	2	1.49	402	0.060	Y													
ND-W-158	5403546	473412	1	0.28	2519	0.071	Y													
ND-W-158	5405106	472746	2	1.49	474	0.071	Y													
ND-W-158	5404738	472955	2	1.49	469	0.070	Y													
ND-W-158	5405799	472795	2	1.49	144	0.021	Y													
ND-W-159	5404109	473026	1	0.28	843	0.024	Y													
ND-W-160	5406865	472523	1	0.28	155	0.004	Y													
ND-W-161	5407045	472522	1	0.28	155	0.004	Y													

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
ND-W-162	5406341	472947	1	0.28	762	0.021	Y													
ND-W-163	5405989	473878	1	0.28	283	0.008	Y													
ND-W-163	5406275	473595	2	1.49	486	0.072	Y													
ND-W-163	5406573	473178	3	4.4	95	0.042	Y													
ND-W-163	5406366	473432	3	4.4	17	0.007	Y													
ND-W-163	5406407	473394	3	4.4	104	0.046	Y													
ND-W-163	5406533	473198	3	4.4	20	0.009	Y													
ND-W-163	5406723	473142	3	4.4	254	0.112	Y													
ND-W-163	5407001	472942	3	4.4	134	0.059	Y													
ND-W-164	5406113	473854	1	0.28	85	0.002	Y													
ND-W-165	5406186	473963	1	0.28	131	0.004	Y													
ND-W-166	5406272	473912	1	0.28	135	0.004	Y													
ND-W-166	5406179	473881	2	1.49	121	0.018	Y													
ND-W-167	5406450	473613	1	0.28	83	0.002	Y													
ND-W-167	5406391	473521	2	1.49	208	0.031	Y													
ND-W-168	5406402	473621	1	0.28	44	0.001	Y													
ND-W-169	5406374	473244	1	0.28	94	0.003	Y													
ND-W-170	5406651	473135	1	0.28	49	0.001	Y													
ND-W-171	5407343	473487	1	0.28	281	0.008												Y		
ND-W-172	5408338	473836	1	0.28	1241	0.035						Y								
ND-W-173	5407246	474544	1	0.28	338	0.009												Y		
ND-W-174	5406537	475127	1	0.28	127	0.004	Y													
ND-W-175	5406414	475163	3	4.4	520	0.229	Y													
ND-W-175	5405600	475121	1	0.28	1663	0.047	Y													
ND-W-175	5406431	474742	1	0.28	173	0.005	Y													
ND-W-175	5406425	474867	2	1.49	75	0.011	Y													

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
ND-W-177	5405664	475144	1	0.28	1678	0.047	Y													
ND-W-179	5406269	474897	1	0.28	237	0.007	Y													
ND-W-180	5406356	474804	1	0.28	156	0.004	Y													
ND-W-181	5406389	474889	1	0.28	95	0.003	Y													
ND-W-182	5406340	474939	1	0.28	101	0.003	Y													
ND-W-182	5406403	474908	2	1.49	44	0.007	Y													
ND-W-183	5406449	474897	1	0.28	844	0.024	Y													
ND-W-184	5406290	475270	1	0.28	259	0.007	Y													
ND-W-185	5406533	475595	2	1.49	361	0.054	Y													
ND-W-185	5406699	475671	1	0.28	70	0.002	Y													
ND-W-186	5406692	475625	1	0.28	46	0.001	Y													
ND-W-187	5406309	475639	1	0.28	172	0.005	Y													
ND-W-188	5406050	475834	1	0.28	222	0.006	Y													
ND-W-189	5405844	475604	1	0.28	178	0.005	Y													
ND-W-190	5405758	475693	1	0.28	149	0.004	Y													
ND-W-191	5405648	475864	1	0.28	135	0.004	Y													
ND-W-193	5404822	476781	1	0.28	465	0.013	Y		Y											
ND-W-194	5404493	476779	1	0.28	149	0.004	Y													
ND-W-194	5404510	476806	1	0.28	2	0.000	Y													
ND-W-195	5404227	476901	1	0.28	93	0.003	Y		Y											
ND-W-196	5403098	476967	2	1.49	369	0.055	Y		Y											
ND-W-198	5403097	475731	1	0.28	168	0.005	Y													
ND-W-199	5403265	476014	2	1.49	289	0.043	Y													
ND-W-199	5403720	476387	2	1.49	896	0.134	Y													
ND-W-199	5402894	476013	1	0.28	149	0.004	Y													
ND-W-199	5403382	476078	2	1.49	10	0.001	Y													

Attachment 2-2 – Lotic habitats requiring offsetting

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ND-W-199	5403400	476096	2	1.49	20	0.003														
ND-W-199	5402975	475980	1	0.28	14	0.000	Y													
ND-W-199	5402975	475980	1	0.28	35	0.001	Y													
ND-W-200	5403568	476000	1	0.28	65	0.002	Y													
ND-W-201	5403491	476065	1	0.28	48	0.001	Y													
ND-W-202	5403462	476504	1	0.28	88	0.002	Y													
ND-W-205	5416328	471963	1	0.28	357	0.010		Y	Y				Y							
ND-W-206	5416147	471958	1	0.28	718	0.020		Y	Y				Y							
ND-W-209	5414189	471050	1	0.28	336	0.009		Y	Y				Y							
ND-W-210	5415012	472203	1	0.28	129	0.004		Y												
ND-W-211	5415352	471999	1	0.28	192	0.005		Y												
ND-W-229	5412480	470862	1	0.28	80	0.002		Y												
ND-W-229	5412480	470862	2	1.49	28	0.004		Y												
ND-W-230	5412467	470841	1	0.28	80	0.002		Y												
ND-W-231	5411254	470731	1	0.28	128	0.004		Y												
ND-W-232	5411233	470812	1	0.28	140	0.004		Y												
ND-W-233	5411280	470837	1	0.28	186	0.005		Y												
ND-W-237	5404922	472909	1	0.28	87	0.002	Y													
ND-W-237	5404855	472868	1	0.28	102	0.003	Y													
ND-W-238	5408673	472923	1	0.28	374	0.010						Y								
ND-W-239	5407966	473881	1	0.28	488	0.014						Y								
ND-W-241	5403562	476019	1	0.28	53	0.001	Y													
ND-W-242	5403585	475990	1	0.28	33	0.001	Y													
ND-W-243	5403582	475976	1	0.28	100	0.003	Y													
ND-W-244	5403591	475952	1	0.28	54	0.002	Y													
ND-W-249	5411528	469757	1	0.28	24	0.001								Y						

Attachment 2-2 – Lotic habitats requiring offsetting

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ND-W-250	5410579	469601	1	0.28	28	0.001							Y							
ND-W-252	5412411	471397	1	0.28	179	0.005		Y												
North Driftwood River	5412318	470278	4	9.26	774	0.717		Y						Y						
North Driftwood River	5410865	471561	4	9.26	761	0.705												Y		
North Driftwood River	5417784	470495	4	9.26	641	0.594				Y										
North Driftwood River	5408477	472074	4	9.26	4159	3.851				Y		Y						Y		
North Driftwood River	5411745	470992	4	9.26	610	0.565		Y												
North Driftwood River	5410548	471381	4	9.26	867	0.803			Y											
North Driftwood River	5412221	470582	4	9.26	821	0.760		Y												
North Driftwood River	5411167	471708	4	9.26	556	0.514		Y												
North Driftwood River	5412460	470423	4	9.26	223	0.207		Y												
North Driftwood River	5410986	471757	4	9.26	201	0.186		Y										Y		
North Driftwood River	5411930	470752	4	9.26	171	0.158		Y												
North Driftwood River	5411467	471393	4	9.26	777	0.719		Y												

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
North Driftwood R	5406816	471507	3	4.4	10	0.004	Y													
WB-161	5416727	473742	2	1.49	56	0.008		Y												
WB-W-096	5407133	477406	1	0.28	506	0.014							Y							
WB-W-097	5407382	477048	1	0.28	689	0.019	Y										Y			
WB-W-097	5407400	477572	2	1.49	134	0.020							Y							
WB-W-098	5407864	477293	1	0.28	344	0.010	Y						Y							
WB-W-106	5408321	476366	2	1.49	1801	0.268	Y		Y	Y										
WB-W-106	5408910	477188	3	4.4	418	0.184							Y							
WB-W-106	5407665	475763	1	0.28	76	0.002				Y										
WB-W-106	5408796	476987	2	1.49	39	0.006											Y			
WB-W-107	5408786	477108	1	0.28	189	0.005							Y				Y			
WB-W-108	5408822	476880	1	0.28	80	0.002			Y											
WB-W-108	5408843	476972	2	1.49	9	0.001							Y							
WB-W-109	5410239	475315	1	0.28	94	0.003						Y								
WB-W-109	5410228	475395	1	0.28	78	0.002						Y								
WB-W-110	5409213	477140	1	0.28	426	0.012							Y							
WB-W-110	5409153	476887	1	0.28	100	0.003									Y					
WB-W-112	5409835	477071	1	0.28	103	0.003							Y							
WB-W-122	5412423	473990	1	0.28	1008	0.028		Y			Y									
WB-W-122	5412177	474682	2	1.49	111	0.017					Y									
WB-W-122	5412016	475323	2	1.49	190	0.028					Y									
WB-W-122	5412115	475006	2	1.49	160	0.024					Y									
WB-W-122	5412737	476501	3	4.4	343	0.151			Y				Y							
WB-W-122	5412240	476241	3	4.4	475	0.209														
WB-W-122	5412134	475995	3	4.4	167	0.073			Y											
WB-W-122	5412680	476209	3	4.4	205	0.090					Y									

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
WB-W-122	5412225	474596	2	1.49	94	0.014					Y									
WB-W-122	5412369	474454	2	1.49	22	0.003					Y									
WB-W-122	5412026	475476	3	4.4	176	0.077					Y									
WB-W-122	5412158	475698	3	4.4	91	0.040					Y									
WB-W-122	5412743	476263	3	4.4	10	0.005					Y									
WB-W-123	5412453	474382	1	0.28	194	0.005					Y									
WB-W-124	5412710	474604	1	0.28	122	0.003					Y									
WB-W-124	5412399	474623	1	0.28	2	0.000					Y									
WB-W-124	5412246	474622	1	0.28	79	0.002					Y									
WB-W-125	5411956	475858	1	0.28	237	0.007			Y		Y									
WB-W-126	5412168	475569	1	0.28	92	0.003					Y									
WB-W-127	5412203	475603	1	0.28	47	0.001					Y									
WB-W-128	5412054	475685	2	1.49	46	0.007					Y									
WB-W-128	5412018	475670	1	0.28	35	0.001					Y									
WB-W-129	5412026	475656	1	0.28	37	0.001					Y									
WB-W-130	5412032	475708	1	0.28	58	0.002					Y									
WB-W-131	5410891	474572	1	0.28	319	0.009			Y		Y							Y		
WB-W-131	5411532	474628	3	4.4	184	0.081					Y									
WB-W-131	5411870	475361	3	4.4	140	0.062					Y									
WB-W-131	5411418	474537	3	4.4	136	0.060					Y									
WB-W-131	5411529	475053	3	4.4	351	0.154					Y									
WB-W-131	5411666	475347	3	4.4	223	0.098					Y									
WB-W-131	5411973	475385	3	4.4	50	0.022					Y									
WB-W-132	5411064	474582	1	0.28	73	0.002					Y									
WB-W-133	5411155	474343	1	0.28	160	0.004					Y									
WB-W-134	5411109	474338	1	0.28	79	0.002					Y									

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
WB-W-134	5411132	474398	2	1.49	79	0.012					Y									
WB-W-135	5411092	474385	1	0.28	61	0.002					Y									
WB-W-136	5411612	474610	1	0.28	137	0.004					Y									
WB-W-137	5410013	475887	2	1.49	179	0.027						Y								
WB-W-137	5411154	476104	2	1.49	1170	0.174			Y									Y		
WB-W-137	5410262	476162	2	1.49	48	0.007						Y						Y		
WB-W-137	5412060	476042	2	1.49	168	0.025			Y											
WB-W-137	5411687	475979	2	1.49	129	0.019			Y											
WB-W-137	5410177	476032	2	1.49	270	0.040						Y								
WB-W-137	5409857	475858	1	0.28	156	0.004						Y								
WB-W-137	5410280	476178	2	1.49	1	0.000						Y								
WB-W-138	5409935	475778	1	0.28	132	0.004						Y								
WB-W-139	5410183	476209	1	0.28	229	0.006						Y								
WB-W-140	5413382	475340	2	1.49	312	0.047					Y									
WB-W-140	5412819	476205	3	4.4	229	0.101					Y									
WB-W-140	5413125	475619	3	4.4	428	0.188					Y									
WB-W-140	5414013	474360	1	0.28	68	0.002					Y									
WB-W-140	5412992	475861	3	4.4	100	0.044					Y									
WB-W-140	5413264	475320	2	1.49	161	0.024					Y									
WB-W-140	5413689	475054	1	0.28	394	0.011					Y									
WB-W-140	5413817	474782	1	0.28	171	0.005					Y									
WB-W-140	5413838	474665	1	0.28	60	0.002					Y									
WB-W-140	5413869	474572	1	0.28	38	0.001					Y									
WB-W-140	5413905	474524	1	0.28	81	0.002					Y									
WB-W-140	5413956	474430	1	0.28	54	0.002					Y									
WB-W-140	5413994	474398	1	0.28	5	0.000					Y									

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
WB-W-141	5413586	474776	2	1.49	204	0.030					Y									
WB-W-141	5413735	474465	1	0.28	441	0.012					Y									
WB-W-141	5413491	475009	2	1.49	272	0.041					Y									
WB-W-141	5413623	474649	2	1.49	24	0.004					Y									
WB-W-142	5413612	474594	1	0.28	92	0.003					Y									
WB-W-143	5413526	474822	1	0.28	108	0.003					Y									
WB-W-144	5413494	474732	1	0.28	262	0.007					Y									
WB-W-145	5413184	474946	1	0.28	349	0.010					Y									
WB-W-145	5413203	474727	1	0.28	106	0.003					Y									
WB-W-145	5413225	474631	1	0.28	15	0.000					Y									
WB-W-146	5413277	475092	1	0.28	113	0.003					Y									
WB-W-147	5416344	475011	3	4.4	412	0.181					Y									
WB-W-147	5416549	474638	3	4.4	267	0.117					Y									
WB-W-147	5416972	473548	2	1.49	732	0.109		Y												
WB-W-147	5416471	474819	3	4.4	201	0.089					Y									
WB-W-147	5414206	476082	3	4.4	483	0.213					Y									
WB-W-147	5415398	475689	3	4.4	984	0.433					Y									
WB-W-147	5413455	476657	3	4.4	601	0.264							Y							
WB-W-147	5415868	475139	3	4.4	948	0.417					Y									
WB-W-147	5414463	475991	3	4.4	20	0.009					Y									
WB-W-147	5414600	475870	3	4.4	229	0.101					Y									
WB-W-147	5414900	475839	3	4.4	527	0.232					Y									
WB-W-147	5416698	474459	3	4.4	52	0.023					Y									
WB-W-147	5413981	476188	3	4.4	168	0.074					Y									
WB-W-147	5417265	472898	1	0.28	637	0.018									Y					
WB-W-147	5416724	474048	3	4.4	530	0.233					Y									

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
WB-W-147	5416978	473149	2	1.49	198	0.030		Y												
WB-W-147	5413763	476333	3	4.4	532	0.234			Y		Y									
WB-W-148	5414116	476299	1	0.28	354	0.010			Y		Y									
WB-W-149	5414177	475945	1	0.28	285	0.008					Y									
WB-W-150	5414372	475913	1	0.28	174	0.005					Y									
WB-W-151	5414595	476020	1	0.28	204	0.006					Y									
WB-W-152	5414468	475550	2	1.49	642	0.096					Y									
WB-W-152	5414538	474940	1	0.28	555	0.016					Y									
WB-W-153	5414294	475116	1	0.28	422	0.012					Y									
WB-W-154	5414329	475259	1	0.28	108	0.003					Y									
WB-W-155	5415210	475840	1	0.28	255	0.007					Y									
WB-W-156	5415288	475115	2	1.49	566	0.084					Y									
WB-W-156	5415049	474846	1	0.28	78	0.002					Y									
WB-W-157	5415048	474875	1	0.28	70	0.002					Y									
WB-W-158	5415104	474824	1	0.28	40	0.001					Y									
WB-W-159	5415182	474825	1	0.28	54	0.002					Y									
WB-W-160	5417204	473123	1	0.28	345	0.010							Y							
WB-W-161	5416728	473211	2	1.49	1018	0.152		Y												
WB-W-161	5416766	472629	1	0.28	71	0.002		Y												
WB-W-162	5416884	472710	1	0.28	245	0.007		Y												
WB-W-163	5416480	474624	2	1.49	233	0.035					Y									
WB-W-163	5416495	474267	1	0.28	127	0.004					Y									
WB-W-163	5416479	474202	1	0.28	31	0.001					Y									
WB-W-164	5416527	474363	1	0.28	44	0.001					Y									
WB-W-165	5416652	474417	1	0.28	80	0.002					Y									
WB-W-166	5416588	474897	2	1.49	291	0.043					Y									

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
WB-W-166	5416943	474876	1	0.28	50	0.001					Y									
WB-W-167	5416751	474797	1	0.28	65	0.002					Y									
WB-W-168	5416436	475011	1	0.28	109	0.003					Y									
WB-W-169	5416196	474997	1	0.28	179	0.005					Y									
WB-W-170	5414312	475290	1	0.28	147	0.004					Y									
WB-W-178	5415718	477140	1	0.28	989	0.028							Y							
WB-W-178	5415678	476520	1	0.28	263	0.007							Y							
WB-W-179	5416109	476946	1	0.28	595	0.017							Y							
WB-W-179	5416321	477307	1	0.28	90	0.003							Y							
WB-W-179	5416077	476502	1	0.28	124	0.003							Y							
WB-W-192	5417396	476783	1	0.28	177	0.005							Y							
WB-W-202	5408960	475392	1	0.28	195	0.005						Y								
WB-W-203	5408796	476911	1	0.28	29	0.001			Y											
WB-W-205	5412329	474383	1	0.28	87	0.002					Y									
WB-W-206	5410337	476101	1	0.28	113	0.003						Y						Y		
WB-W-207	5413675	474846	1	0.28	133	0.004					Y									
WB-W-207	5413714	474867	1	0.28	84	0.002					Y									
WB-W-208	5412751	475867	1	0.28	111	0.003					Y									
WB-W-208	5413738	474865	1	0.28	66	0.002					Y									
WB-W-209	5412634	475880	1	0.28	61	0.002					Y									
WB-W-210	5412675	476058	1	0.28	94	0.003					Y									
WB-W-210	5412623	476136	1	0.28	55	0.002					Y									
WB-W-211	5414947	475743	1	0.28	188	0.005					Y									
WB-W-212	5416559	474274	1	0.28	71	0.002					Y									
WB-W-213	5416740	474383	1	0.28	26	0.001					Y									
WB-W-214	5412790	476064	1	0.28	47	0.001					Y									

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Available Habitat (ha)	TMF	WRS	Contact Water Management	LG Stockpile	OSA	Open Pit	Flow Redution	NDR Diversion	Non-contact diversion	Linear Crossing	Intake/Discharge	Buildings/Infrastructure	Other	Estimated Culvert Length (m)
WB-W-215	5407659	475817	1	0.28	56	0.002				Y										

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
JC-W-10	5401679	472233	3	4.4	41	0	0	41	21%	20%	20.6%	0.000	0.004	0.004	1.000	0.000	0.004	0.0037
JC-W-10	5400242	471290	3	4.4	981	0	0	981	15%	13%	14.1%	0.000	0.061	0.061	1.000	0.000	0.061	0.0607
JC-W-10	5401400	471920	3	4.4	786	0	0	786	20%	16%	18.1%	0.000	0.063	0.063	1.000	0.000	0.063	0.0627
JC-W-10	5401029	472031	3	4.4	260	0	0	260	19%	19%	19.1%	0.000	0.022	0.022	1.000	0.000	0.022	0.0218
JC-W-10	5399731	471236	3	4.4	453	0	0	453	13%	13%	12.7%	0.000	0.025	0.025	1.000	0.000	0.025	0.0252
JC-W-10	5401693	473175	3	4.4	844	0	0	844	10%	25%	17.6%	0.000	0.065	0.065	1.000	0.000	0.065	0.0654
JC-W-10	5400693	471743	3	4.4	873	0	0	873	16%	15%	15.6%	0.000	0.060	0.060	1.000	0.000	0.060	0.0600
JC-W-10	5401709	472288	3	4.4	111	0	0	111	22%	21%	21.6%	0.000	0.011	0.011	1.000	0.000	0.011	0.0106
JC-W-10	5401413	473377	3	4.4	142	0	0	142	10%	10%	10.1%	0.000	0.006	0.006	1.000	0.000	0.006	0.0063
JC-W-10	5401855	472704	3	4.4	345	0	0	345	25%	23%	24.1%	0.000	0.037	0.037	1.000	0.000	0.037	0.0365
JC-W-21	5401751	473260	2	1.49	136	0	136	0			0.0%	0.000	0.020	0.020	0.500	0.000	0.010	0.0101
JC-W-21	5401766	473441	1	0.28	106	106	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
JC-W-21	5401751	473365	2	1.49	86	86	0	0			0.0%	0.013	0.000	0.013	0.500	0.006	0.000	0.0064
JC-W-22	5401781	473406	1	0.28	58	58	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
JC-W-24	5401311	473670	1	0.28	233	0	0	233	11%	9%	10.4%	0.000	0.001	0.001	0.250	0.000	0.000	0.0002
JC-W-24	5401381	473503	2	1.49	164	0	0	164	41%	50%	45.6%	0.000	0.011	0.011	0.500	0.000	0.006	0.0056
JC-W-25	5401438	473633	1	0.28	180	0	0	180	72%	68%	69.9%	0.000	0.004	0.004	0.250	0.000	0.001	0.0009
JC-W-26	5401015	473595	1	0.28	79	0	0	79	12%	12%	12.0%	0.000	0.000	0.000	0.250	0.000	0.000	0.0001
JC-W-26	5400986	473700	1	0.28	149	0	0	149	12%	12%	12.2%	0.000	0.001	0.001	0.250	0.000	0.000	0.0001
NDR-S-01	5402697	476775	1	0.28	773	773	0	0			0.0%	0.022	0.000	0.022	0.250	0.005	0.000	0.0054
NDR-S-01	5407683	473576	3	4.4	334	0	334	0			0.0%	0.000	0.147	0.147	1.000	0.000	0.147	0.1470
NDR-S-01	5407145	472226	4	15.02	488	488	0	0			0.0%	0.733	0.000	0.733	2.000	1.467	0.000	1.4669
NDR-S-01	5407015	472683	3	4.4	534	534	0	0			0.0%	0.235	0.000	0.235	1.000	0.235	0.000	0.2351
NDR-S-01	5404531	476795	3	4.4	935	935	0	0			0.0%	0.411	0.000	0.411	1.000	0.411	0.000	0.4112
NDR-S-01	5406991	472383	3	4.4	605	605	0	0			0.0%	0.266	0.000	0.266	1.000	0.266	0.000	0.2661
NDR-S-01	5405319	476434	3	4.4	898	898	0	0			0.0%	0.395	0.000	0.395	1.000	0.395	0.000	0.3952

Attachment 2-2 – Lotic habitats requiring offsetting

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NDR-S-01	5403172	476742	1	0.28	110	110	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
NDR-S-01	5403800	476646	2	1.49	334	334	0	0			0.0%	0.050	0.000	0.050	0.500	0.025	0.000	0.0249
NDR-S-01	5406990	472514	3	4.4	65	65	0	0			0.0%	0.029	0.000	0.029	1.000	0.029	0.000	0.0288
NDR-S-01	5403567	476729	2	1.49	200	200	0	0			0.0%	0.030	0.000	0.030	0.500	0.015	0.000	0.0149
NDR-S-01	5404062	476733	3	4.4	315	315	0	0			0.0%	0.139	0.000	0.139	1.000	0.139	0.000	0.1386
NDR-S-01	5403232	476743	2	1.49	28	28	0	0			0.0%	0.004	0.000	0.004	0.500	0.002	0.000	0.0021
NDR-S-01	5404904	476621	3	4.4	24	24	0	0			0.0%	0.011	0.000	0.011	1.000	0.011	0.000	0.0106
NDR-S-01	5407481	474075	3	4.4	2621	1186	1434	0			0.0%	0.522	0.631	1.153	1.000	0.522	0.631	1.1531
NDR-S-01	5407377	473272	3	4.4	1133	535	594	0			0.0%	0.235	0.261	0.497	1.000	0.235	0.261	0.4968
NDR-Trib-01	5406949	471713	3	4.4	512	512	0	0			0.0%	0.225	0.000	0.225	1.000	0.225	0.000	0.2254
NDR-Trib-01	5406883	471528	3	4.4	154	154	0	0			0.0%	0.068	0.000	0.068	1.000	0.068	0.000	0.0679
NDR-Trib-01	5407317	472067	3	4.4	1076	190	886	0			0.0%	0.084	0.390	0.473	1.000	0.084	0.390	0.4735
ND-W-005	5416586	471604	2	1.49	619	0	0	619	19%	6%	12.5%	0.000	0.015	0.015	0.500	0.000	0.008	0.0076
ND-W-005	5417070	471049	2	1.49	1017	0	0	1017	34%	20%	27.3%	0.000	0.041	0.041	0.500	0.000	0.021	0.0206
ND-W-005	5416719	471940	1	0.28	464	0	0	464	28%	28%	27.8%	0.000	0.004	0.004	0.250	0.000	0.001	0.0009
ND-W-006	5414927	471998	3	4.4	210	210	0	0			0.0%	0.092	0.000	0.092	1.000	0.092	0.000	0.0922
ND-W-006	5414927	471998	1	0.28	120	216	0	0			0.0%	0.006	0.000	0.006	0.250	0.002	0.000	0.0015
ND-W-006	5414927	471998	2	1.49	120	120	0	0			0.0%	0.018	0.000	0.018	0.500	0.009	0.000	0.0089
ND-W-006	5414600	470780	3	4.4	248	0	248	0			0.0%	0.000	0.120	0.120	1.000	0.000	0.120	0.1202
ND-W-006	5414773	470144	3	4.4	216	0	0	216	77%	67%	72.4%	0.000	0.069	0.069	1.000	0.000	0.069	0.0688
ND-W-006	5416231	470061	3	4.4	152	0	0	152	41%	39%	39.5%	0.000	0.027	0.027	1.000	0.000	0.027	0.0265
ND-W-006	5415866	470295	3	4.4	122	0	0	122	46%	44%	44.9%	0.000	0.024	0.024	1.000	0.000	0.024	0.0242
ND-W-006	5415770	470274	3	4.4	118	0	0	118	54%	53%	53.4%	0.000	0.028	0.028	1.000	0.000	0.028	0.0277
ND-W-006	5415629	470270	3	4.4	206	0	0	206	55%	54%	54.3%	0.000	0.049	0.049	1.000	0.000	0.049	0.0492
ND-W-006	5414863	471762	3	4.4	332	332	0	0			0.0%	0.146	0.000	0.146	1.000	0.146	0.000	0.1459
ND-W-006	5415186	470229	3	4.4	869	0	0	869	66%	57%	61.6%	0.000	0.236	0.236	1.000	0.000	0.236	0.2357

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-006	5414474	471276	3	4.4	738	406	0	332	100%	100%	100.0%	0.179	0.146	0.325	1.000	0.179	0.146	0.3247
ND-W-006	5414587	470214	3	4.4	273	0	0	273	78%	77%	77.6%	0.000	0.093	0.093	1.000	0.000	0.093	0.0932
ND-W-006	5414547	470472	3	4.4	431	0	0	431	87%	78%	82.3%	0.000	0.156	0.156	1.000	0.000	0.156	0.1562
ND-W-006	5414823	471492	3	4.4	511	511	0	0			0.0%	0.225	0.000	0.225	1.000	0.225	0.000	0.2247
ND-W-007	5415696	470702	1	0.28	1014	0	0	1014	56%	30%	42.9%	0.000	0.012	0.012	0.250	0.000	0.003	0.0030
ND-W-009	5415299	470545	1	0.28	920	0	0	920	59%	66%	62.8%	0.000	0.016	0.016	0.250	0.000	0.004	0.0040
ND-W-010	5414163	470775	1	0.28	729	0	0	729	80%	43%	61.4%	0.000	0.013	0.013	0.250	0.000	0.003	0.0033
ND-W-011	5414431	470779	2	1.49	429	0	0	429	91%	82%	86.5%	0.000	0.059	0.059	0.500	0.000	0.029	0.0295
ND-W-011	5414601	470623	3	4.4	6	0	0	6	87%	87%	86.7%	0.000	0.002	0.002	1.000	0.000	0.002	0.0022
ND-W-012	5414317	471008	1	0.28	116	0	116	0			0.0%	0.000	0.003	0.003	0.250	0.000	0.001	0.0008
ND-W-012	5414315	471180	1	0.28	26	26	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
ND-W-013	5414595	472197	1	0.28	140	140	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-014	5414774	472115	1	0.28	205	205	0	0			0.0%	0.006	0.000	0.006	0.250	0.001	0.000	0.0014
ND-W-014	5414774	472115	1	0.28	321	321	0	0			0.0%	0.009	0.000	0.009	0.250	0.002	0.000	0.0022
ND-W-015	5415078	472061	1	0.28	290	290	0	0			0.0%	0.008	0.000	0.008	0.250	0.002	0.000	0.0020
ND-W-015	5414816	472087	1	0.28	237	237	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0017
ND-W-016	5412731	470506	1	0.28	322	322	0	0			0.0%	0.009	0.000	0.009	0.250	0.002	0.000	0.0023
ND-W-024	5413191	470311	2	1.49	234	0	0	234	31%	14%	22.7%	0.000	0.008	0.008	0.500	0.000	0.004	0.0040
ND-W-024	5413061	470424	1	0.28	138	0	0	138	82%	43%	62.6%	0.000	0.002	0.002	0.250	0.000	0.001	0.0006
ND-W-026	5413610	470260	1	0.28	816	0	0	816	53%	17%	34.8%	0.000	0.008	0.008	0.250	0.000	0.002	0.0020
ND-W-030	5412022	469719	3	4.4	649	0	649	0			0.0%	0.000	0.286	0.286	1.000	0.000	0.286	0.2856
ND-W-032	5410512	469620	1	0.28	198	0	198	0			0.0%	0.000	0.006	0.006	0.250	0.000	0.001	0.0014
ND-W-034	5411370	469914	1	0.28	212	41	172	0			0.0%	0.001	0.005	0.006	0.250	0.000	0.001	0.0015
ND-W-034	5411509	469817	2	1.49	180	0	180	0			0.0%	0.000	0.027	0.027	0.500	0.000	0.013	0.0134
ND-W-034	5411644	469736	1	0.28	62	0	62	0			0.0%	0.000	0.002	0.002	0.250	0.000	0.000	0.0004
ND-W-035	5412069	469803	1	0.28	80	0	80	0			0.0%	0.000	0.003	0.003	0.250	0.000	0.001	0.0007

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-038	5411470	470465	1	0.28	664	664	0	0			0.0%	0.019	0.000	0.019	0.250	0.005	0.000	0.0046
ND-W-038	5411017	470463	1	0.28	247	247	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0017
ND-W-038	5409907	469851	1	0.28	1382	311	1070	0			0.0%	0.009	0.030	0.039	0.250	0.002	0.007	0.0097
ND-W-038	5412284	470280	1	0.28	193	193	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
ND-W-039	5411763	470455	1	0.28	1269	1269	0	0			0.0%	0.036	0.000	0.036	0.250	0.009	0.000	0.0089
ND-W-039	5410513	470332	1	0.28	1657	1257	400	0			0.0%	0.035	0.011	0.046	0.250	0.009	0.003	0.0116
ND-W-039	5412024	470397	1	0.28	480	480	0	0			0.0%	0.013	0.000	0.013	0.250	0.003	0.000	0.0034
ND-W-039	5409651	469749	1	0.28	120	0	120	0			0.0%	0.000	0.003	0.003	0.250	0.000	0.001	0.0008
ND-W-040	5411204	470249	1	0.28	478	498	0	0			0.0%	0.014	0.000	0.014	0.250	0.003	0.000	0.0035
ND-W-040	5411298	470018	1	0.28	68	68	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
ND-W-041	5409885	469932	1	0.28	134	134	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-042	5413480	472163	1	0.28	143	143	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-042	5412836	471052	2	1.49	45	45	0	0			0.0%	0.007	0.000	0.007	0.500	0.003	0.000	0.0033
ND-W-042	5413219	471534	1	0.28	1706	1706	0	0			0.0%	0.048	0.000	0.048	0.250	0.012	0.000	0.0119
ND-W-042	5412856	471087	1	0.28	36	36	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-042	5413550	472269	1	0.28	206	206	0	0			0.0%	0.006	0.000	0.006	0.250	0.001	0.000	0.0014
ND-W-042	5412624	470834	2	1.49	60	60	0	0			0.0%	0.009	0.000	0.009	0.500	0.004	0.000	0.0045
ND-W-042	5412684	470923	2	1.49	13	13	0	0			0.0%	0.002	0.000	0.002	0.500	0.001	0.000	0.0009
ND-W-042	5412857	471069	2	1.49	3	3	0	0			0.0%	0.000	0.000	0.000	0.500	0.000	0.000	0.0002
ND-W-042	5412801	471026	2	1.49	22	22	0	0			0.0%	0.003	0.000	0.003	0.500	0.002	0.000	0.0016
ND-W-042	5412465	470531	2	1.49	82	82	0	0			0.0%	0.012	0.000	0.012	0.500	0.006	0.000	0.0061
ND-W-042	5412564	470700	2	1.49	12	12	0	0			0.0%	0.002	0.000	0.002	0.500	0.001	0.000	0.0009
ND-W-043	5412905	471115	1	0.28	151	151	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0011
ND-W-044	5412802	470951	1	0.28	111	111	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
ND-W-045	5412796	470914	1	0.28	73	73	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
ND-W-046	5412826	470867	1	0.28	97	97	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-047	5412728	470687	1	0.28	206	206	0	0			0.0%	0.006	0.000	0.006	0.250	0.001	0.000	0.0014
ND-W-048	5411857	470703	2	1.49	276	276	0	0			0.0%	0.041	0.000	0.041	0.500	0.021	0.000	0.0205
ND-W-048	5411619	470604	1	0.28	90	90	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0006
ND-W-049	5411813	470512	1	0.28	99	99	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-050	5411665	470798	1	0.28	42	42	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-051	5412373	471377	2	1.49	59	59	0	0			0.0%	0.009	0.000	0.009	0.500	0.004	0.000	0.0044
ND-W-051	5412354	471544	2	1.49	123	123	0	0			0.0%	0.018	0.000	0.018	0.500	0.009	0.000	0.0091
ND-W-051	5412101	470991	2	1.49	344	344	0	0			0.0%	0.051	0.000	0.051	0.500	0.026	0.000	0.0256
ND-W-051	5412330	471106	2	1.49	140	140	0	0			0.0%	0.021	0.000	0.021	0.500	0.010	0.000	0.0104
ND-W-051	5411887	470813	2	1.49	44	44	0	0			0.0%	0.007	0.000	0.007	0.500	0.003	0.000	0.0033
ND-W-051	5412321	471803	1	0.28	333	333	0	0			0.0%	0.009	0.000	0.009	0.250	0.002	0.000	0.0023
ND-W-051	5412321	471803	2	1.49	404	404	0	0			0.0%	0.060	0.000	0.060	0.500	0.030	0.000	0.0301
ND-W-052	5412115	470889	1	0.28	187	187	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
ND-W-052	5412527	471618	1	0.28	369	369	0	0			0.0%	0.010	0.000	0.010	0.250	0.003	0.000	0.0026
ND-W-053	5412885	472487	1	0.28	233	233	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0016
ND-W-053	5412686	472129	2	1.49	502	502	0	0			0.0%	0.075	0.000	0.075	0.500	0.037	0.000	0.0374
ND-W-053	5412766	472336	1	0.28	72	72	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
ND-W-053	5412797	472419	1	0.28	33	33	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
ND-W-054	5412826	472306	1	0.28	114	114	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
ND-W-054	5413013	472286	1	0.28	263	263	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0018
ND-W-055	5412564	472329	1	0.28	193	193	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0014
ND-W-056	5412616	471970	2	1.49	50	50	0	0			0.0%	0.007	0.000	0.007	0.500	0.004	0.000	0.0037
ND-W-056	5412408	471984	2	1.49	229	229	0	0			0.0%	0.034	0.000	0.034	0.500	0.017	0.000	0.0170
ND-W-057	5411403	471218	1	0.28	451	451	0	0			0.0%	0.013	0.000	0.013	0.250	0.003	0.000	0.0032
ND-W-058	5411697	471426	1	0.28	261	261	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0018
ND-W-058	5411618	471296	1	0.28	55	55	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-058	5411853	471544	1	0.28	88	88	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-058	5411776	471532	1	0.28	34	34	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
ND-W-059	5412013	472648	2	1.49	7	7	0	0			0.0%	0.001	0.000	0.001	0.500	0.001	0.000	0.0005
ND-W-059	5412285	472822	1	0.28	61	61	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-059	5412285	472822	2	1.49	101	101	0	0			0.0%	0.015	0.000	0.015	0.500	0.008	0.000	0.0075
ND-W-059	5411371	472079	3	4.4	122	122	0	0			0.0%	0.054	0.000	0.054	1.000	0.054	0.000	0.0536
ND-W-059	5411988	472616	2	1.49	31	31	0	0			0.0%	0.005	0.000	0.005	0.500	0.002	0.000	0.0023
ND-W-059	5412138	472734	2	1.49	90	90	0	0			0.0%	0.013	0.000	0.013	0.500	0.007	0.000	0.0067
ND-W-059	5411605	472268	2	1.49	298	298	0	0			0.0%	0.044	0.000	0.044	0.500	0.022	0.000	0.0222
ND-W-059	5411303	471757	3	4.4	217	217	0	0			0.0%	0.095	0.000	0.095	1.000	0.095	0.000	0.0955
ND-W-059	5411314	471973	3	4.4	123	123	0	0			0.0%	0.054	0.000	0.054	1.000	0.054	0.000	0.0543
ND-W-059	5411778	472380	2	1.49	111	111	0	0			0.0%	0.016	0.000	0.016	0.500	0.008	0.000	0.0082
ND-W-059	5411843	472485	2	1.49	35	35	0	0			0.0%	0.005	0.000	0.005	0.500	0.003	0.000	0.0026
ND-W-059	5411955	472582	2	1.49	3	3	0	0			0.0%	0.000	0.000	0.000	0.500	0.000	0.000	0.0002
ND-W-059	5412370	472966	1	0.28	142	142	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-060	5412368	472859	1	0.28	93	93	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-061	5412248	472591	1	0.28	54	54	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-062	5412245	472650	1	0.28	59	59	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-063	5412328	472699	1	0.28	239	239	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0017
ND-W-064	5412186	472923	1	0.28	108	108	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
ND-W-065	5412074	472929	1	0.28	167	167	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0012
ND-W-066	5412034	472813	1	0.28	51	51	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0004
ND-W-066	5411844	472867	1	0.28	68	68	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
ND-W-067	5412081	472595	1	0.28	79	79	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-068	5411453	472498	1	0.28	82	82	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-068	5411643	472510	1	0.28	308	308	0	0			0.0%	0.009	0.000	0.009	0.250	0.002	0.000	0.0022

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-069	5411488	472115	1	0.28	57	57	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-070	5411480	472087	1	0.28	73	73	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
ND-W-071	5411460	472070	1	0.28	55	55	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-072	5411416	472170	1	0.28	69	69	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
ND-W-073	5411321	472195	1	0.28	62	62	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-074	5411287	472148	1	0.28	45	45	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-075	5411236	472149	1	0.28	53	53	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0004
ND-W-076	5411211	472149	1	0.28	36	36	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-077	5411178	472140	1	0.28	30	30	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
ND-W-077	5411178	472140	2	1.49	83	83	0	0			0.0%	0.012	0.000	0.012	0.500	0.006	0.000	0.0062
ND-W-077	5411259	472127	2	1.49	23	23	0	0			0.0%	0.003	0.000	0.003	0.500	0.002	0.000	0.0017
ND-W-078	5411494	471956	1	0.28	169	169	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0012
ND-W-079	5411424	471869	2	1.49	189	189	0	0			0.0%	0.028	0.000	0.028	0.500	0.014	0.000	0.0141
ND-W-079	5411590	471887	1	0.28	147	147	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-080	5411331	471854	1	0.28	36	36	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-081	5411334	472825	2	1.49	100	100	0	0			0.0%	0.015	0.000	0.015	0.500	0.007	0.000	0.0074
ND-W-081	5410770	472380	2	1.49	333	0	333	0			0.0%	0.000	0.050	0.050	0.500	0.000	0.025	0.0248
ND-W-081	5410992	471923	2	1.49	243	243	0	0			0.0%	0.036	0.000	0.036	0.500	0.018	0.000	0.0181
ND-W-081	5411121	472602	2	1.49	845	845	0	0			0.0%	0.126	0.000	0.126	0.500	0.063	0.000	0.0629
ND-W-081	5411475	472965	1	0.28	81	81	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-081	5410743	472211	2	1.49	74	74	0	0			0.0%	0.011	0.000	0.011	0.500	0.006	0.000	0.0055
ND-W-081	5410772	472160	1	0.28	28	28	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
ND-W-081	5410900	472032	2	1.49	36	36	0	0			0.0%	0.005	0.000	0.005	0.500	0.003	0.000	0.0027
ND-W-082	5411527	472854	1	0.28	75	75	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
ND-W-083	5410805	472565	1	0.28	92	92	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0006
ND-W-084	5410828	472174	1	0.28	77	77	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-085	5410877	472140	1	0.28	58	58	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-086	5410897	472142	1	0.28	58	58	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-087	5410789	471953	1	0.28	206	36	170	0			0.0%	0.001	0.005	0.006	0.250	0.000	0.001	0.0014
ND-W-087	5410815	471822	1	0.28	191	191	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
ND-W-089	5410642	471236	1	0.28	113	113	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
ND-W-090	5410448	471256	1	0.28	182	182	182	0			0.0%	0.005	0.005	0.010	0.250	0.001	0.001	0.0025
ND-W-091	5410262	471339	1	0.28	163	163	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0011
ND-W-091	5410229	471213	1	0.28	72	72	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
ND-W-092	5408252	470312	1	0.28	147	147	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-092	5409088	470753	2	1.49	1244	1244	0	0			0.0%	0.185	0.000	0.185	0.500	0.093	0.000	0.0927
ND-W-092	5408621	470305	2	1.49	378	378	0	0			0.0%	0.056	0.000	0.056	0.500	0.028	0.000	0.0282
ND-W-092	5409625	471148	2	1.49	267	267	0	0			0.0%	0.040	0.000	0.040	0.500	0.020	0.000	0.0199
ND-W-092	5410090	471523	2	1.49	206	206	0	0			0.0%	0.031	0.000	0.031	0.500	0.015	0.000	0.0153
ND-W-092	5410047	471417	2	1.49	16	16	0	0			0.0%	0.002	0.000	0.002	0.500	0.001	0.000	0.0012
ND-W-092	5409997	471371	2	1.49	6	6	0	0			0.0%	0.001	0.000	0.001	0.500	0.000	0.000	0.0005
ND-W-092	5409872	471325	2	1.49	40	40	0	0			0.0%	0.006	0.000	0.006	0.500	0.003	0.000	0.0030
ND-W-093	5408430	470228	1	0.28	49	49	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-094	5408736	470258	1	0.28	126	126	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-095	5408734	470158	2	1.49	213	213	0	0			0.0%	0.032	0.000	0.032	0.500	0.016	0.000	0.0158
ND-W-095	5408655	470034	2	1.49	13	13	0	0			0.0%	0.002	0.000	0.002	0.500	0.001	0.000	0.0010
ND-W-096	5408514	469938	1	0.28	101	101	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-096	5408564	469962	1	0.28	23	23	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
ND-W-097	5408625	469913	1	0.28	96	96	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-098	5408837	470261	1	0.28	76	76	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
ND-W-098	5408868	470219	1	0.28	96	96	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-099	5408882	470259	1	0.28	60	60	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-100	5408830	470320	1	0.28	76	76	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
ND-W-101	5408886	470325	1	0.28	93	93	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-102	5409238	470840	1	0.28	111	111	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
ND-W-103	5409092	470797	1	0.28	127	127	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-104	5409703	471136	1	0.28	130	130	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-105	5409796	471154	1	0.28	180	180	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
ND-W-106	5409865	471135	1	0.28	232	232	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0016
ND-W-107	5410100	471261	1	0.28	104	104	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-108	5410173	471825	1	0.28	193	193	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
ND-W-108	5410115	471724	2	1.49	103	103	0	0			0.0%	0.015	0.000	0.015	0.500	0.008	0.000	0.0077
ND-W-109	5410122	471858	1	0.28	178	178	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0012
ND-W-110	5409938	471880	1	0.28	373	374	0	0			0.0%	0.010	0.000	0.010	0.250	0.003	0.000	0.0026
ND-W-111	5409369	471759	1	0.28	72	0	72	0			0.0%	0.000	0.002	0.002	0.250	0.000	0.001	0.0005
ND-W-111	5409447	471804	1	0.28	77	0	77	0			0.0%	0.000	0.002	0.002	0.250	0.000	0.001	0.0005
ND-W-112	5409523	472408	1	0.28	869	0	869	0			0.0%	0.000	0.024	0.024	0.250	0.000	0.006	0.0061
ND-W-112	5409473	471955	2	1.49	69	0	69	0			0.0%	0.000	0.010	0.010	0.500	0.000	0.005	0.0051
ND-W-112	5409492	472023	2	1.49	70	0	70	0			0.0%	0.000	0.010	0.010	0.500	0.000	0.005	0.0052
ND-W-113	5409419	472107	1	0.28	190	0	190	0			0.0%	0.000	0.005	0.005	0.250	0.000	0.001	0.0013
ND-W-114	5409052	472431	2	1.49	557	0	557	0			0.0%	0.000	0.083	0.083	0.500	0.000	0.041	0.0415
ND-W-114	5409053	472684	1	0.28	58	0	58	0			0.0%	0.000	0.002	0.002	0.250	0.000	0.000	0.0004
ND-W-114	5409049	472139	2	1.49	77	0	77	0			0.0%	0.000	0.011	0.011	0.500	0.000	0.006	0.0057
ND-W-115	5409103	472687	1	0.28	45	0	45	0			0.0%	0.000	0.001	0.001	0.250	0.000	0.000	0.0003
ND-W-116	5408981	472252	1	0.28	196	0	196	0			0.0%	0.000	0.005	0.005	0.250	0.000	0.001	0.0014
ND-W-117	5409090	472181	1	0.28	204	0	204	0			0.0%	0.000	0.006	0.006	0.250	0.000	0.001	0.0014
ND-W-117	5409065	472062	2	1.49	94	0	94	0			0.0%	0.000	0.014	0.014	0.500	0.000	0.007	0.0070
ND-W-118	5409130	471794	1	0.28	411	0	411	0			0.0%	0.000	0.011	0.011	0.250	0.000	0.003	0.0029

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-118	5409038	471963	2	1.49	112	0	112	0			0.0%	0.000	0.017	0.017	0.500	0.000	0.008	0.0083
ND-W-119	5409030	471818	1	0.28	204	0	204	0			0.0%	0.000	0.006	0.006	0.250	0.000	0.001	0.0014
ND-W-120	5408986	471937	1	0.28	108	0	108	0			0.0%	0.000	0.003	0.003	0.250	0.000	0.001	0.0008
ND-W-121	5408796	471972	1	0.28	149	0	149	0			0.0%	0.000	0.004	0.004	0.250	0.000	0.001	0.0010
ND-W-122	5408607	472233	1	0.28	250	0	250	0			0.0%	0.000	0.007	0.007	0.250	0.000	0.002	0.0017
ND-W-123	5408130	472130	1	0.28	170	0	170	0			0.0%	0.000	0.005	0.005	0.250	0.000	0.001	0.0012
ND-W-124	5406887	471903	1	0.28	111	111	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
ND-W-124	5406958	471883	2	1.49	48	48	0	0			0.0%	0.007	0.000	0.007	0.500	0.004	0.000	0.0035
ND-W-125	5406926	471924	1	0.28	78	78	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
ND-W-126	5406848	471621	1	0.28	123	123	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0009
ND-W-127	5406721	471688	1	0.28	62	62	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-128	5406613	471484	1	0.28	79	0	0	79	31%	55%	43.1%	0.000	0.001	0.001	0.250	0.000	0.000	0.0002
ND-W-128	5406680	471480	1	0.28	9	0	0	9	74%	74%	73.6%	0.000	0.000	0.000	0.250	0.000	0.000	0.0000
ND-W-130	5406865	471201	1	0.28	259	0	259	0			0.0%	0.000	0.007	0.007	0.250	0.000	0.002	0.0018
ND-W-135	5406813	469957	1	0.28	153	0	153	0			0.0%	0.000	0.004	0.004	0.250	0.000	0.001	0.0011
ND-W-135	5406873	470092	2	1.49	1	0	1	0			0.0%	0.000	0.000	0.000	0.500	0.000	0.000	0.0001
ND-W-136	5406855	470006	1	0.28	51	0	51	0			0.0%	0.000	0.001	0.001	0.250	0.000	0.000	0.0004
ND-W-137	5406984	469957	1	0.28	28	0	28	0			0.0%	0.000	0.001	0.001	0.250	0.000	0.000	0.0002
ND-W-137	5406993	469987	1	0.28	37	0	37	0			0.0%	0.000	0.001	0.001	0.250	0.000	0.000	0.0003
ND-W-138	5407112	469987	1	0.28	98	0	98	0			0.0%	0.000	0.003	0.003	0.250	0.000	0.001	0.0007
ND-W-138	5406916	470235	2	1.49	111	0	111	0			0.0%	0.000	0.017	0.017	0.500	0.000	0.008	0.0083
ND-W-138	5407051	470016	1	0.28	64	0	64	0			0.0%	0.000	0.002	0.002	0.250	0.000	0.000	0.0005
ND-W-138	5406874	470393	2	1.49	25	0	25	0			0.0%	0.000	0.004	0.004	0.500	0.000	0.002	0.0019
ND-W-138	5406995	470060	2	1.49	40	0	40	0			0.0%	0.000	0.006	0.006	0.500	0.000	0.003	0.0030
ND-W-138	5406857	470354	2	1.49	63	0	63	0			0.0%	0.000	0.009	0.009	0.500	0.000	0.005	0.0047
ND-W-152	5405273	473234	2	1.49	339	339	0	0			0.0%	0.050	0.000	0.050	0.500	0.025	0.000	0.0252

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-152	5406069	472726	3	4.4	659	659	0	0			0.0%	0.290	0.000	0.290	1.000	0.290	0.000	0.2900
ND-W-152	5406824	472324	3	4.4	537	537	0	0			0.0%	0.236	0.000	0.236	1.000	0.236	0.000	0.2361
ND-W-152	5403032	474314	2	1.49	205	205	0	0			0.0%	0.031	0.000	0.031	0.500	0.015	0.000	0.0153
ND-W-152	5405620	472958	2	1.49	663	663	0	0			0.0%	0.099	0.000	0.099	0.500	0.049	0.000	0.0494
ND-W-152	5404575	473466	2	1.49	1234	1234	0	0			0.0%	0.184	0.000	0.184	0.500	0.092	0.000	0.0919
ND-W-152	5403580	473878	2	1.49	1761	1761	0	0			0.0%	0.262	0.000	0.262	0.500	0.131	0.000	0.1312
ND-W-152	5402799	474264	1	0.28	125	125	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-152	5405104	473374	2	1.49	156	156	0	0			0.0%	0.023	0.000	0.023	0.500	0.012	0.000	0.0116
ND-W-153	5402825	474251	1	0.28	46	46	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-154	5403148	474369	1	0.28	79	79	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-155	5403127	474215	1	0.28	58	58	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-156	5404944	473568	2	1.49	353	353	0	0			0.0%	0.053	0.000	0.053	0.500	0.026	0.000	0.0263
ND-W-156	5403151	474224	1	0.28	64	64	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-157	5404603	474015	1	0.28	880	880	0	0			0.0%	0.025	0.000	0.025	0.250	0.006	0.000	0.0062
ND-W-157	5404209	474706	1	0.28	1330	1330	0	0			0.0%	0.037	0.000	0.037	0.250	0.009	0.000	0.0093
ND-W-157	5404844	473743	1	0.28	75	75	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
ND-W-158	5404506	473029	1	0.28	101	101	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-158	5405459	472723	1	0.28	149	149	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-158	5405459	472723	2	1.49	402	402	0	0			0.0%	0.060	0.000	0.060	0.500	0.030	0.000	0.0300
ND-W-158	5403546	473412	1	0.28	2519	2519	0	0			0.0%	0.071	0.000	0.071	0.250	0.018	0.000	0.0176
ND-W-158	5405106	472746	2	1.49	474	474	0	0			0.0%	0.071	0.000	0.071	0.500	0.035	0.000	0.0353
ND-W-158	5404738	472955	2	1.49	469	469	0	0			0.0%	0.070	0.000	0.070	0.500	0.035	0.000	0.0349
ND-W-158	5405799	472795	2	1.49	144	144	0	0			0.0%	0.021	0.000	0.021	0.500	0.011	0.000	0.0107
ND-W-159	5404109	473026	1	0.28	843	843	0	0			0.0%	0.024	0.000	0.024	0.250	0.006	0.000	0.0059
ND-W-160	5406865	472523	1	0.28	155	155	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0011
ND-W-161	5407045	472522	1	0.28	155	155	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0011

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-162	5406341	472947	1	0.28	762	762	0	0			0.0%	0.021	0.000	0.021	0.250	0.005	0.000	0.0053
ND-W-163	5405989	473878	1	0.28	283	283	0	0			0.0%	0.008	0.000	0.008	0.250	0.002	0.000	0.0020
ND-W-163	5406275	473595	2	1.49	486	486	0	0			0.0%	0.072	0.000	0.072	0.500	0.036	0.000	0.0362
ND-W-163	5406573	473178	3	4.4	95	95	0	0			0.0%	0.042	0.000	0.042	1.000	0.042	0.000	0.0418
ND-W-163	5406366	473432	3	4.4	17	17	0	0			0.0%	0.007	0.000	0.007	1.000	0.007	0.000	0.0075
ND-W-163	5406407	473394	3	4.4	104	104	0	0			0.0%	0.046	0.000	0.046	1.000	0.046	0.000	0.0456
ND-W-163	5406533	473198	3	4.4	20	20	0	0			0.0%	0.009	0.000	0.009	1.000	0.009	0.000	0.0086
ND-W-163	5406723	473142	3	4.4	254	254	0	0			0.0%	0.112	0.000	0.112	1.000	0.112	0.000	0.1116
ND-W-163	5407001	472942	3	4.4	134	134	0	0			0.0%	0.059	0.000	0.059	1.000	0.059	0.000	0.0588
ND-W-164	5406113	473854	1	0.28	85	85	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-165	5406186	473963	1	0.28	131	131	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-166	5406272	473912	1	0.28	135	135	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-166	5406179	473881	2	1.49	121	121	0	0			0.0%	0.018	0.000	0.018	0.500	0.009	0.000	0.0090
ND-W-167	5406450	473613	1	0.28	83	83	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-167	5406391	473521	2	1.49	208	208	0	0			0.0%	0.031	0.000	0.031	0.500	0.015	0.000	0.0155
ND-W-168	5406402	473621	1	0.28	44	44	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-169	5406374	473244	1	0.28	94	94	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-170	5406651	473135	1	0.28	49	49	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-171	5407343	473487	1	0.28	281	0	281	0			0.0%	0.000	0.008	0.008	0.250	0.000	0.002	0.0020
ND-W-172	5408338	473836	1	0.28	1241	0	1241	0			0.0%	0.000	0.035	0.035	0.250	0.000	0.009	0.0087
ND-W-173	5407246	474544	1	0.28	338	0	338	0			0.0%	0.000	0.009	0.009	0.250	0.000	0.002	0.0024
ND-W-174	5406537	475127	1	0.28	127	127	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-175	5406414	475163	3	4.4	520	520	0	0			0.0%	0.229	0.000	0.229	1.000	0.229	0.000	0.2288
ND-W-175	5405600	475121	1	0.28	1663	1663	0	0			0.0%	0.047	0.000	0.047	0.250	0.012	0.000	0.0116
ND-W-175	5406431	474742	1	0.28	173	173	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0012
ND-W-175	5406425	474867	2	1.49	75	75	0	0			0.0%	0.011	0.000	0.011	0.500	0.006	0.000	0.0056

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-177	5405664	475144	1	0.28	1678	1678	0	0			0.0%	0.047	0.000	0.047	0.250	0.012	0.000	0.0117
ND-W-179	5406269	474897	1	0.28	237	237	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0017
ND-W-180	5406356	474804	1	0.28	156	156	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0011
ND-W-181	5406389	474889	1	0.28	95	95	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-182	5406340	474939	1	0.28	101	101	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-182	5406403	474908	2	1.49	44	44	0	0			0.0%	0.007	0.000	0.007	0.500	0.003	0.000	0.0033
ND-W-183	5406449	474897	1	0.28	844	844	0	0			0.0%	0.024	0.000	0.024	0.250	0.006	0.000	0.0059
ND-W-184	5406290	475270	1	0.28	259	259	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0018
ND-W-185	5406533	475595	2	1.49	361	361	0	0			0.0%	0.054	0.000	0.054	0.500	0.027	0.000	0.0269
ND-W-185	5406699	475671	1	0.28	70	70	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
ND-W-186	5406692	475625	1	0.28	46	46	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-187	5406309	475639	1	0.28	172	172	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0012
ND-W-188	5406050	475834	1	0.28	222	222	0	0			0.0%	0.006	0.000	0.006	0.250	0.002	0.000	0.0016
ND-W-189	5405844	475604	1	0.28	178	178	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0012
ND-W-190	5405758	475693	1	0.28	149	149	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-191	5405648	475864	1	0.28	135	135	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-193	5404822	476781	1	0.28	465	358	107	0			0.0%	0.010	0.003	0.013	0.250	0.003	0.001	0.0033
ND-W-194	5404493	476779	1	0.28	149	149	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-194	5404510	476806	1	0.28	2	2	0	0			0.0%	0.000	0.000	0.000	0.250	0.000	0.000	0.0000
ND-W-195	5404227	476901	1	0.28	93	93	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-196	5403098	476967	2	1.49	369	187	0	0			0.0%	0.028	0.000	0.028	0.500	0.014	0.000	0.0139
ND-W-198	5403097	475731	1	0.28	168	168	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0012
ND-W-199	5403265	476014	2	1.49	289	289	0	0			0.0%	0.043	0.000	0.043	0.500	0.022	0.000	0.0215
ND-W-199	5403720	476387	2	1.49	896	896	0	0			0.0%	0.134	0.000	0.134	0.500	0.067	0.000	0.0668
ND-W-199	5402894	476013	1	0.28	149	149	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-199	5403382	476078	2	1.49	10	10	0	0			0.0%	0.001	0.000	0.001	0.500	0.001	0.000	0.0007

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-199	5403400	476096	2	1.49	20	20	0	0			0.0%	0.003	0.000	0.003	0.500	0.002	0.000	0.0015
ND-W-199	5402975	475980	1	0.28	14	14	0	0			0.0%	0.000	0.000	0.000	0.250	0.000	0.000	0.0001
ND-W-199	5402975	475980	1	0.28	35	35	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
ND-W-200	5403568	476000	1	0.28	65	65	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
ND-W-201	5403491	476065	1	0.28	48	48	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
ND-W-202	5403462	476504	1	0.28	88	88	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-205	5416328	471963	1	0.28	357	144	0	214	100%	100%	100.0%	0.004	0.006	0.010	0.250	0.001	0.001	0.0025
ND-W-206	5416147	471958	1	0.28	718	463	0	255	100%	100%	100.0%	0.013	0.007	0.020	0.250	0.003	0.002	0.0050
ND-W-209	5414189	471050	1	0.28	336	336	0	0			0.0%	0.009	0.000	0.009	0.250	0.002	0.000	0.0024
ND-W-210	5415012	472203	1	0.28	129	129	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-211	5415352	471999	1	0.28	192	192	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
ND-W-229	5412480	470862	1	0.28	80	80	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-229	5412480	470862	2	1.49	28	28	0	0			0.0%	0.004	0.000	0.004	0.500	0.002	0.000	0.0021
ND-W-230	5412467	470841	1	0.28	80	80	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-231	5411254	470731	1	0.28	128	128	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
ND-W-232	5411233	470812	1	0.28	140	140	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
ND-W-233	5411280	470837	1	0.28	186	186	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
ND-W-237	5404922	472909	1	0.28	87	87	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
ND-W-237	5404855	472868	1	0.28	102	102	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-238	5408673	472923	1	0.28	374	0	374	0			0.0%	0.000	0.010	0.010	0.250	0.000	0.003	0.0026
ND-W-239	5407966	473881	1	0.28	488	0	488	0			0.0%	0.000	0.014	0.014	0.250	0.000	0.003	0.0034
ND-W-241	5403562	476019	1	0.28	53	53	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0004
ND-W-242	5403585	475990	1	0.28	33	33	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
ND-W-243	5403582	475976	1	0.28	100	100	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
ND-W-244	5403591	475952	1	0.28	54	54	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
ND-W-249	5411528	469757	1	0.28	24	0	24	0			0.0%	0.000	0.001	0.001	0.250	0.000	0.000	0.0002

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
ND-W-250	5410579	469601	1	0.28	28	0	28	0			0.0%	0.000	0.001	0.001	0.250	0.000	0.000	0.0002
ND-W-252	5412411	471397	1	0.28	179	179	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
North Driftwood River	5412318	470278	4	9.26	774	357	417	0			0.0%	0.330	0.386	0.717	2.000	0.660	0.773	1.4332
North Driftwood River	5410865	471561	4	9.26	761	0	761	0			0.0%	0.000	0.705	0.705	2.000	0.000	1.410	1.4098
North Driftwood River	5417784	470495	4	9.26	641	641	0	0			0.0%	0.594	0.000	0.594	2.000	1.188	0.000	1.1876
North Driftwood River	5408477	472074	4	9.26	4159	760	3398	0			0.0%	0.704	3.147	3.851	2.000	1.408	6.294	7.7022
North Driftwood River	5411745	470992	4	9.26	610	610	0	0			0.0%	0.565	0.000	0.565	2.000	1.130	0.000	1.1304
North Driftwood River	5410548	471381	4	9.26	867	867	0	0			0.0%	0.803	0.000	0.803	2.000	1.606	0.000	1.6060
North Driftwood River	5412221	470582	4	9.26	821	821	0	0			0.0%	0.760	0.000	0.760	2.000	1.520	0.000	1.5204
North Driftwood River	5411167	471708	4	9.26	556	556	0	0			0.0%	0.514	0.000	0.514	2.000	1.029	0.000	1.0290
North Driftwood River	5412460	470423	4	9.26	223	223	0	0			0.0%	0.207	0.000	0.207	2.000	0.413	0.000	0.4132
North Driftwood River	5410986	471757	4	9.26	201	144	58	0			0.0%	0.133	0.053	0.186	2.000	0.266	0.107	0.3725
North Driftwood River	5411930	470752	4	9.26	171	171	0	0			0.0%	0.158	0.000	0.158	2.000	0.316	0.000	0.3159
North Driftwood River	5411467	471393	4	9.26	777	777	0	0			0.0%	0.719	0.000	0.719	2.000	1.438	0.000	1.4381

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
North Driftwood R	5406816	471507	3	4.4	10	10	0	0			0.0%	0.004	0.000	0.004	1.000	0.004	0.000	0.0044
WB-161	5416727	473742	2	1.49	56	56	0	0			0.0%	0.008	0.000	0.008	0.500	0.004	0.000	0.0042
WB-W-096	5407133	477406	1	0.28	506	0	0	506	23%	17%	20.3%	0.000	0.003	0.003	0.250	0.000	0.001	0.0007
WB-W-097	5407382	477048	1	0.28	689	362	0	327	83%	83%	83.4%	0.010	0.008	0.018	0.250	0.003	0.002	0.0044
WB-W-097	5407400	477572	2	1.49	134	0	0	1334	60%	60%	60.0%	0.000	0.119	0.119	0.500	0.000	0.060	0.0596
WB-W-098	5407864	477293	1	0.28	344	0	0	344	75%	60%	67.1%	0.000	0.006	0.006	0.250	0.000	0.002	0.0016
WB-W-106	5408321	476366	2	1.49	1801	1801	0	0			0.0%	0.268	0.000	0.268	0.500	0.134	0.000	0.1342
WB-W-106	5408910	477188	3	4.4	418	0	418	0			0.0%	0.000	0.184	0.184	1.000	0.000	0.184	0.1838
WB-W-106	5407665	475763	1	0.28	76	76	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
WB-W-106	5408796	476987	2	1.49	39	0	39	0			0.0%	0.000	0.006	0.006	0.500	0.000	0.003	0.0029
WB-W-107	5408786	477108	1	0.28	189	0	96	94	18%	36%	27.0%	0.000	0.003	0.003	0.250	0.000	0.001	0.0008
WB-W-108	5408822	476880	1	0.28	80	80	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
WB-W-108	5408843	476972	2	1.49	9	0	9	0			0.0%	0.000	0.001	0.001	0.500	0.000	0.001	0.0006
WB-W-109	5410239	475315	1	0.28	94	0	94	0			0.0%	0.000	0.003	0.003	0.250	0.000	0.001	0.0007
WB-W-109	5410228	475395	1	0.28	78	0	78	0			0.0%	0.000	0.002	0.002	0.250	0.000	0.001	0.0005
WB-W-110	5409213	477140	1	0.28	426	0	0	426	97%	61%	79.1%	0.000	0.009	0.009	0.250	0.000	0.002	0.0024
WB-W-110	5409153	476887	1	0.28	100	0	100	0			0.0%	0.000	0.003	0.003	0.250	0.000	0.001	0.0007
WB-W-112	5409835	477071	1	0.28	103	0	0	103	47%	39%	43.3%	0.000	0.001	0.001	0.250	0.000	0.000	0.0003
WB-W-122	5412423	473990	1	0.28	1008	1008	0	0			0.0%	0.028	0.000	0.028	0.250	0.007	0.000	0.0071
WB-W-122	5412177	474682	2	1.49	111	111	0	0			0.0%	0.017	0.000	0.017	0.500	0.008	0.000	0.0083
WB-W-122	5412016	475323	2	1.49	190	190	0	0			0.0%	0.028	0.000	0.028	0.500	0.014	0.000	0.0141
WB-W-122	5412115	475006	2	1.49	160	160	0	0			0.0%	0.024	0.000	0.024	0.500	0.012	0.000	0.0119
WB-W-122	5412737	476501	3	4.4	343	0	21	322	100%	100%	100.0%	0.000	0.151	0.151	1.000	0.000	0.151	0.1510
WB-W-122	5412240	476241	3	4.4	475	475	0	0			0.0%	0.209	0.000	0.209	1.000	0.209	0.000	0.2088
WB-W-122	5412134	475995	3	4.4	167	167	0	0			0.0%	0.073	0.000	0.073	1.000	0.073	0.000	0.0734
WB-W-122	5412680	476209	3	4.4	205	205	0	0			0.0%	0.090	0.000	0.090	1.000	0.090	0.000	0.0900

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
WB-W-122	5412225	474596	2	1.49	94	94	0	0			0.0%	0.014	0.000	0.014	0.500	0.007	0.000	0.0070
WB-W-122	5412369	474454	2	1.49	22	22	0	0			0.0%	0.003	0.000	0.003	0.500	0.002	0.000	0.0016
WB-W-122	5412026	475476	3	4.4	176	176	0	0			0.0%	0.077	0.000	0.077	1.000	0.077	0.000	0.0772
WB-W-122	5412158	475698	3	4.4	91	91	0	0			0.0%	0.040	0.000	0.040	1.000	0.040	0.000	0.0398
WB-W-122	5412743	476263	3	4.4	10	10	0	0			0.0%	0.005	0.000	0.005	1.000	0.005	0.000	0.0046
WB-W-123	5412453	474382	1	0.28	194	194	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0014
WB-W-124	5412710	474604	1	0.28	122	122	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0009
WB-W-124	5412399	474623	1	0.28	2	2	0	0			0.0%	0.000	0.000	0.000	0.250	0.000	0.000	0.0000
WB-W-124	5412246	474622	1	0.28	79	79	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
WB-W-125	5411956	475858	1	0.28	237	237	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0017
WB-W-126	5412168	475569	1	0.28	92	92	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0006
WB-W-127	5412203	475603	1	0.28	47	47	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
WB-W-128	5412054	475685	2	1.49	46	46	0	0			0.0%	0.007	0.000	0.007	0.500	0.003	0.000	0.0034
WB-W-128	5412018	475670	1	0.28	35	35	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
WB-W-129	5412026	475656	1	0.28	37	37	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
WB-W-130	5412032	475708	1	0.28	58	58	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
WB-W-131	5410891	474572	1	0.28	319	213	105	0			0.0%	0.006	0.003	0.009	0.250	0.001	0.001	0.0022
WB-W-131	5411532	474628	3	4.4	184	184	0	0			0.0%	0.081	0.000	0.081	1.000	0.081	0.000	0.0811
WB-W-131	5411870	475361	3	4.4	140	140	0	0			0.0%	0.062	0.000	0.062	1.000	0.062	0.000	0.0616
WB-W-131	5411418	474537	3	4.4	136	136	0	0			0.0%	0.060	0.000	0.060	1.000	0.060	0.000	0.0596
WB-W-131	5411529	475053	3	4.4	351	351	0	0			0.0%	0.154	0.000	0.154	1.000	0.154	0.000	0.1544
WB-W-131	5411666	475347	3	4.4	223	23	0	0			0.0%	0.010	0.000	0.010	1.000	0.010	0.000	0.0100
WB-W-131	5411973	475385	3	4.4	50	50	0	0			0.0%	0.022	0.000	0.022	1.000	0.022	0.000	0.0219
WB-W-132	5411064	474582	1	0.28	73	73	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
WB-W-133	5411155	474343	1	0.28	160	160	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0011
WB-W-134	5411109	474338	1	0.28	79	79	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
WB-W-134	5411132	474398	2	1.49	79	79	0	0			0.0%	0.012	0.000	0.012	0.500	0.006	0.000	0.0059
WB-W-135	5411092	474385	1	0.28	61	61	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
WB-W-136	5411612	474610	1	0.28	137	137	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
WB-W-137	5410013	475887	2	1.49	179	0	179	0			0.0%	0.000	0.027	0.027	0.500	0.000	0.013	0.0134
WB-W-137	5411154	476104	2	1.49	1170	705	465	0			0.0%	0.105	0.069	0.174	0.500	0.053	0.035	0.0872
WB-W-137	5410262	476162	2	1.49	48	0	48	0			0.0%	0.000	0.007	0.007	0.500	0.000	0.004	0.0036
WB-W-137	5412060	476042	2	1.49	168	168	0	0			0.0%	0.025	0.000	0.025	0.500	0.013	0.000	0.0125
WB-W-137	5411687	475979	2	1.49	129	129	0	0			0.0%	0.019	0.000	0.019	0.500	0.010	0.000	0.0096
WB-W-137	5410177	476032	2	1.49	270	0	270	0			0.0%	0.000	0.040	0.040	0.500	0.000	0.020	0.0201
WB-W-137	5409857	475858	1	0.28	156	0	156	0			0.0%	0.000	0.004	0.004	0.250	0.000	0.001	0.0011
WB-W-137	5410280	476178	2	1.49	1	0	1	0			0.0%	0.000	0.000	0.000	0.500	0.000	0.000	0.0001
WB-W-138	5409935	475778	1	0.28	132	0	132	0			0.0%	0.000	0.004	0.004	0.250	0.000	0.001	0.0009
WB-W-139	5410183	476209	1	0.28	229	0	229	0			0.0%	0.000	0.006	0.006	0.250	0.000	0.002	0.0016
WB-W-140	5413382	475340	2	1.49	312	312	0	0			0.0%	0.047	0.000	0.047	0.500	0.023	0.000	0.0233
WB-W-140	5412819	476205	3	4.4	229	229	0	0			0.0%	0.101	0.000	0.101	1.000	0.101	0.000	0.1008
WB-W-140	5413125	475619	3	4.4	428	428	0	0			0.0%	0.188	0.000	0.188	1.000	0.188	0.000	0.1882
WB-W-140	5414013	474360	1	0.28	68	68	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
WB-W-140	5412992	475861	3	4.4	100	100	0	0			0.0%	0.044	0.000	0.044	1.000	0.044	0.000	0.0442
WB-W-140	5413264	475320	2	1.49	161	161	0	0			0.0%	0.024	0.000	0.024	0.500	0.012	0.000	0.0120
WB-W-140	5413689	475054	1	0.28	394	394	0	0			0.0%	0.011	0.000	0.011	0.250	0.003	0.000	0.0028
WB-W-140	5413817	474782	1	0.28	171	171	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0012
WB-W-140	5413838	474665	1	0.28	60	60	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
WB-W-140	5413869	474572	1	0.28	38	38	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
WB-W-140	5413905	474524	1	0.28	81	81	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
WB-W-140	5413956	474430	1	0.28	54	54	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
WB-W-140	5413994	474398	1	0.28	5	5	0	0			0.0%	0.000	0.000	0.000	0.250	0.000	0.000	0.0000

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
WB-W-141	5413586	474776	2	1.49	204	204	0	0			0.0%	0.030	0.000	0.030	0.500	0.015	0.000	0.0152
WB-W-141	5413735	474465	1	0.28	441	441	0	0			0.0%	0.012	0.000	0.012	0.250	0.003	0.000	0.0031
WB-W-141	5413491	475009	2	1.49	272	272	0	0			0.0%	0.041	0.000	0.041	0.500	0.020	0.000	0.0203
WB-W-141	5413623	474649	2	1.49	24	24	0	0			0.0%	0.004	0.000	0.004	0.500	0.002	0.000	0.0018
WB-W-142	5413612	474594	1	0.28	92	92	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0006
WB-W-143	5413526	474822	1	0.28	108	108	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
WB-W-144	5413494	474732	1	0.28	262	262	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0018
WB-W-145	5413184	474946	1	0.28	349	349	0	0			0.0%	0.010	0.000	0.010	0.250	0.002	0.000	0.0024
WB-W-145	5413203	474727	1	0.28	106	106	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
WB-W-145	5413225	474631	1	0.28	15	15	0	0			0.0%	0.000	0.000	0.000	0.250	0.000	0.000	0.0001
WB-W-146	5413277	475092	1	0.28	113	113	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
WB-W-147	5416344	475011	3	4.4	412	412	0	0			0.0%	0.181	0.000	0.181	1.000	0.181	0.000	0.1814
WB-W-147	5416549	474638	3	4.4	267	267	0	0			0.0%	0.117	0.000	0.117	1.000	0.117	0.000	0.1175
WB-W-147	5416972	473548	2	1.49	732	732	0	0			0.0%	0.109	0.000	0.109	0.500	0.055	0.000	0.0545
WB-W-147	5416471	474819	3	4.4	201	201	0	0			0.0%	0.089	0.000	0.089	1.000	0.089	0.000	0.0887
WB-W-147	5414206	476082	3	4.4	483	483	0	0			0.0%	0.213	0.000	0.213	1.000	0.213	0.000	0.2127
WB-W-147	5415398	475689	3	4.4	984	984	0	0			0.0%	0.433	0.000	0.433	1.000	0.433	0.000	0.4329
WB-W-147	5413455	476657	3	4.4	601	0	0	601	78%	78%	78.2%	0.000	0.207	0.207	1.000	0.000	0.207	0.2065
WB-W-147	5415868	475139	3	4.4	948	948	0	0			0.0%	0.417	0.000	0.417	1.000	0.417	0.000	0.4173
WB-W-147	5414463	475991	3	4.4	20	20	0	0			0.0%	0.009	0.000	0.009	1.000	0.009	0.000	0.0088
WB-W-147	5414600	475870	3	4.4	229	229	0	0			0.0%	0.101	0.000	0.101	1.000	0.101	0.000	0.1007
WB-W-147	5414900	475839	3	4.4	527	527	0	0			0.0%	0.232	0.000	0.232	1.000	0.232	0.000	0.2317
WB-W-147	5416698	474459	3	4.4	52	53	0	0			0.0%	0.023	0.000	0.023	1.000	0.023	0.000	0.0233
WB-W-147	5413981	476188	3	4.4	168	168	0	0			0.0%	0.074	0.000	0.074	1.000	0.074	0.000	0.0740
WB-W-147	5417265	472898	1	0.28	637		637	0			0.0%	0.000	0.018	0.018	0.250	0.000	0.004	0.0045
WB-W-147	5416724	474048	3	4.4	530	530	0	0			0.0%	0.233	0.000	0.233	1.000	0.233	0.000	0.2332

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
WB-W-147	5416978	473149	2	1.49	198	198	0	0			0.0%	0.030	0.000	0.030	0.500	0.015	0.000	0.0148
WB-W-147	5413763	476333	3	4.4	532	532	0	0			0.0%	0.234	0.000	0.234	1.000	0.234	0.000	0.2342
WB-W-148	5414116	476299	1	0.28	354	354	0	0			0.0%	0.010	0.000	0.010	0.250	0.002	0.000	0.0025
WB-W-149	5414177	475945	1	0.28	285	285	0	0			0.0%	0.008	0.000	0.008	0.250	0.002	0.000	0.0020
WB-W-150	5414372	475913	1	0.28	174	174	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0012
WB-W-151	5414595	476020	1	0.28	204	204	0	0			0.0%	0.006	0.000	0.006	0.250	0.001	0.000	0.0014
WB-W-152	5414468	475550	2	1.49	642	642	0	0			0.0%	0.096	0.000	0.096	0.500	0.048	0.000	0.0478
WB-W-152	5414538	474940	1	0.28	555	555	0	0			0.0%	0.016	0.000	0.016	0.250	0.004	0.000	0.0039
WB-W-153	5414294	475116	1	0.28	422	422	0	0			0.0%	0.012	0.000	0.012	0.250	0.003	0.000	0.0030
WB-W-154	5414329	475259	1	0.28	108	108	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
WB-W-155	5415210	475840	1	0.28	255	255	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0018
WB-W-156	5415288	475115	2	1.49	566	566	0	0			0.0%	0.084	0.000	0.084	0.500	0.042	0.000	0.0422
WB-W-156	5415049	474846	1	0.28	78	78	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0005
WB-W-157	5415048	474875	1	0.28	70	70	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
WB-W-158	5415104	474824	1	0.28	40	40	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
WB-W-159	5415182	474825	1	0.28	54	54	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
WB-W-160	5417204	473123	1	0.28	345	0	345	0			0.0%	0.000	0.010	0.010	0.250	0.000	0.002	0.0024
WB-W-161	5416728	473211	2	1.49	1018	1018	0	0			0.0%	0.152	0.000	0.152	0.500	0.076	0.000	0.0758
WB-W-161	5416766	472629	1	0.28	71	71	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
WB-W-162	5416884	472710	1	0.28	245	245	0	0			0.0%	0.007	0.000	0.007	0.250	0.002	0.000	0.0017
WB-W-163	5416480	474624	2	1.49	233	233	0	0			0.0%	0.035	0.000	0.035	0.500	0.017	0.000	0.0174
WB-W-163	5416495	474267	1	0.28	127	127	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
WB-W-163	5416479	474202	1	0.28	31	31	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
WB-W-164	5416527	474363	1	0.28	44	44	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003
WB-W-165	5416652	474417	1	0.28	80	80	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
WB-W-166	5416588	474897	2	1.49	291	291	0	0			0.0%	0.043	0.000	0.043	0.500	0.022	0.000	0.0217

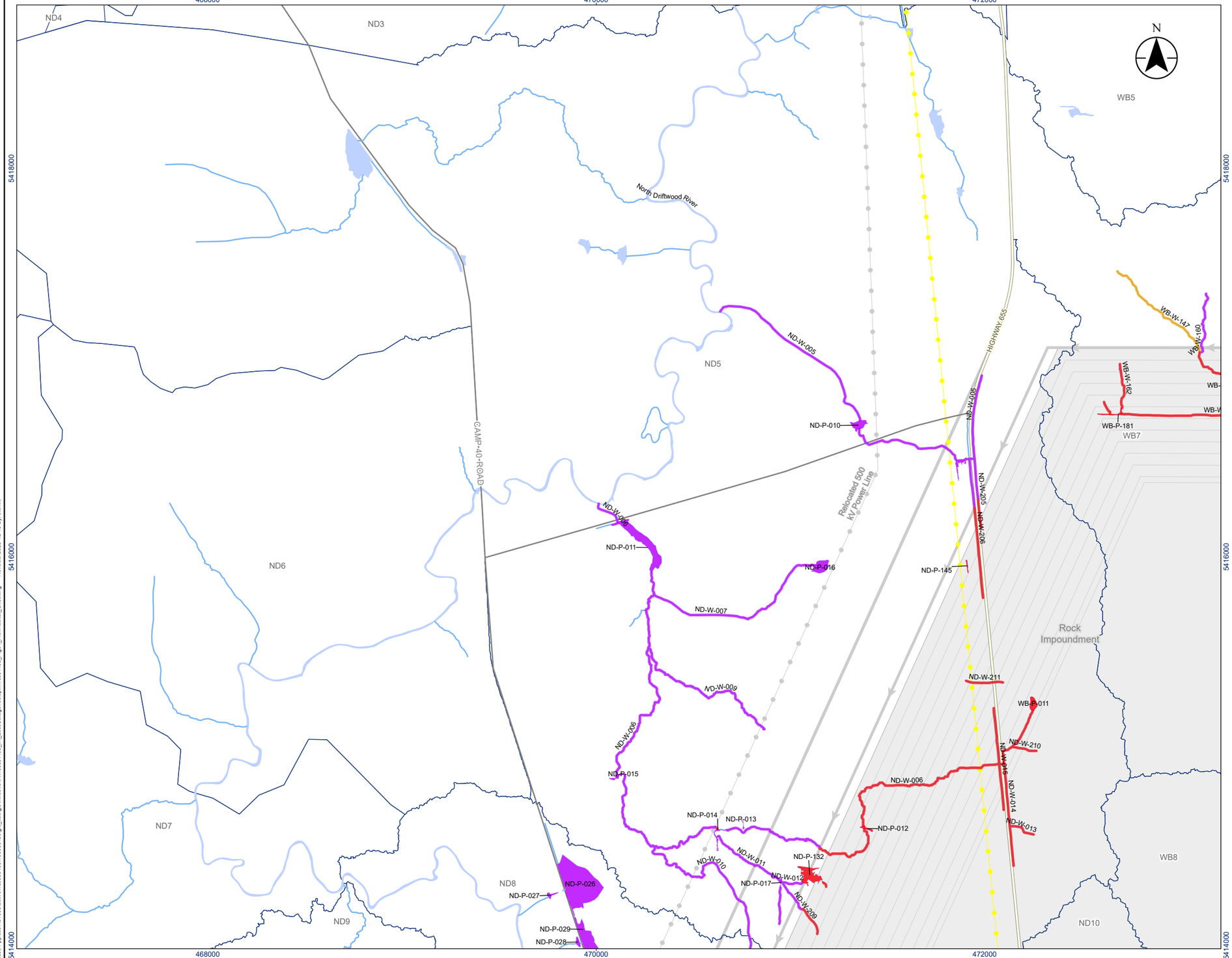
Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
WB-W-166	5416943	474876	1	0.28	50	50	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0004
WB-W-167	5416751	474797	1	0.28	65	65	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
WB-W-168	5416436	475011	1	0.28	109	109	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
WB-W-169	5416196	474997	1	0.28	179	179	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
WB-W-170	5414312	475290	1	0.28	147	147	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0010
WB-W-178	5415718	477140	1	0.28	989	0	0	989	36%	15%	25.8%	0.000	0.007	0.007	0.250	0.000	0.002	0.0018
WB-W-178	5415678	476520	1	0.28	263	0	0	263	96%	41%	68.3%	0.000	0.005	0.005	0.250	0.000	0.001	0.0013
WB-W-179	5416109	476946	1	0.28	595	0	0	595	59%	38%	48.4%	0.000	0.008	0.008	0.250	0.000	0.002	0.0020
WB-W-179	5416321	477307	1	0.28	90	0	0	90	34%	33%	33.7%	0.000	0.001	0.001	0.250	0.000	0.000	0.0002
WB-W-179	5416077	476502	1	0.28	124	0	0	124	86%	68%	77.2%	0.000	0.003	0.003	0.250	0.000	0.001	0.0007
WB-W-192	5417396	476783	1	0.28	177	0	0	177	61%	55%	57.7%	0.000	0.003	0.003	0.250	0.000	0.001	0.0007
WB-W-202	5408960	475392	1	0.28	195	0	195	0			0.0%	0.000	0.005	0.005	0.250	0.000	0.001	0.0014
WB-W-203	5408796	476911	1	0.28	29	29	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
WB-W-205	5412329	474383	1	0.28	87	87	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
WB-W-206	5410337	476101	1	0.28	113	0	113	0			0.0%	0.000	0.003	0.003	0.250	0.000	0.001	0.0008
WB-W-207	5413675	474846	1	0.28	133	133	0	0			0.0%	0.004	0.000	0.004	0.250	0.001	0.000	0.0009
WB-W-207	5413714	474867	1	0.28	84	84	0	0			0.0%	0.002	0.000	0.002	0.250	0.001	0.000	0.0006
WB-W-208	5412751	475867	1	0.28	111	111	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0008
WB-W-208	5413738	474865	1	0.28	66	66	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
WB-W-209	5412634	475880	1	0.28	61	61	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
WB-W-210	5412675	476058	1	0.28	94	94	0	0			0.0%	0.003	0.000	0.003	0.250	0.001	0.000	0.0007
WB-W-210	5412623	476136	1	0.28	55	55	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004
WB-W-211	5414947	475743	1	0.28	188	188	0	0			0.0%	0.005	0.000	0.005	0.250	0.001	0.000	0.0013
WB-W-212	5416559	474274	1	0.28	71	71	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0005
WB-W-213	5416740	474383	1	0.28	26	26	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0002
WB-W-214	5412790	476064	1	0.28	47	47	0	0			0.0%	0.001	0.000	0.001	0.250	0.000	0.000	0.0003

Attachment 2-2 – Lotic habitats requiring offsetting

Watercourse Name	Y_NAD83_UTM17	X_NAD83_UTM17	Stream Order	Stream Order Width	Length (m)	Segment Lost or Overprinted (Schedule 2) (m)	Segment Length Lost or Overprinted (HADD) (m)	Segment Length affected by Flow Reduction (m)	Percent overprint at US end (%)	Percent overprint at DS end (%)	Midpoint Reduction in flow (%)	Schedule 2 Habitat Loss (ha)	HADD Habitat Loss/Alteration (ha)	Total Habitat Affected (ha)	Relative Habitat Value	Adjusted Habitat (Schedule 2) (ha)	Adjusted Habitat (HADD) (ha)	Total Adjusted Habitat (ha)
WB-W-215	5407659	475817	1	0.28	56	56	0	0			0.0%	0.002	0.000	0.002	0.250	0.000	0.000	0.0004

Attachment 2.3 Fish Habitat Requiring Offsetting by Impact Type and Regulatory Process



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Legend

Watercourse Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Fisheries Act – Overprint
- Schedule 2 Overprint

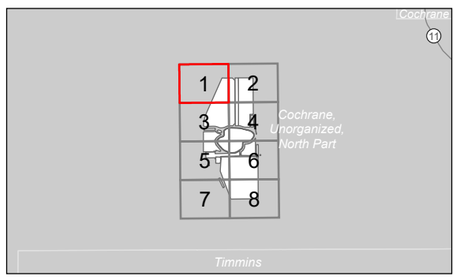
Waterbody Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Schedule 2 Overprint
- Proposed Project Components
- Sub Watershed

Base Features
- Major Road
- Minor Road
- Existing Transmission Line
- Watercourse
- Waterbody

0 0.5 1 km

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Project Location
Timmins, Ontario

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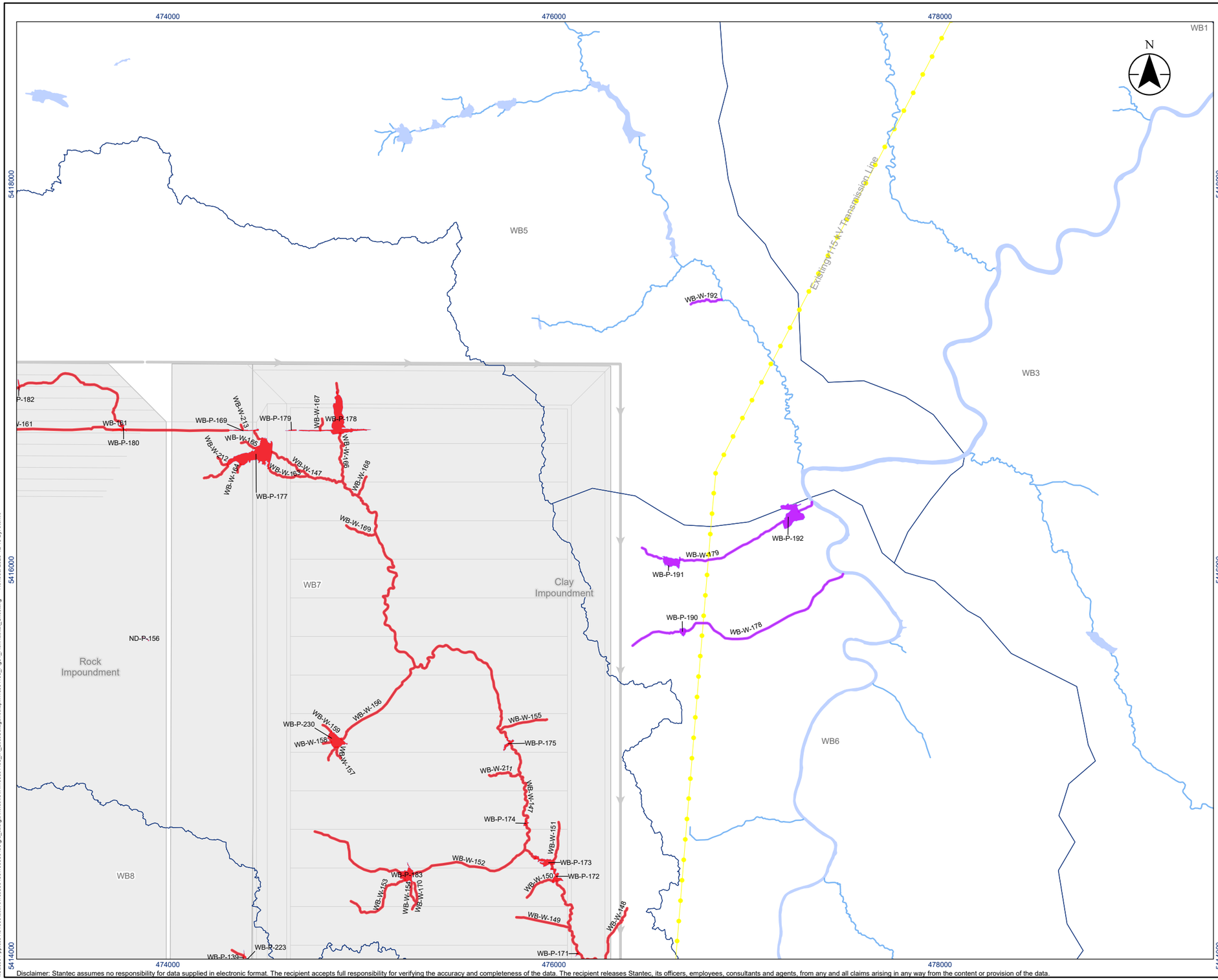
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
1.1

Title
Fish Habitat Requiring Offsetting by Impact Type and Regulatory Process

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CANADA NICKEL COMPANY

Legend

Watercourse Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Schedule 2 Overprint

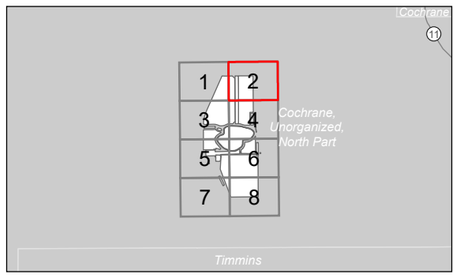
Waterbody Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Schedule 2 Overprint
- Proposed Project Components
- Sub Watershed

Base Features
- Existing Transmission Line
- Watercourse
- Waterbody

0 0.5 1 km

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Project Location
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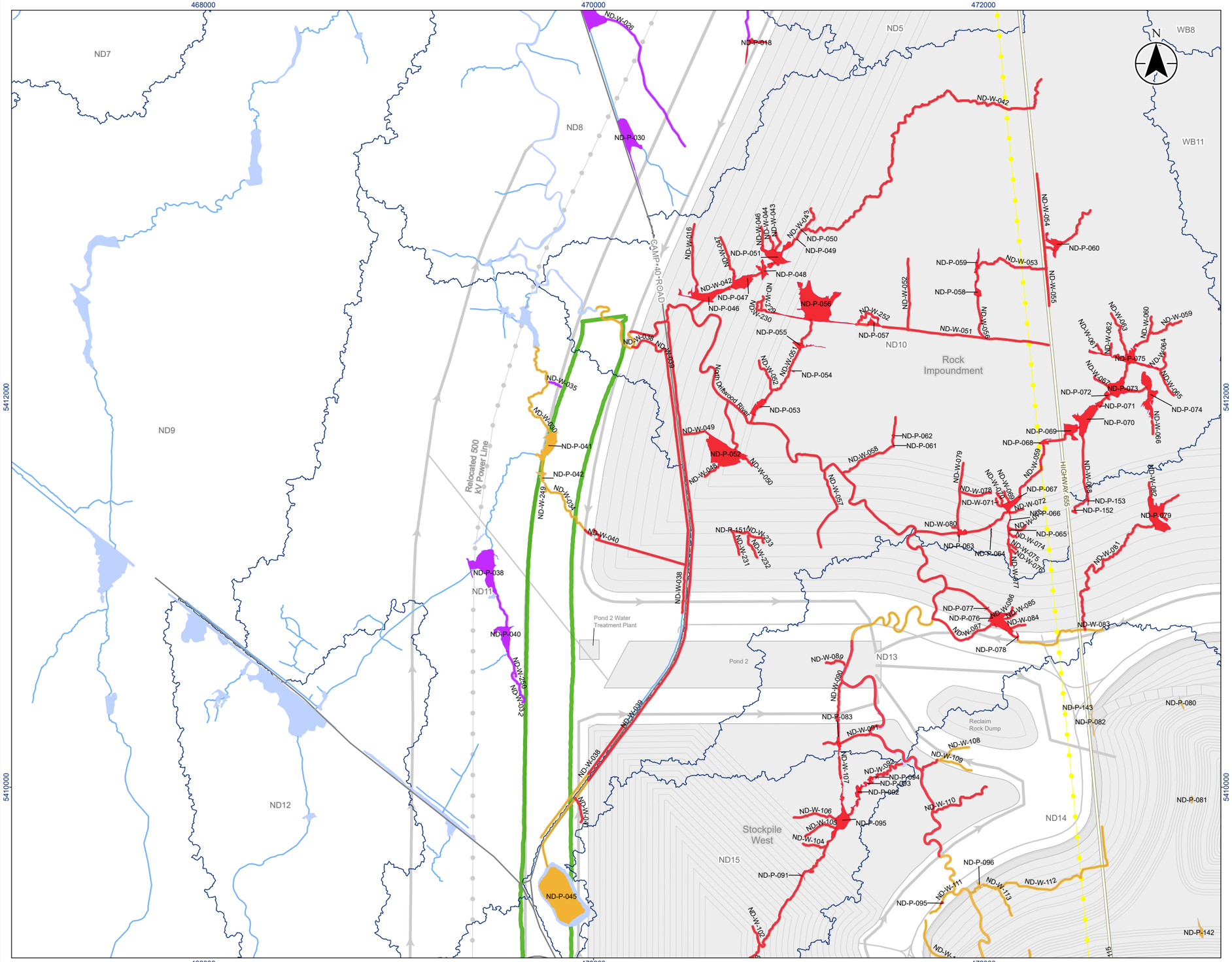
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
1.2

Title
Fish Habitat Requiring Offsetting by Impact Type and Regulatory Process

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Watercourse Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Fisheries Act – Overprint
- Schedule 2 Overprint

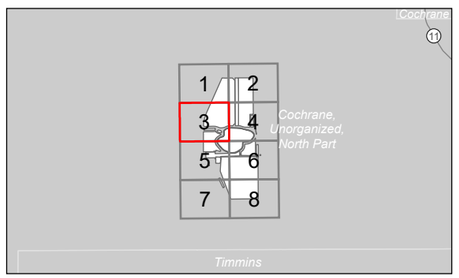
Waterbody Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Fisheries Act – Overprint
- Schedule 2 Overprint
- Diversion Channel Footprint
- Proposed Project Components
- Sub Watershed

Base Features
- Major Road
- Minor Road
- Existing Transmission Line
- Watercourse
- Waterbody

0 0.5 1 km

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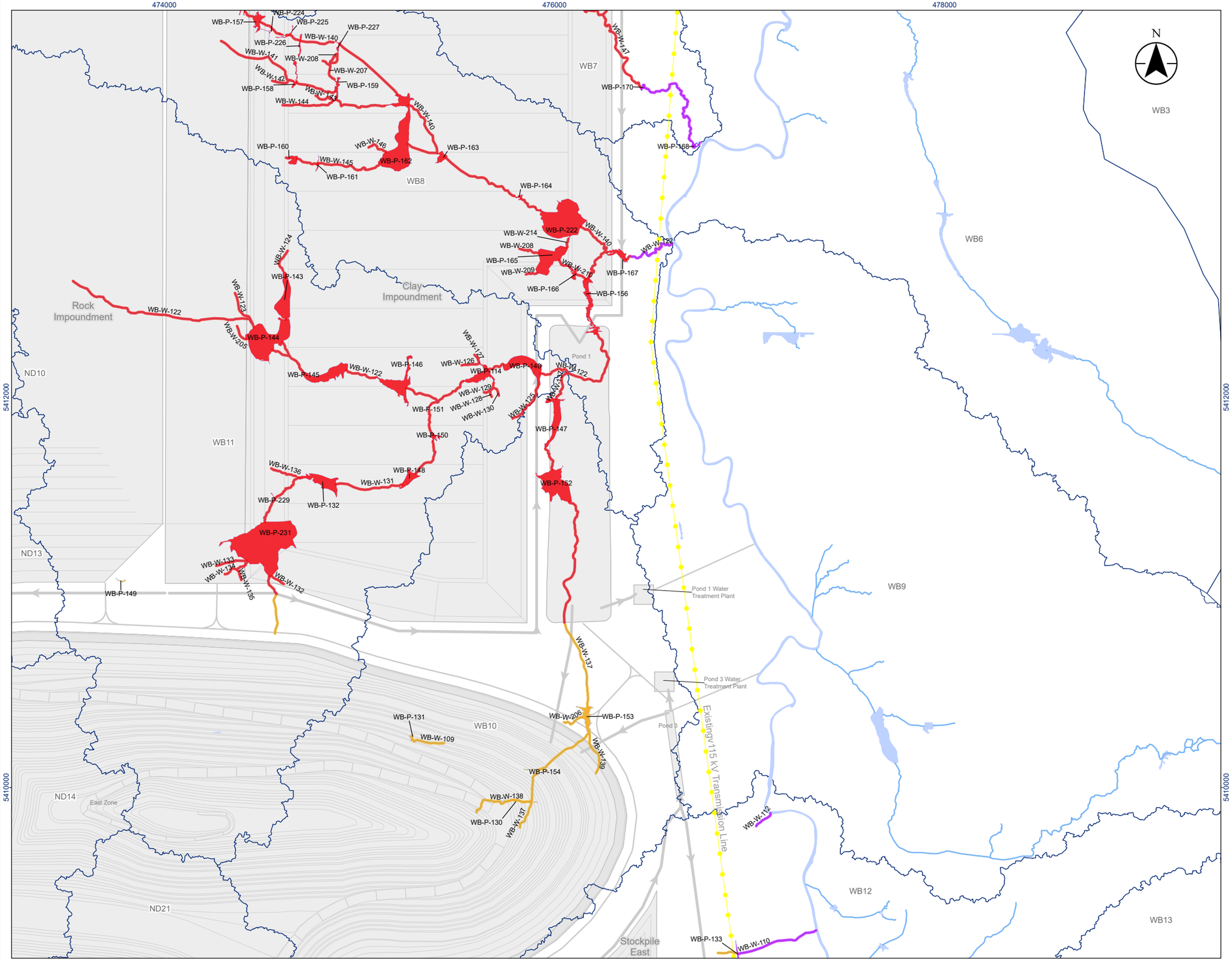
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
1.3

Title
Fish Habitat Requiring Offsetting by Impact Type and Regulatory Process

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Legend

Watercourse Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Fisheries Act – Overprint
- Schedule 2 Overprint

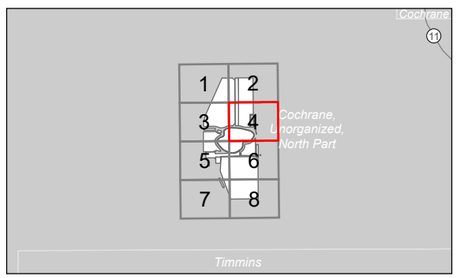
Waterbody Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Fisheries Act – Overprint
- Schedule 2 Overprint
- Proposed Project Components
- Sub Watershed

Base Features
- Existing Transmission Line
- Watercourse
- Waterbody

0 0.5 1 km

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Project Location
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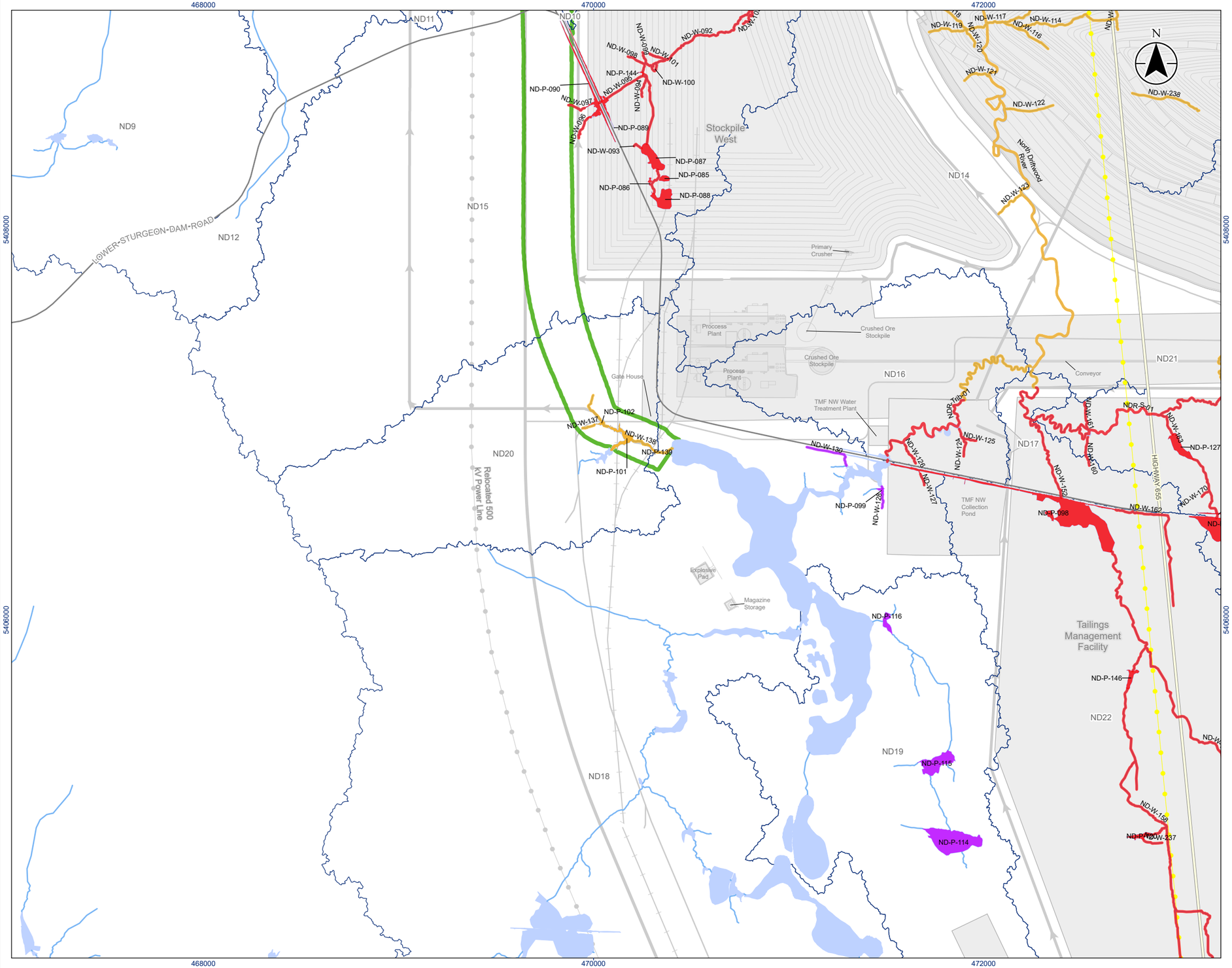
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
1.4

Title
Fish Habitat Requiring Offsetting by Impact Type and Regulatory Process

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Legend

Watercourse Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Fisheries Act – Overprint
- Schedule 2 Overprint

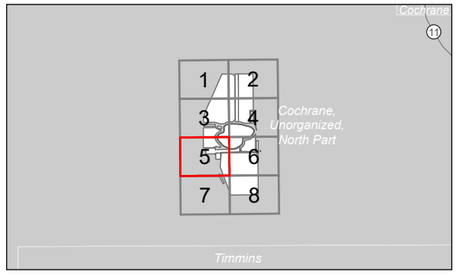
Waterbody Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Fisheries Act – Overprint
- Schedule 2 Overprint
- Diversion Channel Footprint
- Proposed Project Components
- Sub Watershed

Base Features
- Major Road
- Minor Road
- Existing Transmission Line
- Watercourse
- Waterbody

0 0.5 1 km

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Project Location
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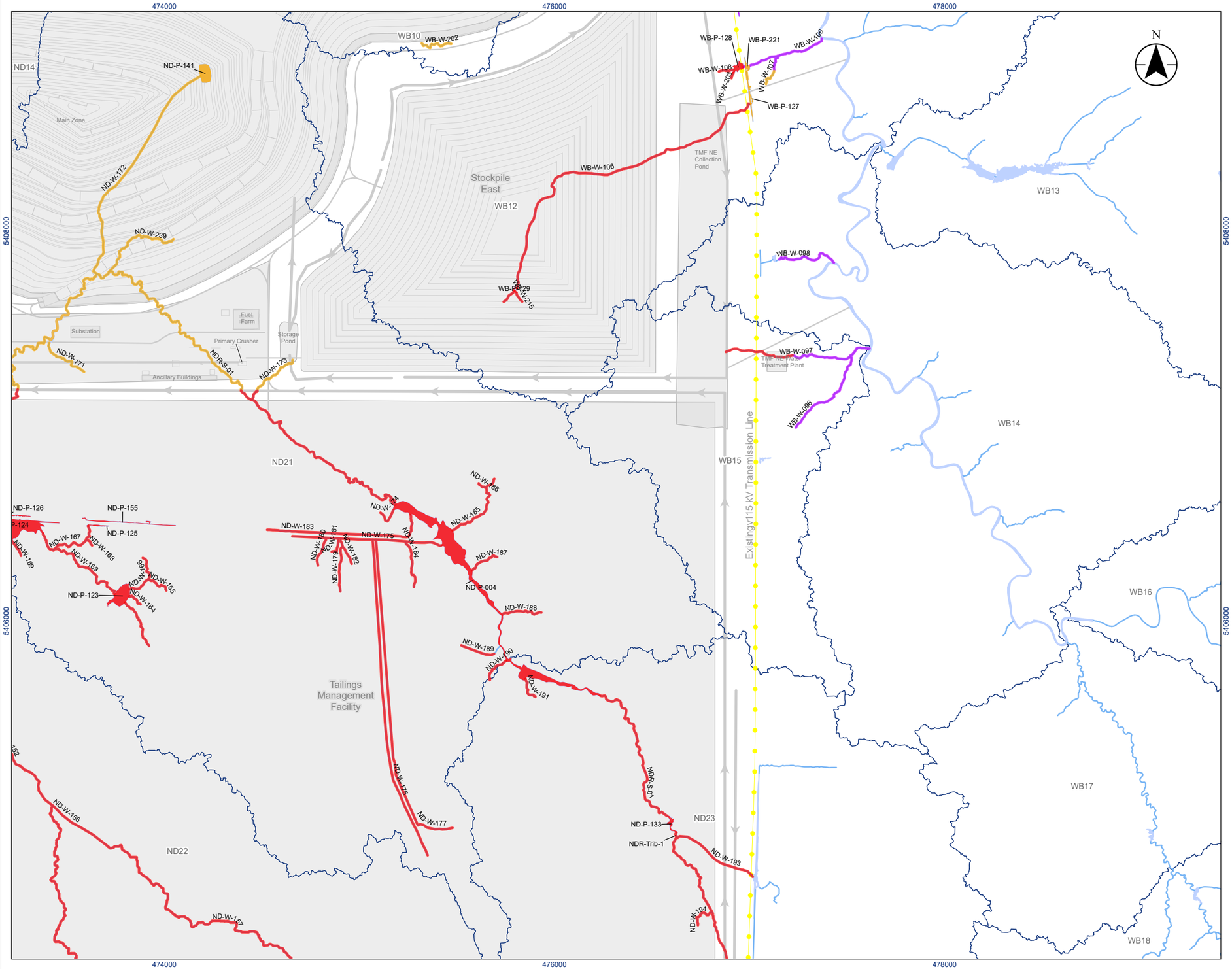
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
1.5

Title
Fish Habitat Requiring Offsetting by Impact Type and Regulatory Process

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CANADA NICKEL COMPANY

Legend

Watercourse Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Fisheries Act – Overprint
- Schedule 2 Overprint

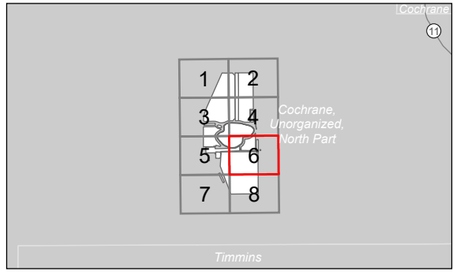
Waterbody Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Fisheries Act – Overprint
- Schedule 2 Overprint
- Proposed Project Components
- Sub Watershed

Base Features
- Existing Transmission Line
- Watercourse
- Waterbody

0 0.5 1 km

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Project Location
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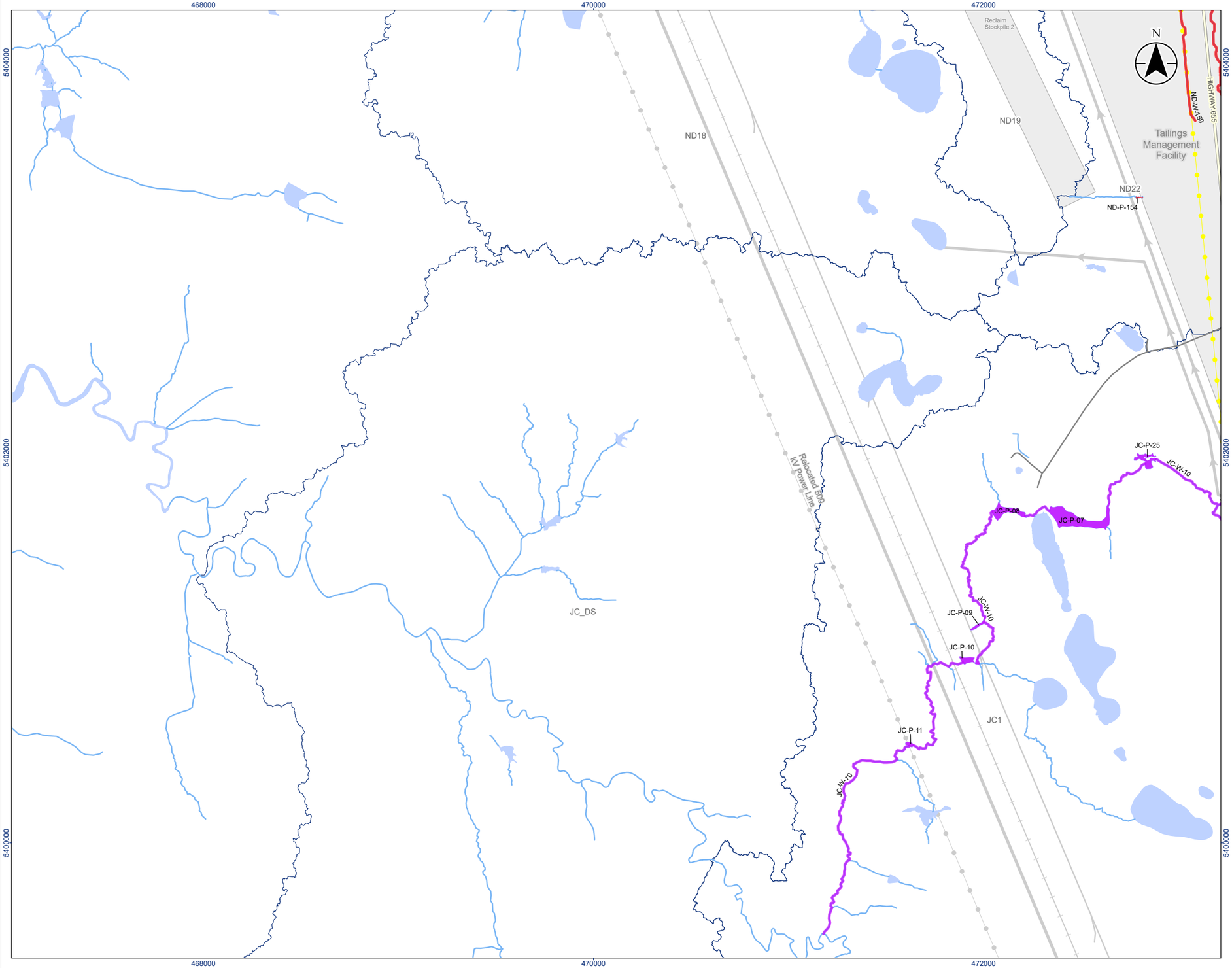
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
1.6

Title
Fish Habitat Requiring Offsetting by Impact Type and Regulatory Process

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CANADA NICKEL COMPANY

Legend

Watercourse Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Schedule 2 Overprint

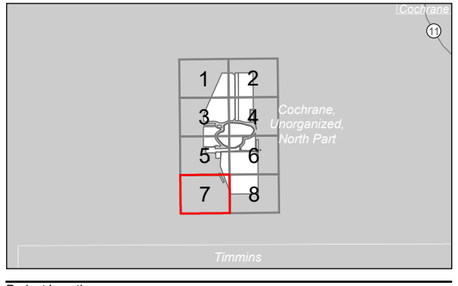
Waterbody Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Schedule 2 Overprint
- Proposed Project Components
- Sub Watershed

Base Features
- Major Road
- Minor Road
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0 0.5 1 km

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Notes
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Project Location
Timmins, Ontario

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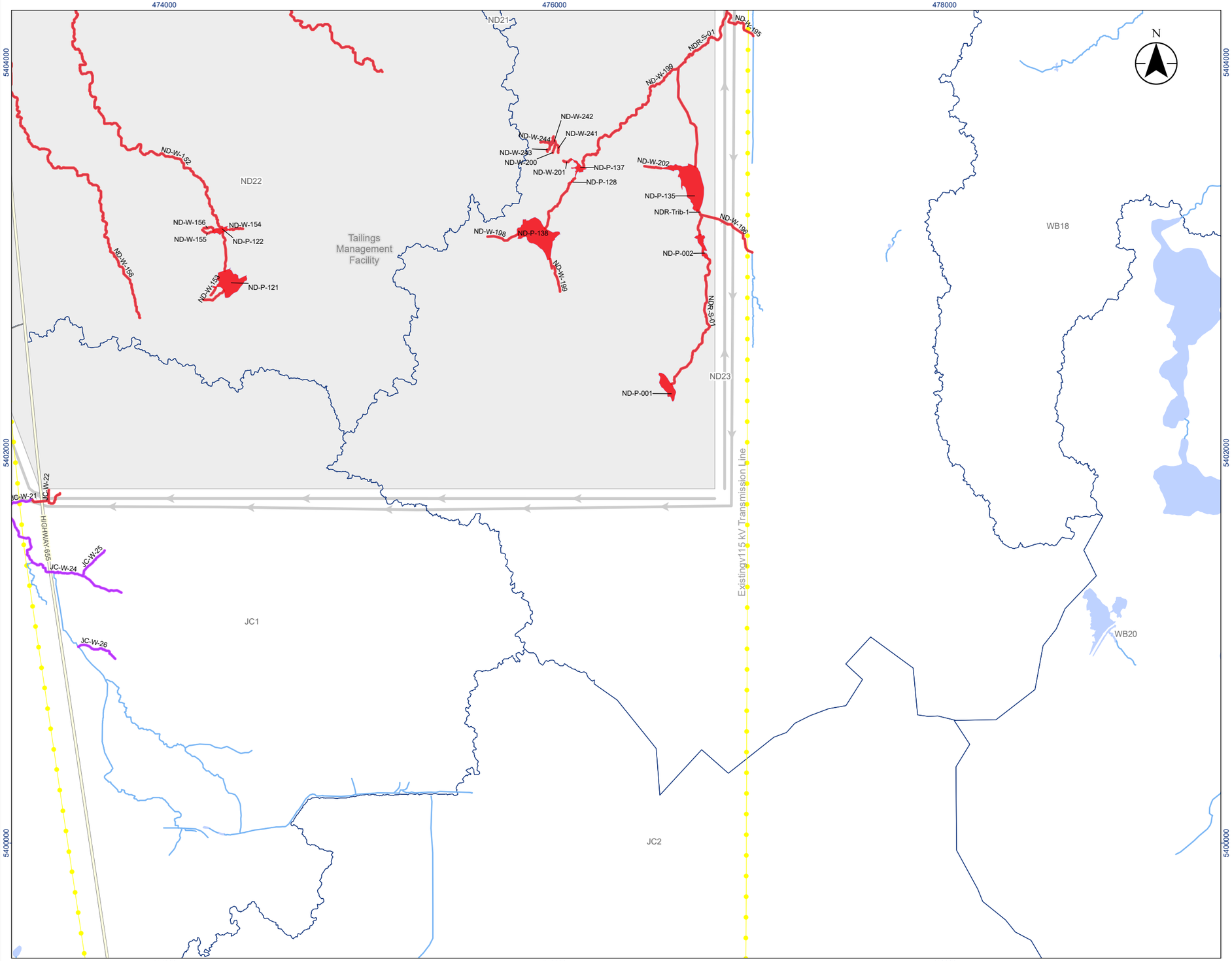
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
1.7

Title
Fish Habitat Requiring Offsetting by Impact Type and Regulatory Process

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Stantec

CANADA NICKEL COMPANY

Legend

Watercourse Habitat Loss Category
- Fisheries Act – Alteration (Includes Flow Reduction and Potential Culvert Crossing)
- Schedule 2 Overprint

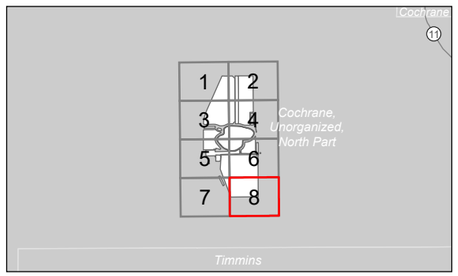
Waterbody Habitat Loss Category
- Schedule 2 Overprint
- Proposed Project Components
- Sub Watershed

Base Features
- Major Road
- Minor Road
- Existing Transmission Line
- Watercourse
- Waterbody

0 0.5 1 km

1:20,000 (At original document size of 11x17)

Notes
1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location
Timmins, Ontario

160901195 REVA
Prepared by stomic on 2025-12-19
Technical Review by AW 2025-12-18

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
1.8

Title
Fish Habitat Requiring Offsetting by Impact Type and Regulatory Process

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Crawford Nickel Project ("the Project")

Canada Nickel's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project
(Received May 30, 2025)

Groundwater-Surface Water Interactions, where Changes May Affect Fish Habitat and Indigenous peoples

December 24, 2025

CANADA NICKEL COMPANY

Stantec

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Abbreviations

Abbreviation	Full Term
BFI	baseflow index
LSA	Local Study Area
RSA	Regional Study Area
HEC-HMS	Hydrologic Engineering Centre - Hydrologic Modelling System
FDP(s)	final discharge point(s)
GHB	general head boundaries
PA	Project Area
TDR	Technical Data Report

Groundwater-Surface Water Interactions, where Changes May Affect Fish Habitat and Indigenous peoples

GW-01 Groundwater Model – General

Comment Description (Context and Rationale):

There is substantial uncertainty in the groundwater model's ability to adequately assess the quantity of groundwater discharge to surface water. This limits the understanding of how much, and where, groundwater currently contributes to surface water flows, and how this may change throughout the life of the project (throughout pit dewatering and then pit filling). This creates uncertainty for related effects on fish and fish habitat and use by Indigenous peoples. Due to project size and pit depth, changes to groundwater and surface water interactions can be substantial, so this is a key issue that needs to be understood with confidence to support planning decisions

Reference to TISG and IS:

TISG: Section 8.6

Required Information to Resolve Comment:

Outstanding information requirements about groundwater-surface water interactions are outlined in the next 5 rows, with respect to:

- *Baseflow calibration*
- *Inputs to surface water model*
- *Boundary conditions*
- *Hydrostratigraphic concepts*
- *Regional fault*

1) *If adaptive water management measures are plausible to ensure changes to groundwater-surface water interactions are controlled within suitable limits, outline those measures at a conceptual level. If they are also expected to be incorporated into permitting regimes, describe how.*

Canada Nickel's Response:

1) *If adaptive water management measures are plausible to ensure changes to groundwater-surface water interactions are controlled within suitable limits, outline those measures at a conceptual level. If they are also expected to be incorporated into permitting regimes, describe how.*

The groundwater flow model was calibrated to groundwater level and baseflow to within industry accepted standards that were defined in the Groundwater Technical Data Report (TDR) (Appendix C.4 of the Impact Statement). While there is inherent uncertainty with any groundwater model, these models remain valuable tools for understanding potential risks. The model provides a framework to identify where uncertainties exist and how they might influence project outcomes, such as informing monitoring plans that validate model predictions and allow for adjustments as new data becomes available, developing adaptive management strategies, and supporting decision making by highlighting areas where additional investigation or contingency planning may be warranted.

A groundwater monitoring and management plan for the Crawford Nickel Project will be developed prior to construction and will include an adaptive management component with trigger thresholds to alert to changing conditions prior to a significant environmental effect. Trigger thresholds will be staged to allow an early indicator system so that minor changes in data could be appropriately followed, monitored, and acted upon, as necessary. Groundwater monitoring wells will be placed around the open pit to validate the predicted extent of the drawdown cone from open pit dewatering. A similar surface water monitoring and management plan will be developed to include stream flow and lake level monitoring with associated trigger thresholds. If the drawdown or change in baseflow is trending larger than predicted at a trigger monitoring location then a subsequent investigation will be completed to understand the cause. Monitoring programs with adaptive management will be incorporated into permit requirements for the Mine (i.e. permits to take water, environmental compliance approvals).

Canada Nickel is committed to implementing technically and economically feasible mitigation measures if monitoring indicates that specified levels of environmental change have been reached or exceeded as a result of Mine development or operation. As noted in Chapter 14 of the Impact Statement, the following measures are proposed to limit groundwater inflow into the Open Pit and other site infrastructure to reduce the Project's effect on groundwater levels and thus on groundwater-surface water interactions (Impact Statement: Section 14.4.2.2):

- Where trenches extend below the water table and there are risks to the surrounding environment (draining effect), Canada Nickel will limit the seepage by lining trenches with a low permeability soil layer (silt and clay) and apply best management practices to reduce water infiltration, if needed.
- If faults or factures that act as conduits for increased flow of groundwater are encountered during advancement of the Open Pit, Canada Nickel will evaluate potential impacts from the increased flows, and, if necessary, implement grouting or other practical measures to reduce groundwater inflow and corresponding drawdown effects.

Additional mitigation measures that may be implemented during construction or operation of the Mine, if deemed appropriate, to mitigate effects on groundwater-surface water interactions may also include:

- Installation of a barrier wall that could include sheet pile, grout curtain, or localized grouting of bedrock to limit groundwater flow toward the open pit in isolated areas.
- Modification to pumping regimes (e.g., location, number, rate of pumping) to reduce drawdown impacts.
- Supplementation of affected watercourse(s) by returning water pumped from the open pit, and treated if necessary, to local watercourses.

Feasibility and implementation decisions, including permitting, beyond that committed to in the Impact Statement will be made based on the circumstances and considerations at the time and incorporated into required permitting at that time. The implementation of additional mitigation measures, beyond that in the Impact Statement, will be driven by the monitoring and adaptive management programs, which will be permitted through Permits To Take Water and Environmental Compliance Approvals issued by the province.

GW-01a Groundwater Model – Baseflow Calibration

Comment Description (Context and Rationale):

The project is located within a clay belt, which includes clay, sand and till, which all have different permeability.

The local groundwater model has been shown to meet standard metrics of calibration for groundwater elevation (having used local and regional well measurements for calibration). This result provides some confidence in the ability of the model to forecast effects on groundwater elevation within a level of uncertainty that can be understood.

To calibrate for baseflow, a regional average baseflow was calculated from surface water gauging stations outside of the clay belt and used to estimate baseflows for each local river. Simulated baseflows were compared to estimated baseflows. The model results were one order of magnitude lower than the regional calibration target, with slight variability between watersheds.

As discussed in IAAC's August 2024 comments on the groundwater baseline report, the surficial geology of the watershed will affect the magnitude of groundwater-surface water interactions. The proponent's November 2024 response to these comments confirmed this concept, noting that the regional watersheds with the highest degree of low permeability materials have the lowest baseflow index (indicating that the surface water has a lower quantity of groundwater), and noting that there is baseflow index variation across the PA.

While conceptually, local baseflow quantities (from within clay belt) can be expected to be lower than regional baseflow quantities (from outside of clay belt), it is not possible to quantitively assess the uncertainty of the local groundwater model, including how local variation may contribute to that uncertainty, using the regional stations alone.

The sensitivity analysis addresses the response of the model to changes in the hydraulic conductivity of the surficial units, and streambed conductance, but the results do not help to quantify the uncertainty within the results without a comparison to local baseflow information.

The groundwater model is not expected to precisely match observed baseflow values, given the limitations of the groundwater modelling; however, better data support for local baseflow variability is required to understand the degree of uncertainty within the groundwater model results. IAAC understands from the proponent's November 2024 response to IAAC's comments on the groundwater baseline report that some local flow monitoring results are available that can support a better understanding of local variability and uncertainty in the model predictions.

Confidence in how the groundwater model predicts baseflow is necessary to understand groundwater-surface water interactions, changes to surface water (flows, quantity, and quality), and associated effects to fish and fish habitat, and Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.6.1, Section 8.6.2

IS: Appendix C.4, Appendix C.5

Required Information to Resolve Comment:

1) *To support accurate interpretation of the existing groundwater model's outputs, evaluate the model's calibration using more representative local baseflow information. Use regional information only when it is justified by local analysis. Where existing observation periods of local stations are not sufficient for analysis, the shorter-term data should be compared to regional data both within and outside of the clay belt to determine the confidence in the model results.*

2) *Provide a comparison between observed and simulated baseflow quantities, and a discussion of the likely uncertainty in the groundwater model results.*

Note that this is not a requirement to revise or recalibrate the model using local baseflows for the impact assessment, but such an improvement may be required to support permitting.

Canada Nickel's Response:

1) *To support accurate interpretation of the existing groundwater model's outputs, evaluate the model's calibration using more representative local baseflow information. Use regional information only when it is justified by local analysis. Where existing observation periods of local stations are not sufficient*

for analysis, the shorter-term data should be compared to regional data both within and outside of the clay belt to determine the confidence in the model results.

2) *Provide a comparison between observed and simulated baseflow quantities, and a discussion of the likely uncertainty in the groundwater model results.*

The following text is provided in response to GW-01a 1) and 2) inclusive.

The field hydrometric monitoring program was conducted by WSP, Stantec, and Canada Nickel staff. WSP installed the hydrometric stations between 2021 and 2022 to collect continuous water level data. In addition, WSP, Stantec, and Canada Nickel staff conducted manual *in situ* flow and water level measurements which was used to develop stage:discharge rating curves. These rating curves were used to estimate continuous flow at each monitoring station using the collected continuous water level data. In Appendix B.6 of the Impact Statement Stantec presented the continuous water levels and stage:discharge rating curves developed using monitoring data collected up to the end of November 2023. Additional continuous water level and manual flow measurements were taken over the year 2024 and 2025. The updated hydrographs inclusive of data through to 2025 are presented as part of the response to SW-Quan-01.

SepHydro, a hydrograph separation tool developed by the Canadian Rivers Institute , University of New Brunswick, and Agricultural and Agri-Food Canada (Danielescu 2018), was used to determine the percent of baseflow contribution for each of the hydrometric stations with available continuous flow datasets. Following the methodology outlined in Section 4.1.2 of Appendix B.6 of the Impact Statement that was used for regional stations, SepHydro applied the Lynne and Hollick method (1979) to separate baseflow from streamflow for the local hydrometric monitoring stations.

The calculated baseflow index (BFI) describes the proportional contribution of baseflow to total streamflow for the full drainage area upstream of the hydrometric monitoring station. Using the upstream watershed area for each hydrometric monitoring station, a unit baseflow rate (of units $m^3/s/km^2$) was calculated. The unit baseflow rate used local monitored flow data in the determination of a unit baseflow rate. The unit baseflow rate was then used to calculate the baseflow rate for individual subwatersheds. For subwatersheds without an installed hydrometric monitoring station, the BFI of the nearest downstream subwatershed was applied to calculate baseflow rates. For the North Driftwood watershed only one hydrometric station BFI was available to be applied to the subwatersheds within the North Driftwood.

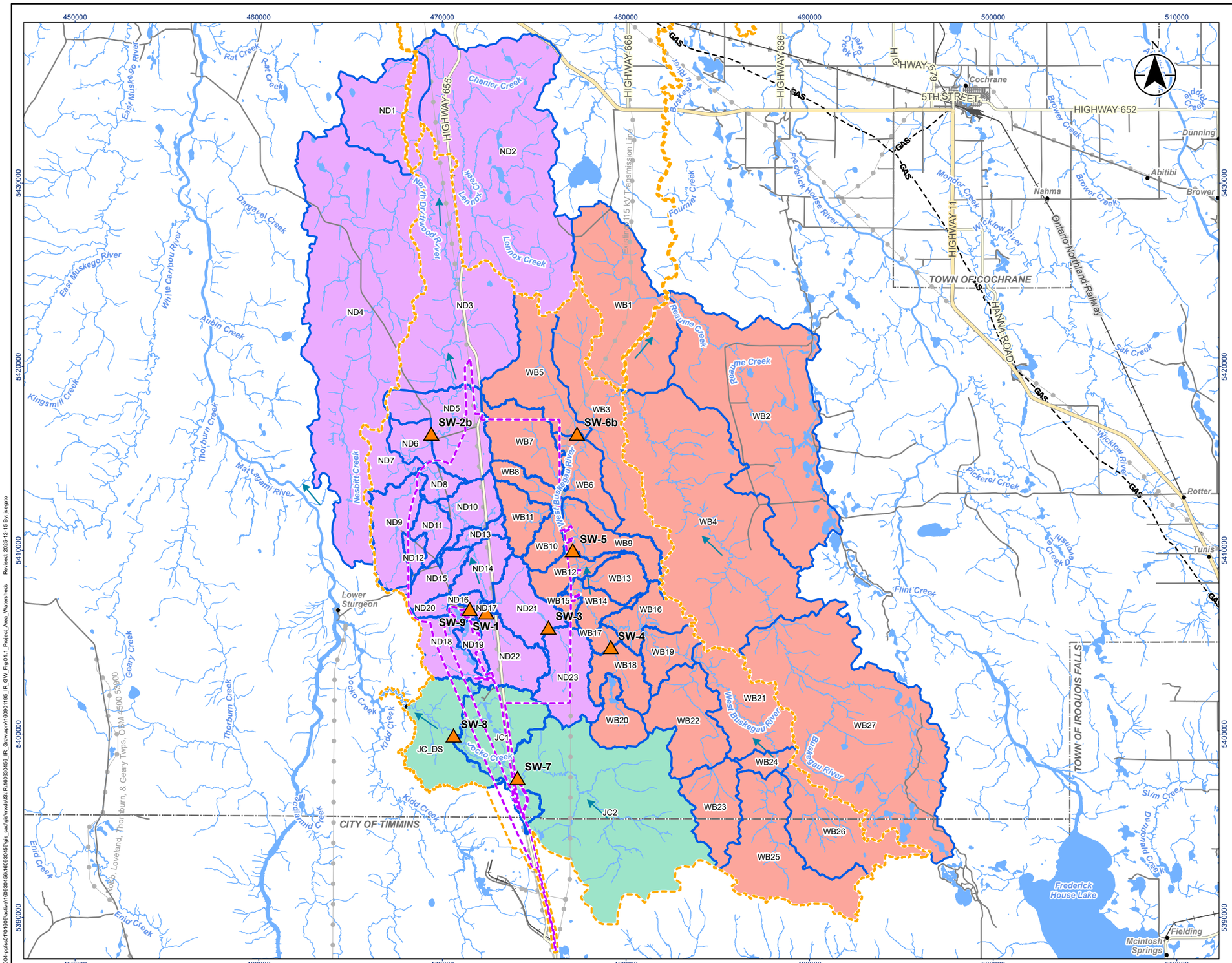
The revised baseflow estimates detailed above, and how they compared to predicted groundwater discharge rates, are presented in Table GW-01.1 . The locations of each subwatershed and hydrology station are presented on Figure GW-01.1.

Table GW-01.1 Updated Groundwater Model Baseflow Calibration

Sub-watershed	Representative Hydrology Station	Subwatershed Area (km^2)	Local BFI	Estimated Local Baseflow (m^3/s)	Simulated Groundwater Discharge for Baseline Conditions for Varying Values of Riverbed and Lakebed Conductance (m^3/s)		
					Base Case	X 0.1	X 2
JC_DS	SW-8	18.37	0.22	0.058	-0.0101	-0.0036	-0.0109
JC1	SW-8*	19.45	0.22	0.061	0.0313	0.0276	0.0318
JC2	SW-7*	71.82	0.23	0.264	0.0429	0.0429	0.0428
ND3	SW-2b	50.61	0.22	0.168	0.0580	0.0575	0.0580
ND5	SW-2b	18.07	0.22	0.060	0.0082	0.0082	0.0081
ND6	SW-2b*	4.80	0.22	0.016	0.0044	0.0044	0.0044
ND7	SW-2b	6.28	0.22	0.021	0.0026	0.0027	0.0026
ND8	SW-2b	3.28	0.22	0.011	0.0053	0.0053	0.0053
ND10	SW-2b	7.71	0.22	0.026	0.0077	0.0076	0.0078
ND13	SW-2b	2.33	0.22	0.008	0.0051	0.0051	0.0050
ND14	SW-2b	7.19	0.22	0.024	0.0125	0.0126	0.0125
ND16	SW-2b	1.07	0.22	0.004	0.0040	0.0048	0.0040
ND17	SW-2b	0.28	0.22	0.001	0.0007	0.0007	0.0007
ND18	SW-2b	9.53	0.22	0.032	-0.0563	-0.0200	-0.0660
ND19	SW-2b	2.75	0.22	0.009	0.0786	0.0392	0.0884
ND21	SW-2b	10.75	0.22	0.036	0.0123	0.0122	0.0124
ND23	SW-2b	13.02	0.22	0.043	0.0087	0.0078	0.0087
WB3	SW-6b	28.71	0.23	0.121	0.0045	0.0045	0.0045
WB5	SW-6b	18.92	0.23	0.080	0.0017	0.0016	0.0016
WB6	SW-6b*	9.75	0.23	0.041	0.0073	0.0073	0.0073
WB9	SW-5*	10.17	0.32	0.047	0.0042	0.0042	0.0042
WB12	SW-5	6.03	0.32	0.028	0.0018	0.0019	0.0018
WB14	SW-5	4.91	0.32	0.023	-0.0002	0.0003	-0.0002
WB16	SW-5	8.51	0.32	0.039	0.0042	0.0043	0.0042

Sub-watershed	Representative Hydrology Station	Subwatershed Area (km^2)	Local BFI	Estimated Local Baseflow (m^3/s)	Simulated Groundwater Discharge for Baseline Conditions for Varying Values of Riverbed and Lakebed Conductance (m^3/s)		
					Base Case	X 0.1	X 2
WB19	SW-5	7.23	0.32	0.033	0.0053	0.0052	0.0053
WB21	SW-5	18.87	0.32	0.087	-0.0146	-0.0137	-0.0146
			Total	1.341	0.2301	0.2306	0.2297

Notes:
* Hydrology Station is located in the subwatershed indicated



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Legend

- Project Area
- Local Study Area
- Regional Study Area

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Existing Transmission Line
- Natural Gas Pipeline
- Watercourse
- Municipal Boundary - Lower Tier
- Waterbody
- Hydrometric Station
- Subwatershed
- Jocko Creek Watershed
- North Driftwood River Watershed
- West Buskegau River Watershed
- Watercourse Flow Direction

0 5 10 km

1:210,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location
Timmins, Ontario

160901195 REVA
Prepared by jsegato on 2025-12-15

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
GW-01.1

Title
Project Area Watersheds, Subwatersheds and Hydrometric Monitoring Stations

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As predicted in the Groundwater TDR (Appendix C.4 of Impact Statement), the BFIs for many of the local subwatersheds within the Local Study Area (LSA)/Regional Study Area (RSA) are lower than the average regional BFI of 0.3 (Impact Statement Appendix B.6) due to the presence of the clay belt. The calibration to baseflow presented in in the Groundwater TDR (Impact Statement Appendix C.4, Section 5.2.5.3), based on the regional BFI, resulted in simulated groundwater discharge to surface water in the groundwater flow model that was lower than the estimated baseflows based on the regional assessment by a factor of 6 to 11. The updated baseflow calibration presented in Table GW-01.1 demonstrates that the simulated groundwater discharge to surface water is typically lower than the estimated baseflows based on the field hydrometric monitoring program by factors of up to 8.6, with a factor of 5.8 being the average. This indicates that existing groundwater flow model is better calibrated to local baseflow estimates than to the regional baseflow estimate presented in the Groundwater TDR.

The Groundwater TDR included an assessment of model calibration sensitivity to river and lakebed conductance (Impact Statement Appendix C.4, Section 5.2.6.3), which concluded that the model calibration was sensitive to decreases in conductance with a reduction of one order of magnitude resulting in an approximately 20% decrease in residual mean (an increase in predicted heads on average) while increasing the conductance by a factor of two did not result in a change in average predicted heads. Table GW-01.1 expands on this sensitivity analysis by presenting the changes in predicted groundwater discharge to surface water with a one order of magnitude decrease or a factor of two increase in river and lakebed conductance. These sensitivity runs show that, while some groundwater discharge to individual reaches may be sensitive to increases and decreases in conductance, the average groundwater discharge rate in the local subwatersheds presented above is relatively insensitive to these changes. Increasing and decreasing conductance by an order of magnitude and a factor of two, respectively, results in changes to the overall groundwater discharge rate of less than 0.25%. Considering these results together, increased confidence may be given to the calibrated groundwater model as an appropriate tool for evaluating potential groundwater-driven baseflow changes in predictive model scenarios.

References:

Danielescu S., MacQuarrie, K.T.B. and A. Popa. 2018. *SEPHYDRO: A Customizable Online Tool for Hydrograph Separation*. Groundwater 56: 589-593. DOI: https://doi.org/10.1111/gwat.12792.

Lyne V., and M. Hollick. 1979. *Stochastic time-variable rainfall-runoff modelling*. Institute of Engineers Australia National Conference. Publ. 79/10, pp. 89-93.

GW-01b Groundwater Model – Input to Surface Water Model

Comment Description (Context and Rationale):

To be confident in advice to decision-makers, IAAC must first be clear on how the IS conclusions were generated. Due to what may be inconsistent reporting, IAAC is not able to explain whether and how groundwater model outputs informed surface water model inputs, and therefore whether predictions are reasonable. These inconsistencies relate to both seepage discharge and total groundwater discharge to surface water.

The values of modelled groundwater seepage for passive closure included in the surface water model (HEC-HMS model), outlined in Table B.1.4 of Appendix C.5 (the Surface Water Resource Assessment) of the IS, do not match the groundwater model output values for passive closure in Table 7.4 of Appendix C.4 (the Groundwater Assessment), creating uncertainty in how the groundwater model results were incorporated into surface water modelling.

Additionally, it is not clear that the total groundwater discharge to each watershed from the groundwater model is carried forward into the surface water model. The groundwater results are discussed in Table 6.13 of Appendix C.5, but it appears that the baseflow values in the surface water model were set to a constant value based on an analysis of regional stations, which is higher than the groundwater model results, and does not appear to change during the project life. This approach would result in the model inappropriately diluting mine impacted seepage by introducing a larger quantity of groundwater seepage into the surface water model relative to the results of the groundwater model. Given the extent to which groundwater discharge is predicted to change for each surface water body throughout the life of the project (Tables 6.1 to 6.4 in Appendix C.4), it is reasonable that specific predictions be incorporated into the surface water model. For example, the West Buskegau River changes from receiving over 1000 m3/day from groundwater to losing 2000 m3/day to groundwater in Year 30. The approach currently taken introduces a high degree of uncertainty into the assessment of changes to surface water quantity and quality.

Confidence in how groundwater model inputs are incorporated into the surface water model is necessary to understand groundwater-surface water interactions, changes to surface water (flows, quantity, and quality), and associated effects to fish and fish habitat and Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.6.1, Section 8.6.2

IS: Appendix C.4, Appendix C.5

Required Information to Resolve Comment:

1) *Provide an expanded description and rationale of the sources of seepage rates presented in Table B.1.4 of Appendix C.5, including any discrepancies between the seepage values reported in Appendix C.4 and Appendix C.5. Ensure that the seepage values from the groundwater model are carried forward to the surface water model.*

2) *Confirm if the predicted groundwater discharge to surface water features (Table 6.13 of Appendix C.5) was included in the surface water model under baseline and during all project phases.*

3) *If predicted groundwater discharge to surface water features (Table 6.13 of Appendix C.5) was not included, revise the surface water model to include any groundwater discharge to surface water, accounting for both the long-term watershed wide groundwater discharge (such as passive closure) and the short-term reductions in groundwater discharge (such as during pit dewatering) and provide the estimated changes to surface water quantity. Alternatively, quantify the uncertainty in the surface water model and provide information on what measures will be put in place to manage the uncertainty.*

Canada Nickel's Response:

1) *Provide an expanded description and rationale of the sources of seepage rates presented in Table B.1.4 of Appendix C.5, including any discrepancies between the seepage values reported in Appendix C.4 and Appendix C.5. Ensure that the seepage values from the groundwater model are carried forward to the surface water model.*

Seepage rate values output from the groundwater model were incorporated into the Hydrologic Engineering Centre Hydrologic Modelling System (HEC-HMS) hydrologic model to support the flow change assessment (Table B.1.4 of Appendix C.5). Groundwater contributions within the baseline HEC-HMS hydrologic model were not based on the groundwater seepage outputs of the groundwater model. Groundwater contributions to local receivers within the HEC-HMS model were developed through an integrated baseflow model which applied the Recession Baseflow Method (see response to GW-01b -2 for additional details).

The Project Area (PA) was simulated in the HEC-HMS hydrologic model by removing the portions of the sub-watersheds within the Project boundary. The surface water inflows and groundwater recharge from those removed areas was no longer simulated by the HEC-HMS model. Discharges from the Project at up to four final discharge points (FDPs) were estimated by the water balance and input as point sources in the hydrologic model. The Project associated groundwater seepage rates that were modelled by the groundwater model to increase in comparison to the baseline groundwater model were input into the hydrologic model. They were added to the hydrologic model as point source inputs for the given sub-subwatershed with the constant groundwater flow seepage rate for the appropriate life of mine phase model output. If the groundwater model predicts a decrease in groundwater contributions from baseline for a given watercourse or waterbody due to the Project, the Project associated groundwater seepage rate to that receiver is assumed to be 0 m^3/day in the hydrologic model setup (Section 7.2 of Appendix C.4). The HEC-HMS model only uses these point sources for the FDPs and additional groundwater

seepage to represent PA water contributions to local receivers. Otherwise, surface runoff and groundwater seepage from those subwatershed areas is not modelled in the hydrologic model.

Project reductions in groundwater seepage to local receivers due to pit dewatering are mitigated in the hydrologic model by being captured as pit dewatering flow that eventually is discharged to local receivers (North Driftwood and West Buskegau Rivers) via one of the up to four FDPs. The site discharge to the North Driftwood River and West Buskegau River downstream of the PA will reduce the potential impacts of predicted groundwater seepage reductions along these reaches. For the watercourses and waterbodies that are predicted to receive additional groundwater seepage due to Project activities in the groundwater model for a given life of mine phase, groundwater seepage outputs from the groundwater model were input into those subsequent receiver subwatersheds in the HEC-HMS model.

A comparison of seepage rates presented in Table B.1.4 of Appendix C.5 (hydrologic model inputs) and seepage rate values presented in Appendix C.4 (groundwater model outputs) is provided in Table GW-01.2. An assessment of the presented rates determined that seepage values from the groundwater model for modelled Operations Phase 2 and 3 (Mine Year 18 to 41) and Passive Closure (Pit Full; greater than Mine Year 46) had not been carried forward to the surface water HEC-HMS model. Seepage rates for Operations Phase 1 and 2 (Mine Year 4 to 18) were the same between the groundwater model and the HEC-HMS model. The Impact Statement HEC-HMS model was subsequently re-run for this IR response for Mine Year 35 and Pit Full using the seepage rates provided by the groundwater model for Mine Year 35 and Pit Full to determine the impacts of the updated HEC-HMS model inputs to predictions made in the flow change assessment.

Table GW-01.2 Comparison of Seepage Rates Presented in Table B.1.4 and Tables 7.2, 7.3 and 7.4 of Appendix C.4

Watershed	Subwatersheds	Watercourse/Lake	Seepage Rate (m^3/d)					
			Mine Year 17 (Operations Phase 1 and 2 (Mine Year 4 to 18))		Mine Year 35 (Operations Phase 2 and 3 (Mine Year 18 to 41)		Pit Full (Passive Closure (Mine Year 46+)	
			HEC-HMS Model Seepage Rate	Predicted Fate of Seepage in Appendix C.4	HEC-HMS Model Seepage Rate	Predicted Fate of Seepage in Appendix C.4	HEC-HMS Model Seepage Rate	Predicted Fate of Seepage in Appendix C.4
Jocko Creek	JC2		1270	1270	9	0	9	0
	JC1	Unnamed Lake (South of Zed Lake)	1503	1503	39	64	39	208
	JC1		935	935	262	0	262	0
	JC_DS	Zed Lake	43	43	0	0	0	0
	JC_DS		51	51	31	0	31	0
North Driftwood	ND18	Mel Lake	1099	1099	94	2	94	58
	ND18	Sutherland Lake	155	155	13	0	13	2
	ND19	Jack Lake	58	58	0	0	0	0
	ND19	Gerry Lake	1453	1453	207	0	207	530
	ND10	Unnamed Lake (LG Stockpile West)	-	-	324	0	324	40
	ND8		55	55	4	11	4	161
	ND7		-	-	8	0	8	1
	ND6		14	14	196	6	196	29
	ND5		125	125	-	70	-	259
	ND3		-	-	320	0	320	19
West Buskegau	WB21		-	-	1	0	1	0
	WB19		75	75	89	0	89	0
	WB16		771	771	32	0	30	0
	WB14		1244	1244	10	0	8	0
	WB6		67	67	-	28	-	310
	WB5		37	37	-	21	-	66
	WB3		1	1	-	0	-	12

Table GW-01.3 to Table GW-01.5 provide a comparison of anticipated flow changes presented in Table 6.8, Table 6.10, and Table 6.12 of Appendix C.5 and the results of the HEC-HMS model run with the updated seepage rates. As part of the review of HEC-HMS model, it was determined that for the pit filled scenario, the pit flow contributions to the North Driftwood River and West Buskegau River were not functioning and the Impact Statement model outputs did not actually include pit lake outflows to the receivers as point source discharges. A comparison of flow change assessment values for the Impact Statement model for the pit filled life of mine phase with and without the correct pit lake discharges has been included in Table GW-01.3 to Table GW-01.5. The pit filled hydrologic model scenario, using the seepage inputs used in Appendix C.5 for the Impact Statement are presented under the heading "Corrected Appendix C.5". Values using both the correct seepage input and pit lake discharges are presented under the heading "Updated".

Table GW-01.3 Comparison of Climate Change Adjusted Jocko Creek HEC-HMS Model Flow Changes from Baseline Conditions

	Subwatershed	Operations Phase 3 (Modelled Years 30 to 41 – Year 35)				Pit Filled (Passive Closure)			
		+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase	+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase
Appendix C.5	JC_DS	0	0	0	No	0	0	0	No
Updated		0	0	0	No	0	0	0	No

Table GW-01.4 Comparison of Climate Change Adjusted West Buskegau River HEC-HMS Model Flow Changes from Baseline Conditions

			Operations Phase 3 (Modelled Years 30 to 41 – Year 35)				Pit Filled (Passive Closure)			
			+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase	+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase
← Moving Upstream	Appendix C.5	WB1	0	0	3	No	0	0	0	No
	Corrected Appendix C.5		-	-	-	-	0	0	60	No
	Updated		0	0	3	No	0	0	**61**	No
	Appendix C.5	WB5	2	0	30	No	0	0	12	No
	Corrected Appendix C.5		-	-	-	-	0	0	96	No
	Updated		2	0	30	No	0	0	**100**	No
	Appendix C.5	WB9	0	0	57	No	0	0	22	No
	Corrected Appendix C.5		-	-	-	-	0	0	120	No
	Updated		0	0	56	No	0	0	117	No
	Appendix C.5	WB14	0	0	157	No	0	0	187	No
	Corrected Appendix C.5	WB14	-	-	-	-	0	0	0	No

		Operations Phase 3 (Modelled Years 30 to 41 – Year 35)				Pit Filled (Passive Closure)			
		+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase	+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase
Updated		0	0	0	No	0	0	0	No

Notes:
- Indicates an increase in the number of days in comparison to the Impact Statement model or correct Impact Statement model results.
- Indicates a decrease in the number of days in comparison to the Impact Statement model or correct Impact Statement model results.

Table GW-01.5 Comparison of Climate Change Adjusted North Driftwood River HEC-HMS Model Flow Changes from Baseline Conditions

			Operations Phase 3 (Modelled Years 30 to 41 – Year 35)				Pit Filled (Passive Closure)			
			+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase	+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase
	Appendix C.5		0	0	74	No	0	0	29	No
	Corrected Appendix C.5		-	-	-	-	0	0	130	No
	Updated	ND1	0	0	71	No	0	0	130	No
	Appendix C.5		16	0	86	No	23	1	32	No
	Corrected Appendix C.5		-	-	-	-	10	0	148	No
	Updated	ND3	**17**	0	84	No	10	0	148	No
	Appendix C.5		115	73	112	No	139	87	35	No
	Corrected Appendix C.5		-	-	-	-	78	46	199	No
	Updated	ND5	**128**	**83**	109	No	76	45	**216**	No
	Appendix C.5		108	66	113	No	126	77	57	No
	Corrected Appendix C.5		-	-	-	-	71	40	226	No
	Updated	ND8	**126**	**83**	105	No	69	39	**232**	No
← Moving Upstream	Appendix C.5	ND18	0	0	365	Yes	0	0	365	Yes

		Operations Phase 3 (Modelled Years 30 to 41 – Year 35)				Pit Filled (Passive Closure)			
		+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase	+10% Reduction Days	+10% Reduction & Below Environmental Flow	+10% Increase Days	Q100 Flood Flow Increase
Corrected Appendix C.5	ND18	-	-	-	-	0	0	365	Yes
Updated		0	0	365	Yes	0	0	365	Yes
# - Indicates an increase in the number of days in comparison to the Impact Statement model or correct Impact Statement model results. # - Indicates a decrease in the number of days in comparison to the Impact Statement model or correct Impact Statement model results.									

Jocko Creek

The differences in hydrologic model outputs for the updated seepage rate inputs were assessed based on the difference in the number of days per year for each life of mine phases with flow increases greater than 10% from baseline, or flow decreases greater than 10%. There were no result differences between the number of days with flows having a greater than 10% from the baseline for the Jocko Creek flow changes at JC_DS observed for the two HEC-HMS models (original Appendix C.5 as presented in the Impact Statement and the updated seepage rates presented in Table GW-01.3) for the Operations Phase 2 and 3, and Passive Closure scenarios.

West Buskegau River

For the West Buskegau River HEC-HMS model with corrected pit flow input predicted no additional days with a flow reduction greater than 10% from baseline for the four assessed subwatershed outlets under passive closure conditions compared to the Impact Statement model (Table GW-01.4). The corrected pit flow input predicted an increase in days with a greater than 10% increase from baseline for subwatersheds WB1, WB5 and WB9, the number of days increased ranged from 60 – 100 days under passive closure conditions (Table GW-01.4). Under the Passive Closure scenario for WB14 the corrected pit flow input resulted in a reduction of 187 days of estimated days with 10% greater increase from baseline conditions (Table GW-01.4).

The updated groundwater seepage rates introduced to the West Buskegau River HEC-HMS model predicted changes to the number of days with a 10% change from baseline in comparison to the Impact Statement model or corrected Impact Statement model results (with corrected pit flow input). The updated groundwater seepage values resulted in a similar number of days with a greater than 10% increase from baseline (correct Impact Statement HEC-HMS model for pit filled scenario) for subwatersheds WB1, WB5 and WB9 under passive closure (pit filled) conditions (Table GW-01.4). The updated groundwater seepage rates for the Phase 2 and 3 Operations scenario (Mine Year 35) modelled at the WB9 subwatershed outlet had one fewer day with a flow increase greater than 10% from baseline conditions compared to Impact Statement outputs (Table GW-01.4). For the WB14 subwatershed outlet, the updated groundwater seepage rate model predicted 157 fewer days with a flow increase greater than 10% from baseline conditions for the Operations Phase 2 and 3 compared to the Impact Statement HEC-HMS model (Table GW-01.4).

North Driftwood River

For the North Driftwood River HEC-HMS model with corrected pit flow input predicted no additional days with a flow reduction greater than 10% from baseline for the five assessed subwatershed outlets under passive closure conditions compared to the Impact Statement model (Table GW-01.5). The corrected pit flow input estimated an increase in days with a greater than 10% increase from baseline for subwatersheds ND1, ND3, ND5 and ND8, the number of days increased ranged from 101 – 169 days under passive closure conditions (Table GW-01.5).

The North Driftwood River HEC-HMS model, updated with groundwater seepage rates for the Operations Phase 2 and 3 scenario at subwatershed outlets ND3, ND5 and ND8, showed an increase in the number of simulated days with a flow reduction greater than 10% from baseline conditions. The number of days with reductions increased by 1, 13 and 18 days at ND3, ND5 and ND8, respectively, compared to the Impact Statement HEC-HMS model (Table GW-01.5). This represents a 6% to 17% increase in the number of days predicted with a flow reduction greater than 10% from baseline conditions compared to the Impact Statement model. The number of days with reductions that were also below the environmental flow value increased by 10 and 17 days at ND5 and ND8, respectively, compared to the Impact Statement HEC-HMS model (Table GW-01.5). This represents a 14% to 26% increase in the number of days predicted with a flow reduction greater than 10% from baseline conditions compared to the Impact Statement model. The North Driftwood River HEC-HMS model updated groundwater seepage rates for the Operations Phase 2 and 3 scenario at subwatershed outlets ND1, ND3, ND5 and ND8 resulted in a decrease in the number of days simulated with a flow increase greater than 10% from baseline conditions of 3, 2, 3 and 8 days, respectively, compared to the Impact Statement HEC-HMS model results (Table GW-01.5).

For the North Driftwood River HEC-HMS model Passive Closure scenario, the updated groundwater seepage values resulted in an adjustment to the number of days with a greater than 10% increase from baseline of less than seven for subwatersheds ND5 and ND8 in comparison to the corrected Impact Statement model (Table GW-01.5). The increases in modelled flow results compared to baseline did not increase the 100-year return period flood flow event rate.

Summary

The corrected pit flow input resulted in an overall reduction of greater than 10% flow reduction from baseline days and an increase of flow increase greater than 10% from baseline days for the passive closure scenario for the North Driftwood and West Buskegau watersheds.

Differences in the predictions of the flow change assessment from the updated groundwater seepage input to the Impact Statement model results and the corrected Impact Statement model results is dependent on the project infrastructure that impacts each individual subwatershed within the North Driftwood and West Buskegau watersheds. The greatest magnitude of changes were predicted for the ND5 and ND8 subwatersheds which predicted an overall increase in flow reduction days and an overall decrease in flow increase days from the Impact Statement model results for the Operations Phase 2 and 3 scenario. Updated groundwater seepage input predicted an overall decrease in flow reduction days and an overall increase in flow increase days from the corrected Impact Statement model results for the passive closure scenario.

2) *Confirm if the predicted groundwater discharge to surface water features (Table 6.13 of Appendix C.5) was included in the surface water model under baseline and during all project phases.*

The predicted groundwater discharge to surface water features presented in Table 6.13 of Appendix C.5 was not used for baseline. Groundwater discharge was accounted for in the baseline HEC-HMS hydrologic model through an integrated baseflow model that applied the Recession Baseflow Method. The baseflow parameter values presented in Table 4.10 of Appendix B.6 were derived as part of the

regional baseflow assessment described in Section 4.1.2 of the same Appendix. As described in Section 6.3.6.1.2 of Appendix C.5, the subsequent life-of-mine phases incorporated predicted changes to groundwater discharge. These changes were represented as groundwater seepage to receivers (such as watercourses and waterbodies), based on seepage rates from Project infrastructure. The seepage rates were predicted by the groundwater flow model and are presented in Table B.1.4 of Appendix C.5, as well as Tables 7.2, 7.3, and 7.4 in Appendix C.4. Changes in groundwater seepage rates from the PA were incorporated into the HEC-HMS hydrologic model. The above response to GW-01b.1 includes revised groundwater seepage inputs from the project infrastructure into the HEC-HMS model for the life of mine Operations 2 and 3 phase, and pit filled (passive closure) model scenarios.

3) *If predicted groundwater discharge to surface water features (Table 6.13 of Appendix C.5) was not included, revise the surface water model to include any groundwater discharge to surface water, accounting for both the long-term watershed wide groundwater discharge (such as passive closure) and the short-term reductions in groundwater discharge (such as during pit dewatering) and provide the estimated changes to surface water quantity. Alternatively, quantify the uncertainty in the surface water model and provide information on what measures will be put in place to manage the uncertainty.*

The responses to GW-01b -1 and -2 provide details on inclusion of Project associated seepage rate increases (point source inputs into applicable subwatersheds) and decreases (no PA groundwater seepage, and FDP discharges which include pit dewatering) in the HEC-HMS hydrologic model and revised HEC-HMS model run with flow changes with the updated groundwater seepage rate inputs for the Operations Phase 2 and 3, and post-closure (pit lake) life of mine phases.

The Impact Statement HEC-HMS models included groundwater seepage inputs from the groundwater model for the different life of mine phases, and the revised seepage models include updated seepage rates for the Operations Phase 2 and 3, and Pit Filled (passive closure) life of mine phases. The Operations Phase 1 and 2 life of mine HEC-HMS model did not have groundwater seepage rate inputs updated as part of this GW-01b response, and the subsequent changes to flow downstream of the Project presented in the Impact Statement have not changed, including adverse residual effects.

The extents of the flow changes in the most downstream subwatersheds for two of the three watershed models (JC_DS, WB1 and ND1) were not predicted to change between the revised groundwater seepage above and Impact Statement models (Appendix C.5) for the Operations Phase 2 and 3 and Pit Filled scenarios. No days with a reduction in flow greater than 10% from baseline were predicted for the revised seepage model runs at the watershed model outlets. The update to the pit flow input for the pit filled passive closure scenario predicted an increase of days with a flow increase greater than 10% at the model extents for the North Driftwood River and West Buskegau River watersheds (ND1 and WB1), but not predicted to exceed the baseline flood flow (Q_{100}). There are no predicted to be changes in the predicted impacts between the revised groundwater seepage and Impact Statement models results at the model outlets, which represent the LSA boundary.

The West Buskegau River model for the subwatersheds upstream of model outlet (WB5, WB9 and WB14) had fewer predicted days with flow reductions greater than 10% for the revised model than the Impact Statement model for the Operations Phase 2 and 3 and Pit Filled scenarios. For the number of days with a greater than 10% increase in flows compared to baseline, the Impact Statement model (with pit full outflows) and revised seepage model were similar. Therefore there is no change in the predicted adverse residual effects with respect to changes in flow reductions and increases within the West Buskegau River based on the revised seepage HEC-HMS model results for the Operations Phase 2 and 3 and Pit Filled life of mine phases.

The revised seepage North Driftwood River HEC-HMS model results for the Operations Phase 2 and 3, and Passive Closure scenarios predicted flow reduction greater than 10% from baseline conditions for a similar number of days to the Impact Statement Model, except for ND5 and ND8 outlets, which predicted 13 and 18 more days, respectively, for the Operations Phase 2 and 3 revised seepage model. The ND5 and ND8 outlet Operations Phase 2 and 3 revised seepage results also predicted 10 and 18 more days, respectively, below the environmental flow rate. With respect to number of days of flow increases greater than 10% from baseline the revised model results were similar for Impact Statement model (with pit outflows) and revised seepage models for the Operations Phase 2 and 3, and Passive Closure scenarios, except for ND5 and ND8 in passive closure with 7 and 6 more days, respectively. No increase in the flood flow rate was predicted for the North Driftwood River for the two scenarios for the revised seepage model. The predicted increases in the number of flow reduction days greater than 10% from baseline conditions for ND5 and ND8, and their potential residual effects on fish and fish habitat are discussed further in the response to the FFH-01 comment, as well as SW Qual-02 with the inclusion of discharge flow control measures at the FDPs. With respect to the changes in the number of days with flow increases greater than 10% upstream of the LSA boundary, the results are similar between the revised seepage and Impact Statement HEC-HMS model results and no changes to potential residual effects on surface water quantity are predicted.

Based on the revised HEC-HMS model results with the updated groundwater seepage inputs, the surface water quantity mitigation and enhancement measures presented in Section 15.4.2.2 of the Impact Statement are adequate and applicable. Applicable proposed measures with respect to groundwater seepage flow changes include the following:

- Limit the construction footprint the construction footprint (i.e., PA) to the extent possible to limit the number of subwatersheds overprinted by the PA
- Water discharges to the North Driftwood River and West Buskegau River will be balanced to the extent feasible to maintain watercourse flows

No additional mitigation measures are required to address prediction uncertainty with respect to groundwater seepage changes. The revised groundwater seepage model has been used to respond to other information requests, including but not limited to FFH-01, SW QUAN-01 and SW QUAL-02.

GW-01c Groundwater Model – Boundary Conditions

Comment Description (Context and Rationale):

The IS does not provide sufficient rationale for the selection of boundary conditions in the numerical groundwater model. This creates a high degree of uncertainty in the assessment of changes to groundwater quantity and groundwater to surface water interactions.

The lakes and rivers within the numerical groundwater model are assigned using boundary conditions that maintain the elevation of the surface water feature throughout the life of the project, regardless of any changes in rates of groundwater discharge or recharge. In certain cases, this can result in the boundary condition acting as an infinite source of water and limit the extent of groundwater drawdown associated with pit dewatering. This inhibits IAAC from understanding the geographic extent of changes to surface water flows and levels due to groundwater drawdown, which is necessary to understand how habitats used by fish and species of importance to Indigenous peoples may be affected.

For example, in reviewing groundwater discharge reported in Tables 6.2-6.6 of Appendix C.4:

- *Groundwater elevations around Jack Lake are forecasted to change by <1 m throughout all project phases, despite Jack Lake changing multiple times between a location of groundwater discharge and groundwater recharge. The boundary conditions for Sutherland Lake and Jack Lake appear to be in adjacent numerical cells. As these lakes differ in assigned elevation by 1 m, some of the changes in groundwater discharge may be numerical artifacts. It is not clear how much of this change in discharge may be related to the assignment of boundary conditions.*
- *The unnamed lake west of the west stockpile (a headwater to the North Driftwood River) becomes a constant source of water in the numerical model during operations. This limits the extent of groundwater drawdown around this lake.*
- *West Buskegau River's boundary approximation limits the eastern extent of groundwater drawdown from pit dewatering.*
- *The rationale for the choice of boundary conditions in Appendix C.4 is limited and does not include any local scale data or conceptualization.*

This information is required to assess changes in surface water flows and levels which is then used to assess effects to fish habitat and Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.6.1

IS: Appendix C.4

Required Information to Resolve Comment:

1) *Provide a more detailed rationale for fixing the elevation of all surface water features within the numerical model. The rationale must include:*

   - *Information on the water balance and catchment area of each water feature, to support the degree to which they are maintained by groundwater flow and to support the determination that that there is sufficient runoff to maintain water levels when the water feature becomes a source of groundwater recharge.*
   - *Information on the surficial geology associated with each surface water feature. For example, the degree to which a water feature is incised into the glaciolacustrine unit, or is in contact with glaciofluvial units, would improve certainty in the degree of connection between the groundwater and the surface water flow systems.*
   - *An assessment of the sensitivity of the model results, particularly the extent of groundwater drawdown, associated with the type of boundary condition assigned.*

Canada Nickel's Response:

Assignment of Boundary Conditions in the Numerical Groundwater Flow Model

The lakes and rivers within the numerical groundwater model were assigned using general head boundaries (GHBs) and river boundaries, respectively. Both types of boundary conditions allow for modeling head-dependent fluxes between groundwater and surface water systems with water able to flow into or out of the groundwater system depending on whether the assigned hydraulic head in the surface water feature is above or below the groundwater hydraulic head in model cell. River boundaries and GHBs hold constant the water level in the surface water feature they represent but they do not force the water table to be held constant. The boundary conditions allow the water table to rise above and below the hydraulic head assigned to the boundary condition. The flux between the boundary condition representing the surface water feature and groundwater is also governed by a conductance term that is based on the size of the cell (for GHBs) or the size of the river simulated by a river cell, and the hydraulic conductivity of the lakebed or riverbed.

Local scale data were applied as available to set the properties of the GHB and River boundary conditions as follows:

- The depth and width of each watercourse was assigned based on data from hydrological monitoring stations where available. Where field measurements were not available, aerial photography was used to estimate watercourse width.
- The hydraulic conductivity of riverbed and lakebed sediments was assigned based on grain size analysis of samples collected at 62 locations within the PA. To account for the uncertainty inherent in estimates of hydraulic conductivity, sensitivity scenarios were completed where the riverbed and lakebed hydraulic conductivity was raised and lowered by factors of 2.0 and 0.1, respectively.

- The five headwater lakes (Mel Lake, Sutherland Lake, Jack Lake, Gerry Lake and Martin Lake) and Unnamed Lake (near the West Stockpile)) are located in an area where the site conceptual model indicates that the surficial glaciolacustrine unit is absent (refer to comment GW-01d, Figure GW-01.1). To represent less resistance to flow within each lake, the hydraulic conductivity in each lake was increased by a factor of 2 to 20 compared to the surrounding lithologic units. The depth of the zone of increased hydraulic conductivity was based on the bathymetry data for each lake.

The model results were reviewed to identify river and general head boundary conditions that may contribute an unrealistic volume of recharge to groundwater in operations. These results of these reviews for individual reaches are provided below.

Comments on Groundwater Recharge from Specific Lakes and River Reaches

Mel, Sutherland, and Jack lakes are interconnected and act as one surface water feature. The hydraulic head varies by less than 1 m from the most upstream of the three lakes (Mel and Sutherland Lakes, 274.86 m amsl) to the most downstream (Jack Lake, 274.07 m amsl). This head change over a short distance does not result in numerical instability or unrealistic discharge estimates over the three lake system as increased discharge in one lake is balanced by decreased discharge in another. For example, while there are computed differences between those three lakes, the net flow is 1,300 m^3/d for the system, in total, for the existing conditions scenario. When the gains and losses computed for the three individual reaches are considered together as a whole, there is a computed total net loss of 41 m^3/d for the Year 17 modeled conditions. This predicted flow reflects the reasonable and foreseeable net influence of groundwater flow flowing toward the lakes from the Tailings Management Facility and groundwater loss from the pit draining water from the model.

On Figures A.12 and A.13 of Appendix C.4, the Unnamed Lake (West Stockpile) and certain reaches of the West Buskegau River (WB9, WB12, and WB14) appear to limit the extent of drawdown from the dewatering of the open pit in years 17 and 30, respectively. The effect of the Unnamed Lake (West Stockpile) on the predicted drawdown contours is less than 1 m, which was assessed in the Impact Statement to be within the range of natural variability. For reaches WB9, WB12, and WB14, the numerical groundwater flow model predicts that the approximately 500 m^3/day of groundwater discharge will be replaced by approximately 2,400 m^3/day of groundwater recharge by year 30 – i.e. the three reaches could switch from gaining reaches to losing reaches. The MODFLOW model results were evaluated, as discussed above, to assess changes in groundwater contributions to baseflow for each scenario. The numerical groundwater flow model, however, does not take into account the water that will be added to reach WB9 at discharge points FDP-SP-01 and FDP-SP-03. The groundwater flow model informed the surface water analysis by providing output data on the computed changes in groundwater contributions to surface water. By Mine Year 17 of the Project, the average annual contribution to surface water from these two discharge points is predicted to be approximately 64,000 $m^{3/}$day.

The West Buskegau River HEC-HMS model for the Operations Phase 3 scenario (see response to GW-01b Table GW-01.2) has no groundwater seepage predicted to be discharging from the PA until near the downstream subwatersheds (WB6 and WB5). The subwatersheds immediately adjacent to the Project and downstream of the FDT-SP-01 and FDP-SP-03, WB9 and WB5, for the Operations Phase 3 – Mine Year 35 are not predicted to have days with flow reductions more than 10% of the baseline condition. The additional flow from the FDPs in the West Buskegau River is anticipated to limit the eastern extent of groundwater drawdown from pit dewatering as presented on Figures A.12 and A.13 of Appendix C.4

Predictions of Effects on Surface Water Hydrology Due to Groundwater Drawdown

The purpose of the numerical groundwater flow model described in Impact Statement Appendix C.4 was to assess potential effects of the Project on the quantity of groundwater resources. More specifically, the groundwater flow model was used to predict open pit groundwater inflow rates; groundwater drawdown and mounding related to the Project activities; and changes in groundwater discharge to surface water, or surface water recharge to groundwater, relative to the calibrated baseline conditions for the operation and passive closure phases of the Project.

The effects of predicted changes to groundwater discharge and recharge rates on the flow in the main channels (Jocko Creek, North Driftwood River, and West Buskegau River) were assessed using a continuous HEC-HMS hydrologic model as described in Impact Statement Appendix C.5. The response to GW-01b.1 includes details on how groundwater model seepage outputs were incorporated into the hydrologic model. The HEC-HMS hydrologic modeling work concluded that no changes greater than 10% are predicted at the modelled watershed outlets (JC_DS, ND1 and WB1), including with revised seepage inputs (see response to GW-01b). Water levels in the five headwater lakes (Mel Lake, Sutherland Lake, Jack Lake, Gerry Lake and Martin Lake) and Unnamed Lake (near the West Stockpile)) are predicted to decrease by a maximum of up to 0.05 m during various stages of mine life as a result of changes to groundwater discharge and recharge rates predicted by the groundwater numerical flow model. This reduction in lake levels is within the natural variability range of each waterbody.

As noted in response to GW-01, groundwater and surface water monitoring and management plans will be developed prior to construction and will include an adaptive management component with trigger thresholds to alert to changing conditions prior to significant environmental effect. As part of adaptive management Canada Nickel committed to implementing technically and economically feasible mitigation measures if monitoring indicates that specified levels of environmental change have been reached or exceeded as a result of Mine development or operation. This includes the potential to supplement affected water course(s) by returning water pumped from the open pit, and treated if necessary, to local water courses.

GW-01d Groundwater Model – Hydrostratigraphic Concepts

Comment Description (Context and Rationale):

There is a high degree of uncertainty within the hydrostratigraphic conceptual model regarding the vertical gradients between ground surface and the subsurface geological units, across the study area.

The following uncertainties have been identified in the conceptual groundwater models:

- *Section 5.7 of Appendix B.5 states that information from nested wells within the eastern portion of the open pit footprint shows downwards vertical gradients between the overburden and bedrock, indicating groundwater recharge. However, this section also states that many of the wells screened within the confined deep glaciofluvial aquifer have groundwater elevations above the ground surface, but sufficient detail has not been provided to determine where this occurs. This information does not form a sufficient conceptual model of groundwater recharge and discharge within the local study area.*
- *Section 5.7 also states that surface water features within the local study area are sites of groundwater discharge. However, data has not been provided to support this conceptualization. Based on the results of the numerical model (Table 6.2), some surface water features are recharging the groundwater flow system (Zed Lake and Sutherland Lake).*
- *It is unclear where groundwater elevations exceed ground surface within the confined aquifer on Figure A.11 of Appendix B.5, nor is it clear if the contours from the numerical model on Figure A.9 of Appendix C.4 represent the water table, or if vertical gradients were accounted for in this figure. These figures do not provide sufficient information to support the conceptual model.*

Reference to TISG and IS:

TISG: Section 8.6.1

IS: Appendix B.5, Appendix C.4

Required Information to Resolve Comment:

1) *Revise the conceptual model of groundwater flow to include vertical gradients, and information on areas of groundwater recharge and discharge, by providing:*

   - *A table with all groundwater elevations used in the numerical model calibration process that includes the screened hydrostratigraphic unit, and the ground surface elevation.*
   - *A plan view map highlighting areas of groundwater recharge and discharge.*
   - *A map showing any location of observed artesian conditions.*
   - *A detailed conceptualization of the extent of the confining glaciolacustrine unit, and the confined and unconfined portions of the glaciofluvial unit, including maps and cross-sections.*
   - *Maps and cross-sections showing the distribution of the modelled hydrostratigraphic units.*
   - *Any additional groundwater information available (e.g. standpipe piezometer data) that identifies which surface water features interact with the groundwater flow system, and which ones may be more isolated from groundwater by the glaciolacustrine unit.*

Canada Nickel's Response:

Groundwater Elevation Calibration Targets

The groundwater elevations used in the numerical model calibration process, including the unit screened and the ground surface elevation at each location, is provided in Table GW-01.6.

Table GW-01.6 Numerical Model Calibration Targets – Groundwater Elevations

Well Name/ MECP WWR[a]	Target Groundwater Elevation (m amsl)	Ground Surface Elevation (m amsl)	Screened Hydrostratigraphic Unit
WOS-BH-01	268.55	267.87	Silty Sand/Sandy Till
TSF-BH-34	281.12	283.21	Silty Sand/Sandy Till
TSF-BH-30	278.37	277.86	Silty Sand/Sandy Till
TSF-BH-26B	269.08	270.37	Silty Sand/Sandy Till
TSF-BH-26A	269.11	270.37	Fine/Medium Sand
TSF-BH-22	271.05	271.30	Clayey Till
TSF-BH-16	274.73	275.20	Silty Sand/Sandy Till
TSF-BH-15B	270.22	273.43	Clayey Till
TSF-BH-15A	269.33	273.43	Clayey Till
TSF-BH-11	270.02	275.02	Clayey Till
TSF-BH-06	270.20	276.02	Fine/Medium Sand
TSF-BH-01A	270.53	273.26	Clayey Till
SOS-BH-02	270.19	270.02	Silty Sand/Sandy Till
PF-BH-02	269.25	272.39	Silty Sand/Sandy Till
OP-BH-06	270.18	276.51	Fine/Medium Sand
OP-BH-01	268.30	267.59	Clayey Till
NWR-BH-01	266.91	277.31	Clayey Till
HG-BH-03	269.10	269.13	Clayey Till
HG-BH-01	269.36	269.78	Silty Sand/Sandy Till
DP7-23	268.48	270.35	Fine/Medium Sand
CR-BS-D2	272.55	273.36	Clay
CR-BS-D1	270.81	273.36	Ultramafic
CR-BS-C4	269.56	275.59	Ultramafic
CR-BS-C3	273.95	275.59	Silty Sand/Sandy Till
CR-BS-C2	274.20	275.59	Clayey Till
CR-BS-C1	272.04	275.59	Silty Sand/Sandy Till
CR-BS-B2	272.83	274.79	Clay
CR-BS-B1	272.55	274.79	Metavolcanic Rocks
CR23-307	269.21	274.51	Ultramafic

Well Name/ MECP WWR[a]	Target Groundwater Elevation (m amsl)	Ground Surface Elevation (m amsl)	Screened Hydrostratigraphic Unit
CR23-306	272.58	276.29	Ultramafic
CR22-262A	271.17	276.87	Clay
CR22-260	269.82	273.89	Ultramafic
CR22-211	267.80	275.97	Clayey Till
CR22-203A	271.07	273.59	Silty Sand/Sandy Till
CR21-161B	270.75	277.79	Clay
CR21-142	270.05	277.49	Silty Sand/Sandy Till
CR19-14	269.80	273.35	Silty Sand/Sandy Till
7286671	271.42	287.63	Metavolcanic Rocks
7233144	263.39	268.87	Metasedimentary Rocks
7185741	262.61	266.50	Silty Sand/Sandy Till
7150165	279.16	286.08	Silty Sand/Sandy Till
7132455	262.98	263.51	Sand
7115154	283.33	282.15	Clay
7042392	264.67	277.63	Metasedimentary Rocks
5902374	289.39	293.06	Silty Sand/Sandy Till
1605811	278.66	282.82	Silty Sand/Sandy Till
1605672	290.75	290.63	Clay
1605181	259.88	265.06	Silty Sand/Sandy Till
1605068	269.64	266.50	Metasedimentary Rocks
1605067	269.64	266.5	Metasedimentary Rocks
1605066	266.04	268.01	Metasedimentary Rocks
1604991	251.79	258.80	Silty Sand/Sandy Till
1604893	256.45	258.80	Metasedimentary Rocks
1604875	267.57	275.06	Metasedimentary Rocks
1604700	272.35	279.56	Metavolcanic Rocks
1603745	263.57	266.50	Metasedimentary Rocks
1603617	257.13	268.01	Metasedimentary Rocks
1603611	288.00	301.55	Sand
1603418	255.64	268.01	Silty Sand/Sandy Till

Well Name/ MECP WWR[a]	Target Groundwater Elevation (m amsl)	Ground Surface Elevation (m amsl)	Screened Hydrostratigraphic Unit
1603376	242.43	252.64	Metasedimentary Rocks
1603201	283.14	279.88	Silty Sand/Sandy Till
1603056	276.42	277.94	Metasedimentary Rocks
1603047	277.54	269.14	Silty Sand/Sandy Till
1602567	261.04	268.01	Metasedimentary Rocks
1602357	261.69	271.95	Silty Sand/Sandy Till
1602207	241.22	275.12	Metasedimentary Rocks
1602159	247.02	279.34	Metasedimentary Rocks
1602153	255.63	274.94	Silty Sand/Sandy Till
1601746	260.03	279.34	Sand
1601660	251.14	258.80	Silty Sand/Sandy Till
1601515	249.16	252.64	Silty Sand/Sandy Till
1600790	273.68	278.74	Silty Sand/Sandy Till
1600762	255.73	262.79	Intrusives
1600717	285.97	278.07	Sand
1600714	289.44	297.24	Sand
1600713	277.82	280.19	Silty Sand/Sandy Till
1600712	277.59	282.32	Metavolcanic Rocks
1600710	279.66	276.98	Sand
1600180	243.78	258.90	Silty Sand/Sandy Till
1600179	265.38	270.04	Fine/Medium Sand
1600159	243.82	252.64	Silty Sand/Sandy Till

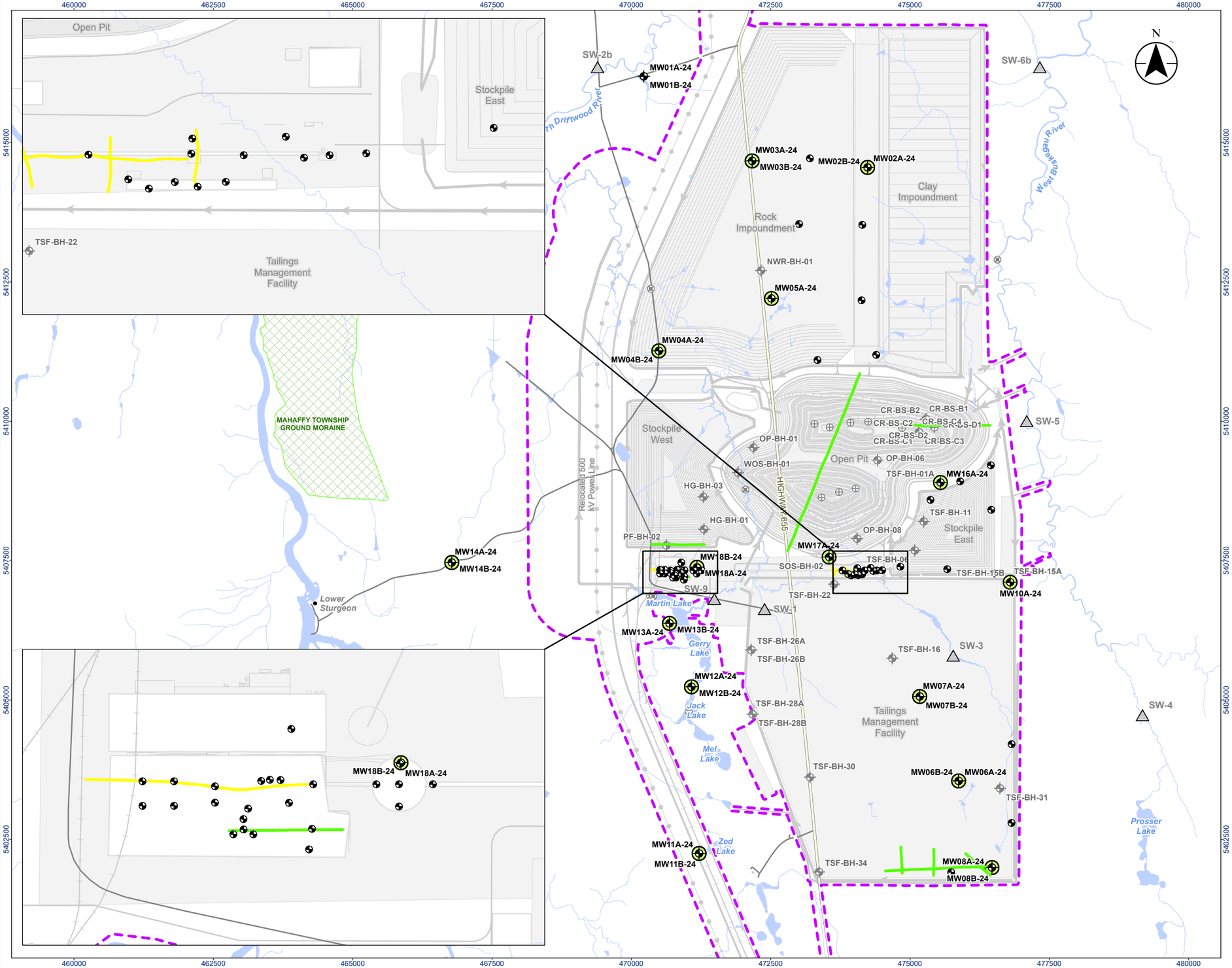
Note:
[a]MECP WWR - Ministry of Environment, Conservation and Parks Water Well Record

Summary of Data Used in Responses

Since the completion of the Groundwater Baseline Report (Impact Statement Appendix B.5) and the TDR – Groundwater Assessment (Impact Statement Appendix C.5), Canada Nickel has completed the following field investigations within the Project Area (PA):

- Drilling of 83 boreholes for a total of over 3,000 m of drilling length
- Installation of 28 monitoring wells at depths ranging from 8 to 88 m below ground surface (bgs)
- Measurement of groundwater levels at 56 locations since completion of the 2024 drilling program, with a combination of manual water level measurements taken three times per year, and dataloggers in 26 of these locations
- Single Well Hydraulic Response Testing (slug tests) in 26 monitoring wells
- Geophysical surveys (resistivity) at 5 locations for a total of 10,270 m of line coverage
- Continued monitoring of 9 existing hydrometric stations

The locations of these additional investigations are presented on Figure GW-01.2.



Stantec

CANADA NICKEL COMPANY

Legend

- Project Area

Post Baseline Investigations

- Monitoring Well
- Borehole
- Hydraulic Response Test

Geophysical Surveys

- Resistivity
- Seismic

Baseline Monitoring Locations

- Monitoring Well
- Exploratory Borehole
- Drive-Point Piezometer
- Hydrometric Station

Base Features

- Major Road
- Minor Road
- Watercourse
- Waterbody
- Conservation Reserve (Regulated)

0 1 2 km

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Notes

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Project Location
Timmins, Ontario

160901195 REVB
Prepared by awhite on 2025-12-19

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
GW-01.2

Title
Post Baseline Groundwater Investigation Locations

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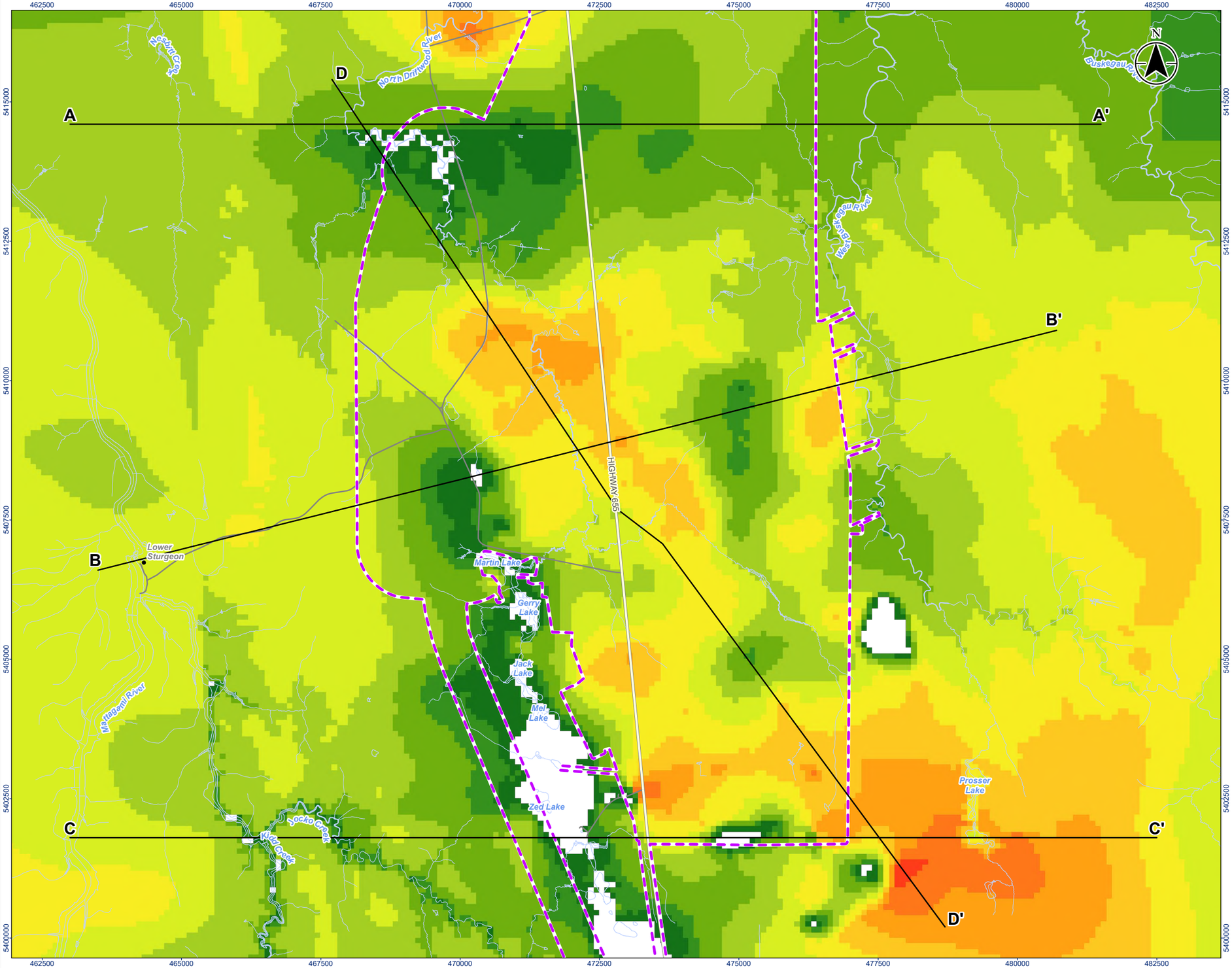
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The geologic data from the drilling and geophysics programs, and the hydraulic conductivity values estimated from single well hydraulic response testing, were used to update the overburden conceptualization in the hydrostratigraphic model described in Impact Statement Appendix C.4 Section 5.1. The additional groundwater levels and surface water flows were used to refine the conceptual understanding of the connection between shallow groundwater and surface water, and the location of observed artesian conditions.

Revisions to the conceptual understanding of groundwater flow within the PA are described below.

Thickness of Glaciolacustrine Unit

The interpreted thickness of the glaciolacustrine unit from the updated overburden hydrostratigraphic model is presented on Figure GW-01.3. Four cross-sections through the conceptual model are presented on Figure GW-01.4 through Figure GW-01.7.



Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Cross Section Location

Confining Glaciolacustrine Unit (m)

- 0
- 0.1 - 2.5
- 2.6 - 5
- 5.1 - 10
- 10.1 - 15
- 15.1 - 20
- 20.1 - 25
- 25.1 - 30
- 30.1 - 35
- 35.1 - 40
- 40.1 - 45

Base Features

- Major Road
- Minor Road
- Watercourse
- Waterbody

0 1 2 km

1:70,000 (At original document size of 11x17)

Notes

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3. Confining Glaciolacustrine Unit extracted from the 2025 Leapfrog Works 3D Conceptual Site Model of the Crawford Nickel Project.
4. Artesian Conditions represent the measured water level above the top of the aquifer. Flowing Artesian Conditions exist when the measured water level is above ground surface.



Project Location
Timmins, Ontario

160901195 REVA
Prepared by jsegato on 2025-12-16

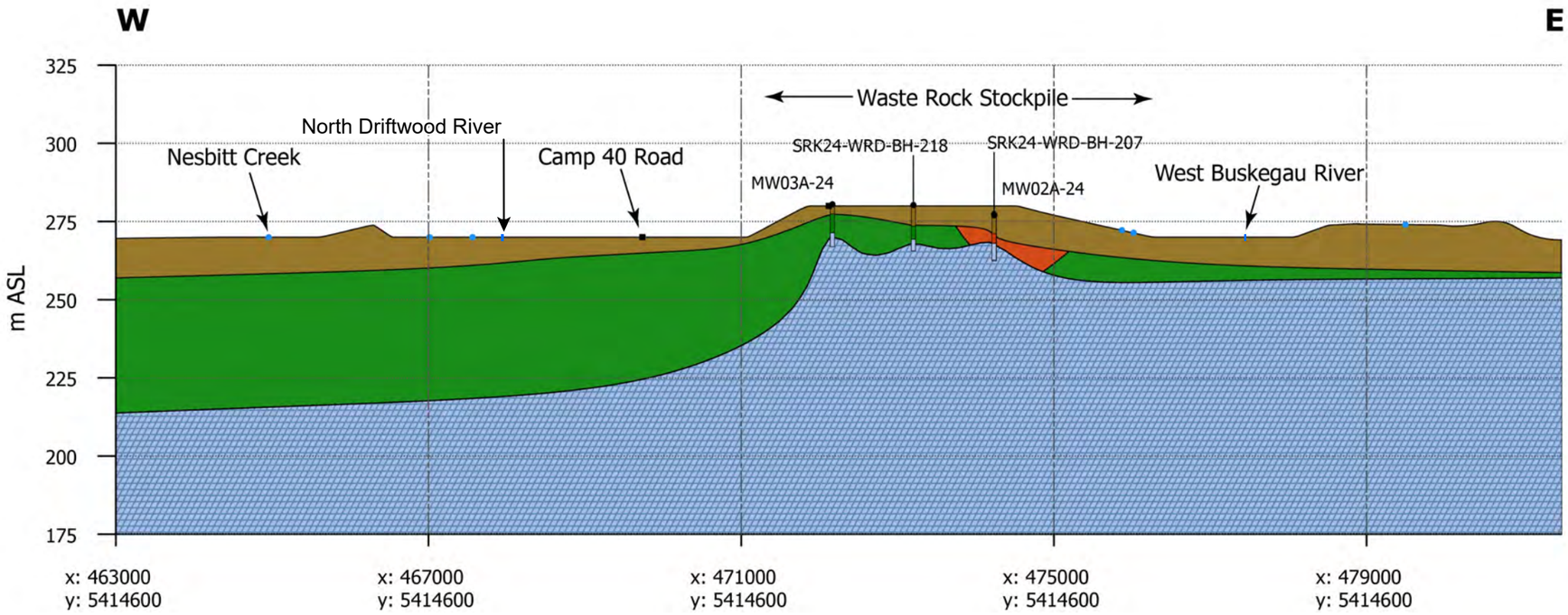
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
GW-01.3

Title
Glaciolacustrine Thickness

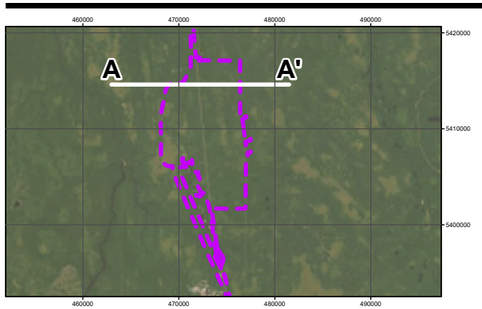
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W: 463000, 5414600

E: 481500, 5414600



Glaciolacustrine Unit
- Clay

Glaciofluvial Unit
- Silty Sand/Sandy Till

Till and Bedrock
- Clayey Till
- Bedrock

- Watercourse
- Road

Vertical exaggeration: 40x

0m 4000m

Notes

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Stantec

Project Location
Timmins, Ontario

160901195 REVA
Prepared by jsegato on 2025-12-19
Technical Review by AW on 2025-11-24

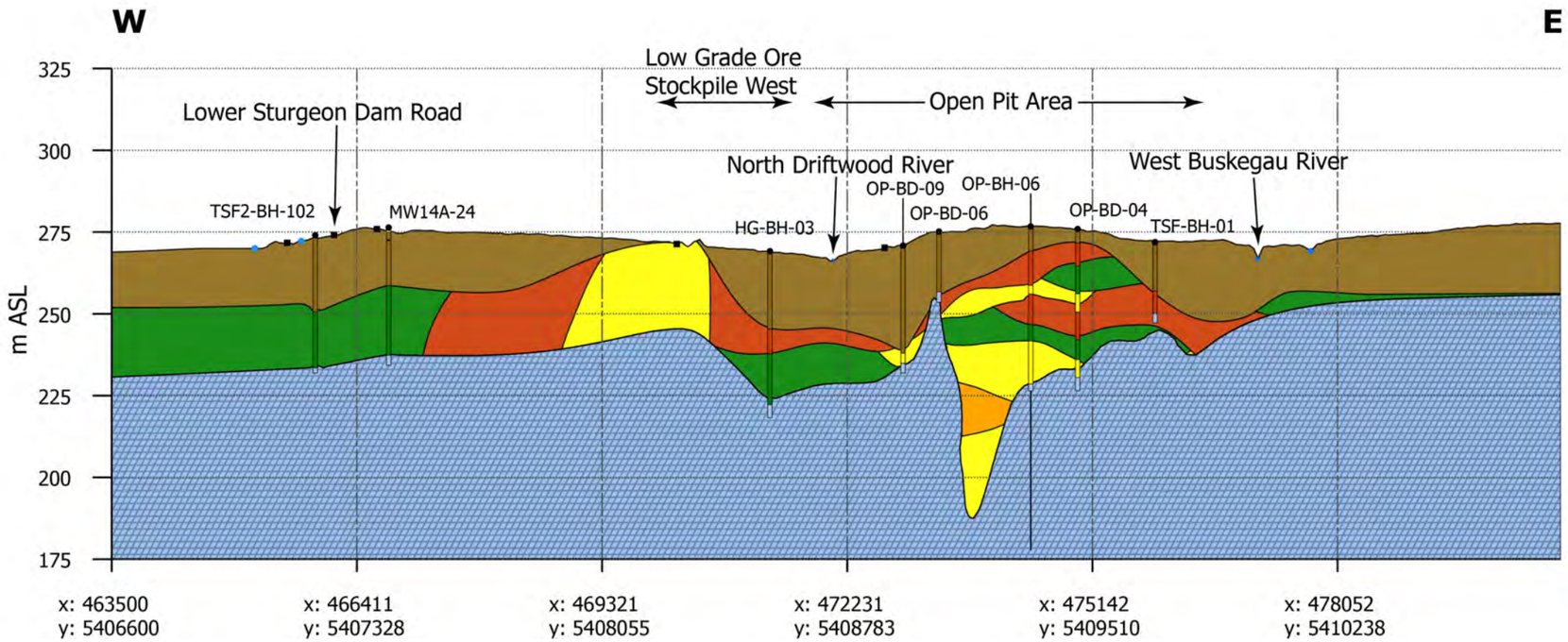
Client/Project
CANADA NICKEL COMPANY (CNC)
CRAWFORD NICKEL PROJECT

Figure No.
GW-01.4

Title
Cross Section A-A'

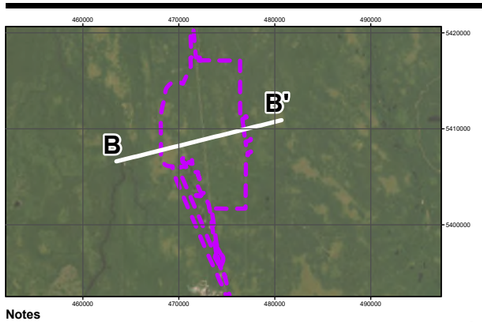
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W: 463500, 5406600

E: 480701, 5410900



Glaciolacustrine Unit
- Clay

Glaciofluvial Unit
- Silty Sand/Sandy Till
- Fine/Medium Sand
- Coarse Sand

Till and Bedrock
- Clayey Till
- Bedrock

- Watercourse
- Road

Vertical exaggeration: 40x

0m 4000m

Notes

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Project Location
Timmins, Ontario

160901195 REVA
Prepared by jsegato on 2025-12-16
Technical Review by AW on 2025-11-24

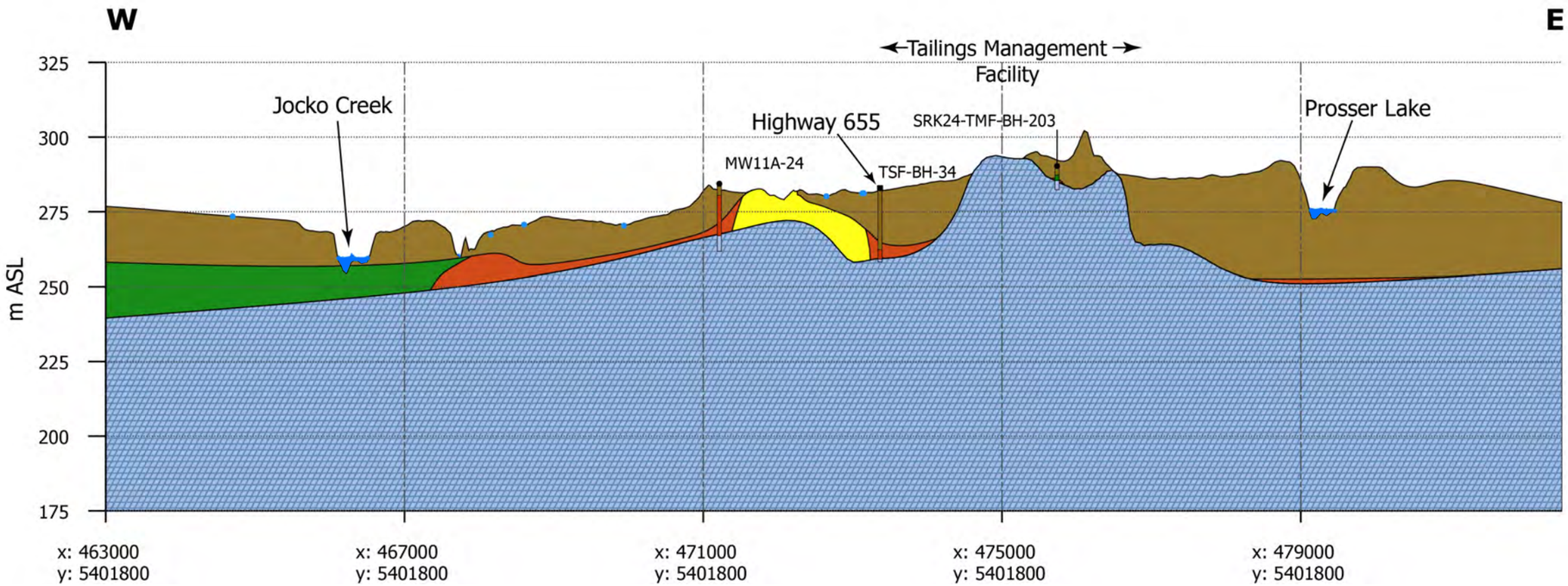
Client/Project
CANADA NICKEL COMPANY (CNC)
CRAWFORD NICKEL PROJECT

Figure No.
GW-01.5

Title
Cross Section B-B'

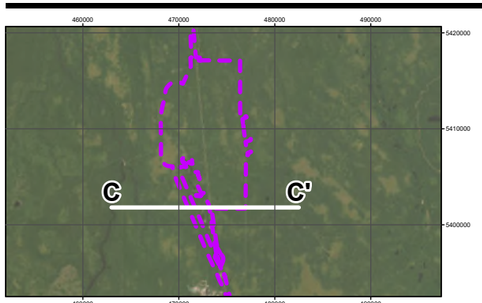
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W: 463000, 5401800

E: 482500, 5401800



Glaciolacustrine Unit
- Clay

Glaciofluvial Unit
- Silty Sand/Sandy Till
- Fine/Medium Sand

Till and Bedrock
- Clayey Till
- Bedrock

- Watercourse
- Road

Vertical exaggeration: 40x

0m — 4000m

Notes

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Stantec

Project Location
Timmins, Ontario

160901195 REVA
Prepared by jsegato on 2025-12-16
Technical Review by AW on 2025-11-24

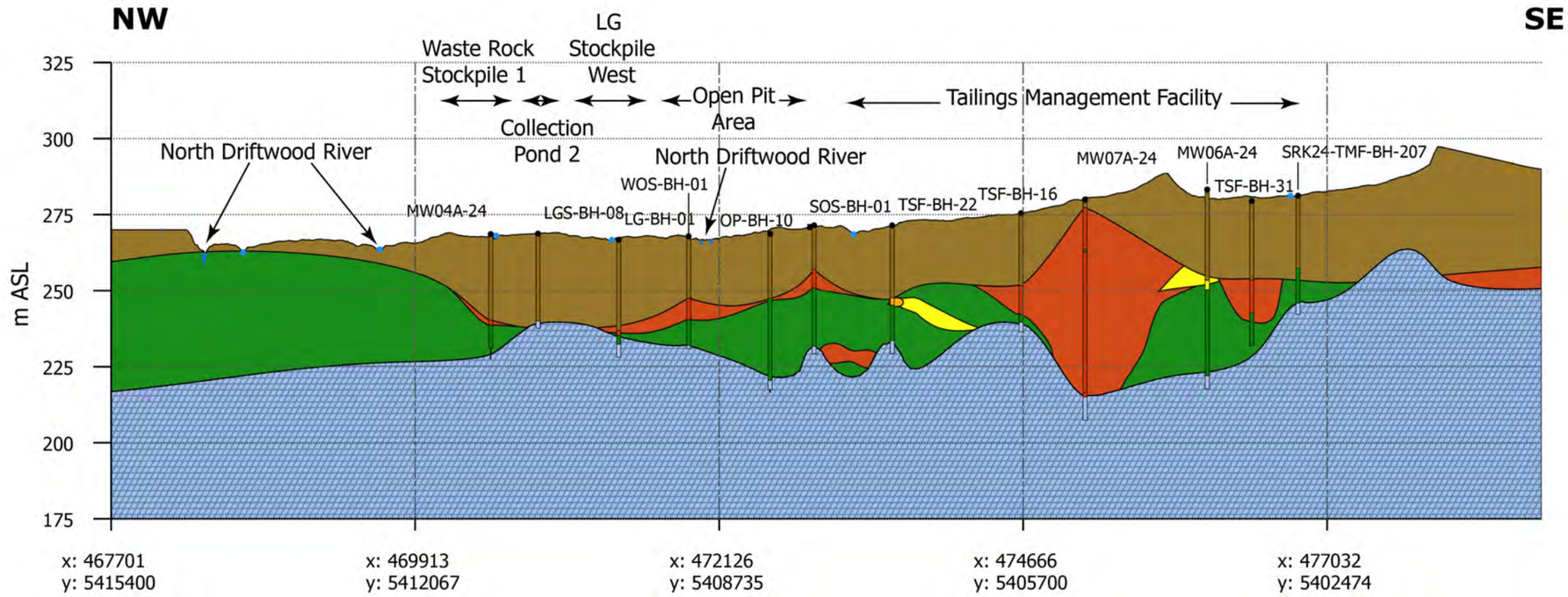
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CRAWFORD NICKEL PROJECT

Figure No.
GW-01.6

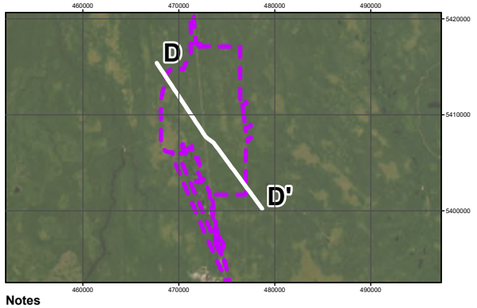
Title
Cross Section C-C'

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W: 467701, 5415400
E: 478700, 5400200



Glaciolacustrine Unit
- Clay

Glaciofluvial Unit
- Silty Sand/Sandy Till
- Fine/Medium Sand
- Coarse Sand

Till and Bedrock
- Clayey Till
- Bedrock

- Watercourse
- Road

Vertical exaggeration: 40x

0m — 4000m

Notes

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Stantec

Project Location
Timmins, Ontario

160901195 REVA
Prepared by jsegato on 2025-12-16
Technical Review by AW on 2025-11-24

Client/Project
CANADA NICKEL COMPANY (CNC)
CRAWFORD NICKEL PROJECT

Figure No.
GW-01.7

Title
Cross Section D-D'

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\\Ca0004-pfss01\01609\active\160930456\160930456_gis_cad\gis\mxds\ISIR\160930456_IR_Gw.aprx\160901195_IR_GW_Fig-01.7_Cross_Section (NW-SE)_Revised on 12/16/2025 9:37 AM by jsegato

The glaciolacustrine unit is the dominant surficial unit in the PA and is up to 45 m thick in isolated locations. Thickness is typically greater than 5 m. There are some isolated locations where this unit is absent, including where the esker deposits are mapped in the headwaters of the North Driftwood River, and areas where bedrock outcropping is present. Underlying this dominant surficial glaciolacustrine unit, there are isolated deposits of glaciofluvial aquifer materials consisting of silty sand to coarse sand, which is typically underlain by either a clay or fine grained till deposit, or it directly overlies bedrock.

Groundwater Recharge and Discharge

The Groundwater Baseline Report (Impact Statement Appendix B.5) cited a regional hydrology assessment that suggested that there may be groundwater discharge in the LSA/RSA based on a regional BFI of 0.3. The data collected in the PA as part of the baseline assessment and the data collected since, suggests there is limited interaction between groundwater and surface water systems across the PA. This is interpreted to be due to the thick glaciolacustrine unit that separates the glaciofluvial and bedrock aquifer systems from the surface water features across most of the PA. The following section describes the various data that were reviewed to support this conceptual understanding.

As noted in response GW-01a above, the BFI for the local watershed across the LSA/RSA are estimated to range from 0.22 to 0.32, which are predominantly lower than the average regional BFI of 0.3 (Impact Statement Appendix B.6) due to the presence of the clay belt. This relatively low BFI indicates that the surface water systems are predominantly surface water fed.

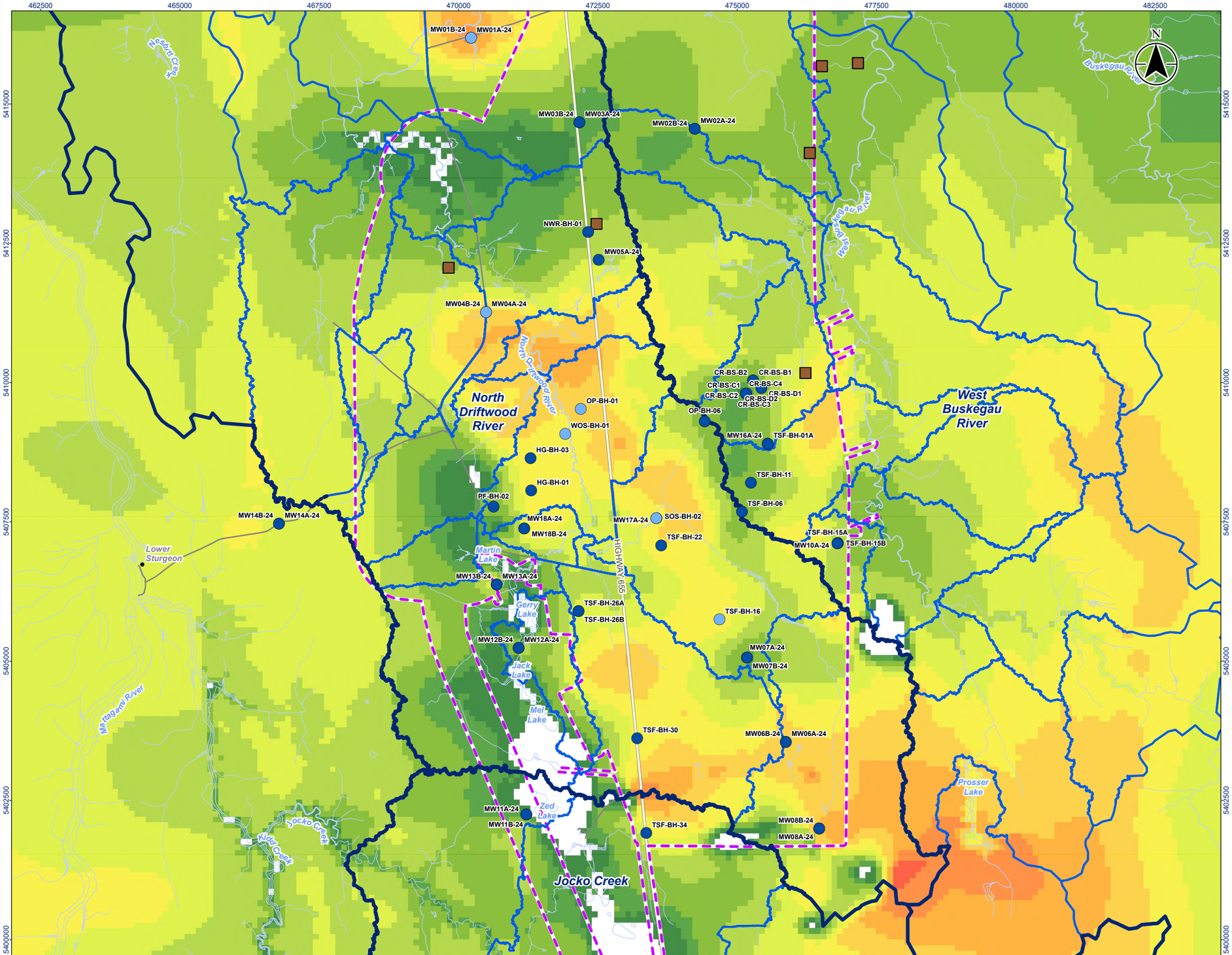
To assess for groundwater surface water interactions across the LSA/RSA, surface water temperature profiles at 9 hydrometric stations (Figure GW-01.2) from 2021 to 2025 were reviewed. Surface water systems that have a strong groundwater input tend to be characterized by more consistent or stable temperatures than those which do not experience groundwater discharge. This is because groundwater maintains a consistent temperature year-round, where surface water is naturally influenced by seasonal air temperatures. In each of the 9 locations monitored, the surface water temperatures typically had a low around 0˚Celcius during winter months, to high temperatures, calculated based on a 95th percentile, ranging from 18˚Celcius to 24˚Celcius. The data did not suggest a strong groundwater influence in these locations based on the seasonal range in water temperature in each location.

In spring and summer 2025, fish habitat assessments were conducted at a subset of watercourses within the LSA/RSA at a total of 66 locations to characterize physical, chemical, and biological conditions relevant to fish use and habitat function. As part of this assessment, conditions indicative of groundwater discharge were noted when observed. This included groundwater upwelling or visible seepage, or the presence of indicator species such as watercress. Based on this assessment, only 6 of 66 locations (9%) were observed to have groundwater discharge indicating a groundwater surface water interaction. The locations where groundwater discharge was observed are presented on Figure GW-01.8.

The fish communities in the North Driftwood River, West Buskegau River, and Jocko Creek Watershed watersheds are represented by a mix of cool-water fish species typical of northeastern Ontario. Species assemblages include a variety of small-bodied forage fishes (e.g., minnows) and larger-bodied species (e.g., northern pike). A total of 28 fish species were identified during baseline surveys (Appendix B.8.2 of the Impact Statement). No evidence of groundwater upwelling was observed along these rivers during

field assessments for fish species. The fish community is dominated by species that do not rely on groundwater upwelling for successful egg development. Obligate cold-water, groundwater-dependent species (e.g., Brook Trout) were not observed within the study area, suggesting that there is not a strong groundwater contribution.

The review of available data summarized above supports the conceptual understanding that the wetlands and surface water features present across the LSA/RSA are interpreted to be a function of a poorly drained landscape characterized by the dominant presence of the glaciolacustrine unit, and not the result of a strong groundwater surface water connection.



Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Artesian
- Flowing Artesian
- Area of Observed Groundwater Discharge
- Watershed Boundary
- Subwatershed Boundary

Confining Glaciolacustrine Unit (m)

- 0
- 0.1 - 2.5
- 2.6 - 5
- 5.1 - 10
- 10.1 - 15
- 15.1 - 20
- 20.1 - 25
- 25.1 - 30
- 30.1 - 35
- 35.1 - 40
- 40.1 - 45

Base Features

- Major Road
- Minor Road
- Watercourse
- Waterbody

0 1 2 km

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Notes

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3. Confining Glaciolacustrine Unit extracted from the 2025 Leapfrog Works 3D Conceptual Site Model of the Crawford Nickel Project.
4. Artesian Conditions represent the measured water level above the top of the aquifer. Flowing Artesian Conditions exist when the measured water level is above ground surface.
5. Areas of observed groundwater discharge based on fish ecology inventory completed in Spring/Summer 2024



Project Location
Timmins, Ontario

160901195 REVA
Prepared by jsegato on 2025-12-18

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
GW-01.8

Title
Location of Observed Groundwater Discharge and Artesian Conditions

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Artesian Conditions

The locations of observed artesian conditions in the glaciofluvial aquifer in Spring 2025 are provided in Figure GW-01.8. For each monitoring well, the measured groundwater elevation in Spring 2025 was compared to the top of the screened aquifer to assess if the aquifer is exhibiting artesian conditions, and to the ground surface elevation to determine if the aquifer is experiencing flowing artesian conditions. Most of the observed artesian wells are located within areas where the overlying glaciolacustrine unit is thick and uninterrupted, and not in the areas where groundwater discharge is suspected (in the headwaters of the North Driftwood River and in the Jocko Creek watershed) which suggests these upward vertical hydraulic gradients are a result of the pressure of a confining unit and not indicative of an area of groundwater discharge. None of the monitoring wells had uncontrolled flow as they were capped with j-plugs that contained the hydraulic head.

GW-01e Groundwater Model – Regional Fault

Comment Description (Context and Rationale):

Despite further testing planned (Section 8.1) there remains uncertainty in the characterization of the regional fault and its effect on groundwater flow. This compounds with the others to cause a high degree of uncertainty with groundwater-surface water interactions.

The hydraulic testing straddled a short fault interval (6 metres) with a longer packer interval (60 metres), so that the test does not provide the properties of the fault. It is acknowledged that borehole logging indicates that the fault may contain gouge and some chlorite mineralization, supporting the assumption that the fault does not act purely as a conduit. A sensitivity analysis of the fault representation within the groundwater numerical model may help to increase certainty in the numerical model results. However, the current numerical software package does not permit this approach (Section 6.5).

Should the regional fault act as a conduit, a barrier, or a combined barrier conduit, it likely influences groundwater flow (direction and quantity) and groundwater-surface water interactions. Understanding how the fault may influence groundwater-surface water interactions is necessary to understand changes to surface water (flows, quantity, and quality), and associated effects to fish and fish habitat and Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.6.1, Section 8.6.2

IS: Appendix B.5 – Section 5.5 & Section 5.6, Appendix C.4 – Section 6.5 & Section 8

Required Information to Resolve Comment:

1) *Provide further characterization of the influence of the regional fault on groundwater flow, including whether it acts as a barrier or a conduit. Within the characterization:*

    - *Introduce horizontal anisotropy to the representation of bedrock hydraulic conductivity to represent barrier conduit properties (if appropriate software remains unavailable).*
    - *Provide information on the sensitivity of model predictions (groundwater inflow to the open pit, seepage from project facilities to surface water, changes in groundwater discharge to surface water, and groundwater drawdown) to changes in hydraulic conductivity of the regional fault.*

Canada Nickel's Response:

In lieu of packer testing data within the regional fault, confidence in the fault characterization can be increased by conducting a sensitivity analysis to assess the sensitivity of modeled hydraulic conductivity of the regional fault to predicted mine pit inflows, groundwater discharge to surface waters, and groundwater elevation contours. As described in Impact Statement Appendix C.4, MODFLOW6 has

undergone upgrades and the software code typically used to model faults as conduits (the conduit flow process package) is not currently compatible with the MODFLOW6 code. Two approaches were used to assess the sensitivity of model predictions to the regional fault acting as a conduit for flow and as a barrier to flow, as described below.

Model Set Up

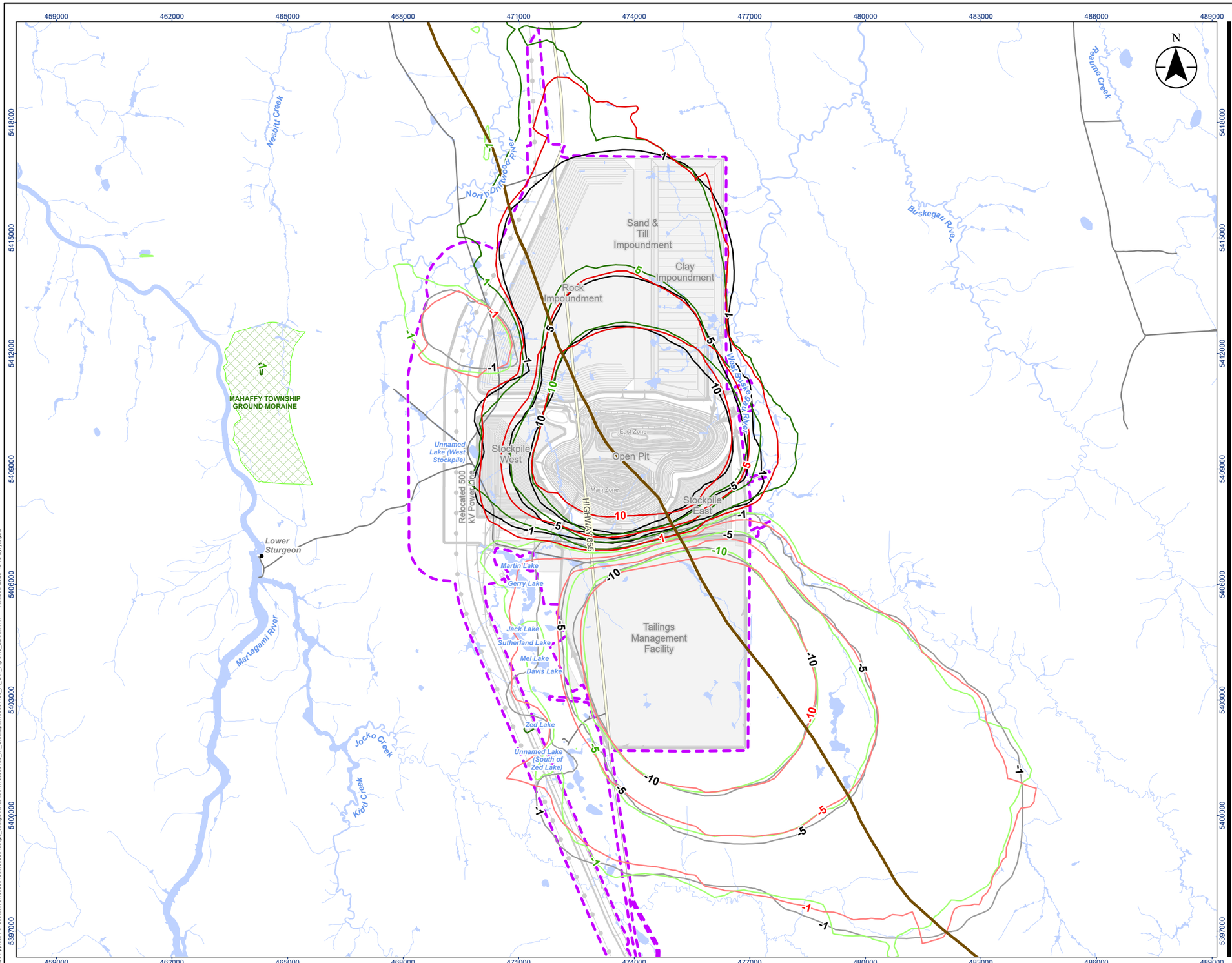
The Year 17 groundwater flow model was used with the current 100 m x 100 m grid spacing within the PA to assess the sensitivity of the model predictions on the characterization of the fault as a conduit for flow. If the model predictions are not sensitive to increases in hydraulic conductivity over a large cell size, they will also not be sensitive to increases in hydraulic conductivity over the more realistic, smaller regional fault width.

Model cells in bedrock model layers 6 through 25 along the alignment of the regional fault were assigned a hydraulic conductivity of $1.2x10^{-7}$ m/s, which is a two-fold increase over the baseline hydraulic conductivity of those layers. Given that the width of the regional fault is expected to have a width equal to approximately $1/100^{th}$ of the width of the model cells (1 m), this two-fold increase is effectively a two hundred-fold increase from baseline hydraulic conductivity.

The horizonal flow barrier package allows for the simulation of thin, vertical low-permeability geologic features that impede the horizontal flow of groundwater and is compatible with the MODFLOW6 code. Using the horizonal flow barrier package, the sensitivity of reduced hydraulic conductivity of the regional fault on model predictions was assessed by assigning a hydraulic conductivity of $1.6x10^{-10}$ m/s, a five hundred-fold decrease under baseline hydraulic conductivity, along the alignment of the regional fault in bedrock model layers 6 through 25 in the Year 17 groundwater flow model.

Results

The predicted groundwater drawdown for each sensitivity run and the Year 17 base case is presented on Figure GW-01.9Predicted Groundwater Table Drawdown – Operations Phase Year 17, Base Case, Regional Fault as Barrier, and Regional Fault as ConduitFigure GW-01.9. The extent of water table drawdown for each of the three scenarios is similar, indicating that the elevation of the water table in the overburden is not sensitive to the presence of the regional fault acting as either a conduit for or barrier to flow. In the area of the headwater lakes of the North Driftwood River, small changes in predicted drawdown are predicted which impact predicted groundwater discharge to surface water as described below.



Stantec

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Legend

- Project Area

Base Features

- Major Road
- Minor Road
- Watercourse
- Waterbody
- Conservation Reserve (Regulated)
- Regional Fault

Baseline Conditions

- Year 17 Baseline Drawdown Contour
- Year 17 Baseline Mounding Contour

Regional Fault as a Barrier

- Year 17 Groundwater Drawdown Contour
- Year 17 Groundwater Mounding Contour

Regional Fault as a Conduit

- Year 17 Groundwater Drawdown Contour
- Year 17 Groundwater Mounding Contour

0 2.5 5 km

1:100,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location
Timmins, Ontario

160901195 REVA
Prepared by jsegato on 2025-12-15

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
GW-01.9

Title
Year 17 Groundwater Drawdown Contours

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

\\Ca0004-pdfss01\01609\active\160930456\gis_cad\gis\mxd\SI\IR\160930456_IR_GWdrawdown\160901195_IR_GW_Fig-01.9_DDown1Y17 Revised: 2025-12-15 By: jsegato

Changes in predicted groundwater discharge to surface water and the open pit are presented in Table GW-01.7. While there are small changes in individual subwatersheds where discharge may increase or decrease, at watershed scale, groundwater discharge to natural surface water features is insensitive to the characterization of the regional fault which is expected because the regional fault, if present, is a bedrock feature whereas the creeks, rivers, and ponds are connected to the overburden units rather than the bedrock units. The groundwater discharge to the open pit in Year 17 is slightly more sensitive to the characterization of the regional fault because, if present, the fault is characterized as being in direct contact with the wall of the open pit. Due to the very low hydraulic conductivity of the native bedrock on either side of the regional fault ($5.8x10^{-8}$ m/s), however, the increase or decrease in discharge to the open pit is minor (2.7% and 1% for the conduit and barrier scenarios, respectively) as there is limited groundwater flow in the bedrock units.

Table GW-01.7 Predicted Groundwater Discharge to Surface Water Features – Operations Year 17 Regional Fault Sensitivity Cases

Surface Water Feature	Predicted Groundwater Discharge Rate – Operations Year 17 (m^3/d)		
	Base Case[1]	Fault as Barrier to Flow[1]	Fault as Conduit for Flow[1]
Jocko Creek	7,797	7,799	7,795
North Driftwood River	848	847	838
West Buskegau River	2,243	2,257	2,206
Unnamed Lake (South of Zed Lake)	2,158	2,159	2,156
Zed Lake	-842	-841	-843
Mel Lake	1,818	1,819	1,816
Sutherland Lake	-2,235	-2,234	-2,236
Jack Lake	543	544	542
Gerry Lake	7,180	7,181	7,174
Martin Lake	2,340	2,340	2,337
Unnamed Lake (West Stockpile)	-255	-254	-257
Open Pit	10,500	10,404	10,779

Note:
1. A negative number indicates that surface water is recharging groundwater at that reach/lake.

Based on the results of the two fault sensitivity analyses, whether the regional fault acts as a conduit, a barrier, or a combined barrier conduit, its influence on groundwater flow (direction and quantity) and groundwater-surface water interactions is predicted to be minor.

Crawford Nickel Project ("the Project")

Canada Nickles's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project
(Received May 30, 2025)

Surface Water Quantity, where Changes May Affect Fish Habitat and Indigenous Peoples

December 24, 2025

CANADA NICKEL COMPANY

Stantec

Contents

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LIST OF ATTACHMENTS

Attachment SW Quan-01 2025 Hydrology Monitoring: Rating Curve and Hydrological Model Memorandum
Attachment SW Quan-02 Ausenco Memorandum: Clarification to water balance comments on the Impact Statement for the Crawford Nickel Project

Abbreviations

Abbreviation	Full Term
ECA	Environmental Compliance Approval
ISW	Industrial Sewage Works
RMSE	root mean square error

Surface Water Quantity, where Changes May Affect Fish Habitat and Indigenous Peoples

SW Quan-01 Surface Water Hydrological Model - General

Comment Description (Context and Rationale):

The surface water hydrological model does not seem to have been designed to inform changes to fish habitat throughout the rivers, and questions about certain inputs and approaches compound with the groundwater model uncertainty, leaving the audience very uncertain about the effects on fish and fish habitat and use by Indigenous peoples. Due to project size and pit depth, changes to river flows and surrounding water levels can be substantial, so this is a key issue that needs to be understood with confidence to support planning decisions.

See also comment GW-01b Groundwater model – input to surface water model.

Reference to TISG and IS:

TISG: Section 8.6

Required Information to Resolve Comment:

Outstanding information requirements about the surface water hydrological model are outlined in the next 4 rows, with respect to:

a. *Model calibration and validation*
b. *Climate change adjustments*
c. *Reach lengths*
d. *Flow changes along river reaches*

1) *If adaptive water management measures are plausible to ensure changes to surface water quantity are controlled within suitable limits, outline those measures at a conceptual level. If they are also expected to be incorporated into permitting regimes, describe how.*

Canada Nickel's Response:

Chapter 15 of the Impact Statement outlined the following surface water quantity mitigation measures to control potential changes within suitable limits:

- Canada Nickel will develop and implement a Site-Wide Water Management Plan (Appendix J of the Impact Statement). This system will be designed to manage the 100-year return period, 24-hour duration storm event using collection ponds and the Open Pit.

- Canada Nickel will limit the construction footprint (i.e., Project Area) to the extent possible to limit the number of subwatersheds overprinted by the Project Area. Canada Nickel will develop and implement a Site-Wide Water Management Plan (Appendix J of the Impact Statement).
- The water management system will be designed to manage the 100-year return period, 24-hour duration storm event using collection ponds and the Open Pit. This Plan will include:
    - Collection ditches sized to convey the 100-year return period, 24-hour duration storm event with freeboard.
    - Sedimentation ponds sized to store up to the 10-year return period, 24-hour duration storm event with freeboard.
    - Flows above the 10-year return period, 24-hour duration storm event and up to the 100-year return period, 24-hour duration storm event will be managed by controlled release to the Open Pit to provide additional temporary storage.
    - In the event of a flood event in excess of 100-year return period parameters, a secondary emergency overflow spillway will direct controlled overflow to the receiving environment. Spillways have been sized for a 200-year event.
    - Gravity collection/conveyance ditches will be employed, where possible, inclusive of overflows from sedimentation ponds to the Open Pit.
    - Water discharges to the North Driftwood River and West Buskegau River will be balanced to the extent feasible to maintain watercourse flows.

The surface water management plan developed to support the Impact Statement (Appendix J) will be developed further in alignment with detailed design of water management infrastructure, including treatment systems, and updating the site-wide water balance and hydrologic model to balance water discharges to the extent feasible between the two watercourses and maintain flows. In addition, the flow controls proposed as part of the revised mixing zone assessment (SW Qual-02) to support a Ministry of Environment, Conservation and Parks (MECP) Industrial Sewage Works (ISW) Environmental Compliance Approval (ECA) application will be further developed in detailed design, including consultation with Fisheries and Oceans Canada (DFO) and Environment and Climate Change Canada (ECCC) to develop a final discharge regime that considers managing water levels in the receiving environment and extents of mixing zones.

In support of the water management plan and regulatory requirements (i.e., Metal and Diamond Mine Effluent Regulations [MDMER] discharge flow monitoring requirements, typical ISW ECA receiver flow monitoring requirements), a surface water monitoring program will be developed, including incorporation of adaptive management measures. The monitoring program will include flow and water level monitoring in adjacent watercourses, including trigger thresholds for changes. If the change in flow (increase or decrease) in the North Driftwood River or West Buskegau River is trending larger than predicted at a trigger monitoring location, then a subsequent investigation will be completed to understand the cause. Accurate flow monitoring at the final discharge points and in the receivers will also be used to manage the

discharge flow control to the extent possible per the ISW ECA requirements to maintain flows in the receiver and meet discharge flow requirements.

In addition to the above mitigation measures, the following may be implemented during construction or operation of the Mine. If deemed appropriate, measures to mitigate effects on surface water flows may also include:

- Modification to pumping regimes (e.g., location, number, rate of pumping) to reduce drawdown impacts due to surface water-groundwater interactions
- Supplementation of affected watercourse(s) by returning water pumped from the open pit, and treated, if necessary, to local watercourses
- Development of a discharge ready cell of treated water for each final discharge point to release treated water during high flow events with consideration of permitted receiver to discharge flows

SW Quan-01a Surface Water Hydrological Models – Model Calibration and Validation

Comment Description (Context and Rationale):

There is a high degree of uncertainty in the three HEC-HMS hydrological models developed (one for each affected watershed) due to the use of pro-rated regional flow data in the calibration and validation of each model. These models are used to predict long-term surface water flows which are necessary to quantify predicted changes to surface water flows and effects to fish habitat.

The models were calibrated against daily discharge flows which were estimated based on measured flows at the Water Survey of Canada (WSC) station ID 04MD004 (Porcupine River at Hoyle) and pro-rated based on watershed areas. The models were calibrated for the period 2008 to 2014. The calibration was measured based on similarity between hydrographs and through statistical performance metrics.

The TISG requires that the IS "provide flow hydrographs and corresponding water levels for nearby streams and rivers including any site-specific rating curves (and manually collected flow/level data), if available, showing the full range of seasonal and inter-annual variations; as well as seasonal low-flow for baseflow quantification;" and that "hydrographs may be based on data from nearby gauging stations or from gauging stations on site if appropriate rationale is provided to explain its applicability; the approach used should take into account the need to provide information for use in fish habitat characterization and effects assessment as guided by the Canadian Science Advisory Secretariat's Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada"

The Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada recommends a minimum of 20 years of river flow data to establish a statistically robust natural flow regime. This can be done using modelled streamflow data and these models must be both calibrated and validated.

Modelled flows were not compared against local measured flows at monitoring stations SW-1 to SW-9, and therefore their applicability to the site cannot be validated. Additionally, IAAC has previously advised the proponent that the use of this WSC station is not suitable for model calibration and that the use of the WSC Station 04MD004 for pro-rating flows likely does not provide an accurate estimation of natural streamflow characteristics in the affected watersheds. Any modelling (e.g., water balance model, water quality modelling, assimilative capacity assessment) that includes data from WSC station ID 04MD004 (Porcupine River at Hoyle) may not be an accurate estimation of characteristics in the affected watersheds.

The low flow statistics (7Q20) in Table 3.1 of Appendix C.5 appear to have been estimated based on watershed area and the corresponding regional regression relationship for the five selected WSC stations used to evaluate regional hydrology. There is no information about how the low flow statistics compare to flows measured on site, which creates a high degree of uncertainty in the estimated low flow which alters IAAC's ability to evaluate the extent of the mixing zone.

In addition, the units of the root mean square error used to quantify the average difference between model predicted and measured values are not reported.

Based on the above, the level of uncertainty in the predicted local flows and estimated flow changes is high. This information is needed for IAAC to reduce uncertainty in predicted effects to fish habitat as a result of changes in surface water flows within the PA and LSA, as well as understand changes to available habitat types for species of importance to Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.6.1, Section 8.6.2

IS: Appendix B.6 – Section 4.1.4 & Section 5.2.4, Appendix C.5 – Appendix C

Required Information to Resolve Comment:

1) *Provide results of model validation at stations SW-1, SW-2b, SW-3, SW-4, SW-5, SW-6b, SW-7, SW-8, and SW-9. The results should include graphical comparison of measured and modelled flows, and a table summarizing the statistical performance metrics over the entire monitoring period.*

2) *Clarify the units of the root mean square error included in Tables B1.4 to B1.6.*

3) *Based on the results of the model validation against local hydrometric data, quantify the level of uncertainty in the estimated flows and flow changes at different locations within the LSA, as well as in any modelling that included streamflow data such as the assimilative capacity assessment and site-wide water balance model.*

4) *Quantify the uncertainty of the low flow (7Q20) predictions based on a comparison of monitoring data collected on-site as part of the baseline program to regional flow data.*

Canada Nickel's Response:

1) *Provide results of model validation at stations SW-1, SW-2b, SW-3, SW-4, SW-5, SW-6b, SW-7, SW-8, and SW-9. The results should include graphical comparison of measured and modelled flows, and a table summarizing the statistical performance metrics over the entire monitoring period.*

See Attachment SW Quan-01, which provides a comprehensive response to this comment.

2) *Clarify the units of the root mean square error included in Tables B1.4 to B1.6.*

Model error was quantified using root mean square error (RMSE). RMSE measures the average magnitude of errors between observed and predicted values, with lower values indicating a better fit between the model and observed data. RMSE is reported in cubic metres per second (m^3/s).

3) *Based on the results of the model validation against local hydrometric data, quantify the level of uncertainty in the estimated flows and flow changes at different locations within the LSA, as well as in any modelling that included streamflow data such as the assimilative capacity assessment and site-wide water balance model.*

See Attachment SW Quan-01, which provides a comprehensive response to this comment.

4) *Quantify the uncertainty of the low flow (7Q20) predictions based on a comparison of monitoring data collected on-site as part of the baseline program to regional flow data.*

See Attachment SW Quan-01, which provides a comprehensive response to this comment.

SW Quan-01b Surface Water Hydrological Model – Climate Change Adjustments

Comment Description (Context and Rationale):

As required in the TISG, the IS considers the effects of climate change in the regional hydrologic model; however, it does not include a sensitivity analysis to quantify the potential effects under both baseline and climate-adjusted baseline conditions to demonstrate how climate change may alter the effects assessment on surface water.

Additionally, there is uncertainty in the model results due to inconsistencies in hydrology peak timing. The regional station mean monthly flow (Figure 5.6 in Appendix B.6) has a discharge peak in May due to spring freshet and a second peak in November due to fall rainfall. Flow hydrographs for local monitoring stations (Appendix B.2 of Appendix B.6) appear to support the regional monthly flow distribution. However, the HEC-HMS predictions using existing climate baseline data (Appendix C.5 Figures A.88 – A.121) show a sharp discharge peak in early April but not an increase in discharge in November, meaning that the modelled timing of peak flows and monthly distribution of flows do not match those estimated by the regional station assessment or local monitoring stations. Modelled climate-adjusted

baseline flows (Appendix C.5 Figures A.18 – A.87) appear to show the receiving environment running at its lowest flow during May, with peaks in February and March. This differs greatly from the characterization of current conditions.

It is uncertain based on the information provided whether climate change adjustments are responsible for the substantial alteration of hydrology peak timing. This creates an unknown level of uncertainty in the modelled hydrographs under climate-adjusted baseline data and their suitability and usefulness to support the assessment of changes to surface water. In particular, inaccurate timing of peak and low flows in the model will hinder the ability to understand how changes in flow affect fish life history processes.

This uncertainty limits IAAC's ability to understand the magnitude of effects to fish and fish habitat and Indigenous peoples through changes to surface water flows and levels, and surface water quality within the PA and LSA.

Reference to TISG and IS:

TISG: Section 8.6.1, Section 14

IS: Appendix C.5 – Section 6.3.6

Required Information to Resolve Comment:

1) *Provide an explanation of any differences in hydrological watershed parameters (for example, discharge peak timing and quantity) between observed on-site water flows and flows modelled in HEC-HMS under baseline and climate-adjusted baseline conditions.*

2) *Provide any HEC-HMS model results that can explain this difference, such as the modelled depth of snowpack time- series in the climate-adjusted baseline, compared with the baseline.*

3) *Provide a sensitivity analysis to quantify the changes to water quantity under existing climate baseline and describe whether the estimated changes to flows are more conservative than under climate-adjusted baseline conditions.*

Canada Nickel's Response:

1) *Provide an explanation of any differences in hydrological watershed parameters (for example, discharge peak timing and quantity) between observed on-site water flows and flows modelled in HEC-HMS under baseline and climate-adjusted baseline conditions.*

See Attachment SW Quan-01, which provides a comprehensive response to this comment.

2) *Provide any HEC-HMS model results that can explain this difference, such as the modelled depth of snowpack time- series in the climate-adjusted baseline, compared with the baseline.*

See Attachment SW Quan-01, which provides a comprehensive response to this comment.

3) *Provide a sensitivity analysis to quantify the changes to water quantity under existing climate baseline and describe whether the estimated changes to flows are more conservative than under climate-adjusted baseline conditions.*

See Attachment SW Quan-01, which provides a comprehensive response to this comment.

SW Quan-01c Surface Water Hydrological Models – Reach Lengths

Comment Description (Context and Rationale):

There are questions about the reach lengths used to calculate the lag times (Table 4.5) used in the hydrological models to predict flows in the receiving environment. The reach lengths for some of the subwatersheds, shown in Table 4.6, appear to be overly large compared to the area of the subwatersheds themselves. For instance, the total area of subwatershed ND3 is approximately 50 km2 with estimated dimensions of 10 km x 5 km, however the length for the associated reach appears to be more than 45 km. This calls into question the accuracy of the reach lengths used to calculate lag times.

This creates a high degree of uncertainty about the modelled flows, leading to compounded levels of uncertainty around the predicted changes to surface water quantity and flows and effects to Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.6.1

IS: Appendix B.6 – Section 4.1.4

Required Information to Resolve Comment:

1) *Provide additional information to demonstrate the accuracy of the reach lengths reported in Table 4.6 and, if incorrect, quantify any uncertainty that this model input may have added to the hydrological model predictions.*

Canada Nickel's Response:

1) *Provide additional information to demonstrate the accuracy of the reach lengths reported in Table 4.6 and, if incorrect, quantify any uncertainty that this model input may have added to the hydrological model predictions.*

See Attachment SW Quan-01, which provides a comprehensive response to this comment.

SW Quan-01d Surface Water Hydrological Models –Flow Changes Along River Reaches

Comment Description (Context and Rationale):

The approach taken to predict changes to surface waters flows in the IS does not present an accurate and comprehensive assessment of effects to inform fish habitat loss and other things.

The IS focuses on the changes to surface water predicted at the most downstream watershed discharge points (WB1 for the West Buskegau and ND1 for the North Driftwood, the model outlets) which are located at quite a distance (tens of kilometers) from the PA. project-related flow changes at these locations are reduced due to the contribution of water from additional tributaries and watersheds. The discussion in the IS generally excludes changes that occur within the reaches between the model outlets and the PA where predicted changes are the largest and frequently exceed the 10% change in flow threshold during operations.

The IS does include the estimated potential changes to flows, based on the number of days in a year when changes to flows are predicted to be beyond the 10% threshold, for a subset of selected subwatersheds in Figures A.18 to A.121 and Tables 6.8 to 6.12. However, there is no distinction or quantification of changes to flows during critical periods that may be relevant to fish and fish habitat.

As a result, the predicted changes to flows are not presented at adequate temporal and spatial scales, nor do they provide quantification of changes to flows and water levels to support assessment of effects to fish and fish habitat or Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.6.2

IS: Appendix C.5 – Section 6.3.6

Required Information to Resolve Comment:

1) *Based on predicted daily changes to flows, provide summary tables for key nodes in the watersheds, extending from the PA to the model outlets, and including the key junctions (confluences) within the reach (refer to Figures A.2 and A.3 for HEC-HMS model schematic with all watershed and confluences). The summary tables should be presented on a monthly basis for both baseline and climate- adjusted conditions, representative of years for all project phases, and include:*
    - *Monthly average flows (baseline, operations, decommissioning and abandonment);*
    - *Changes to monthly average flows as a result of the project (expressed as a %);*
    - *Quantification of the number of days when the 10% change in flow threshold is exceeded.*

2) *Describe the potential changes to water levels estimated as a result of the modelled changes to flows in the receiving environment.*

Canada Nickel's Response:

1) *Based on predicted daily changes to flows, provide summary tables for key nodes in the watersheds, extending from the PA to the model outlets, and including the key junctions (confluences) within the reach (refer to Figures A.2 and A.3 for HEC-HMS model schematic with all watershed and confluences). The summary tables should be presented on a monthly basis for both baseline and climate- adjusted conditions, representative of years for all project phases, and include:*

- *Monthly average flows (baseline, operations, decommissioning and abandonment);*
- *Changes to monthly average flows as a result of the project (expressed as a %);*
- *Quantification of the number of days when the 10% change in flow threshold is exceeded.*

See Attachment SW Quan-01, which provides a comprehensive response to this comment.

2) *Describe the potential changes to water levels estimated as a result of the modelled changes to flows in the receiving environment.*

Reductions in flow and water levels and their potential changes to fish habitat in the North Driftwood River, which is predicted to have the greatest flow reductions in comparison to the West Buskegau River were evaluated in the response to FFH-01. See the response to FFH-01.

The FFH-01 response does not conduct a detailed assessment of changes in flow and water levels in the West Buskegau River due to the Project. However, the predicted number of days of flow reduction with a greater than 10% change from baseline within West Buskegau River watersheds for the existing climate and climate change scenarios, and 1-to-1 and pre-&post- flow control scenarios are substantially fewer (e.g., subwatershed WB6 – Existing Climate Condition, Operations Mine Year 17 – 12 days with flow reductions greater than 10% from baseline) than the North Driftwood River subwatershed (e.g., subwatershed ND8 – Existing Climate Condition, Operations Mine Year 17 – 204 days). In addition, the predicted flow reductions greater than 10% from baseline in the West Buskegau River are predicted to occur during high flow events when flow rates result in the river overtopping its banks (Figure SW Quan-01.1). Based on the water flow change assessment results presented in FFH-01 for the North Driftwood River, the potential changes associated with flow reduction days greater than 10% from baseline in the West Buskegau River would not be expected to alter fish habitat availability more than in the North Driftwood River.

With respect to flow increases predicted in the North Driftwood River and West Buskegau River due to the Project, flow changes in subwatersheds downstream of the Project Area are predicted to have a greater than 10% change from baseline flows. Figure SW Quan-01.1 presents a flow hydrograph with baseline and Operations Year 17 predicted daily flow rates for the West Buskegau River subwatershed WB5, which is downstream of the Project Area and final discharge points (FDPs) for the climate change condition and 1-to-1 flow control scenario. Typically for higher flow events (e.g., spring freshet), the flows within WB5 are not predicted to increase due to the Project and are typically reduced due to the storage

lag time with the site-wide water management infrastructure prior to release. Flows are predominantly predicted to increase during lower flow periods and high flow events below 7 m^3/s, which would typically be below bankfull flows along the reach.

Figures SW Quan-01.2 and SW Quan-01.3 present the baseline and Mine Year 17 flow hydrographs for the subwatershed ND8 in the North Driftwood River for the climate change condition 1-to-1 and pre-&post- flow control scenarios, respectively. For high flow events as was observed in the WB5 hydrographs, the predicted Project high flows are estimated to be less than the baseline conditions for the two flow control scenarios. Based on these predicted changes to water levels and flow in the North Driftwood River and West Buskegau River there is no increase to the baseline 100-year return period flood flows adjacent to and downstream of the Project Area and there would be no increase to scour and erosion potential in the channel.

Figure SW Quan-01.1 Subwatershed WB5 Operations Year 17 Hydrograph for the Climate Change Condition and 1-to-1 Flow Control Scenario

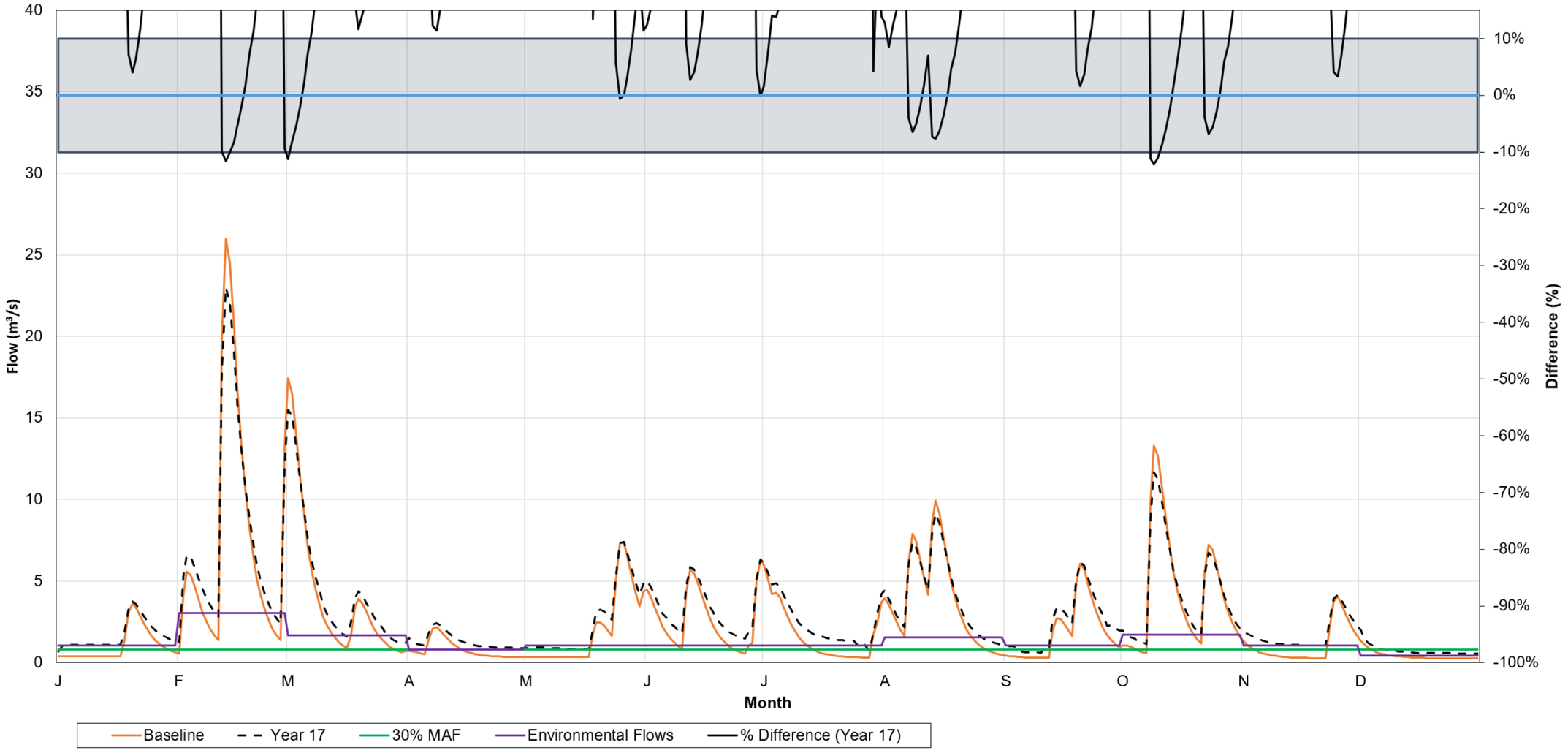


Figure SW Quan-01.2 Subwatershed ND8 Operations Year 17 Hydrograph for the Climate Change Condition and 1-to-1 Flow Control Scenario

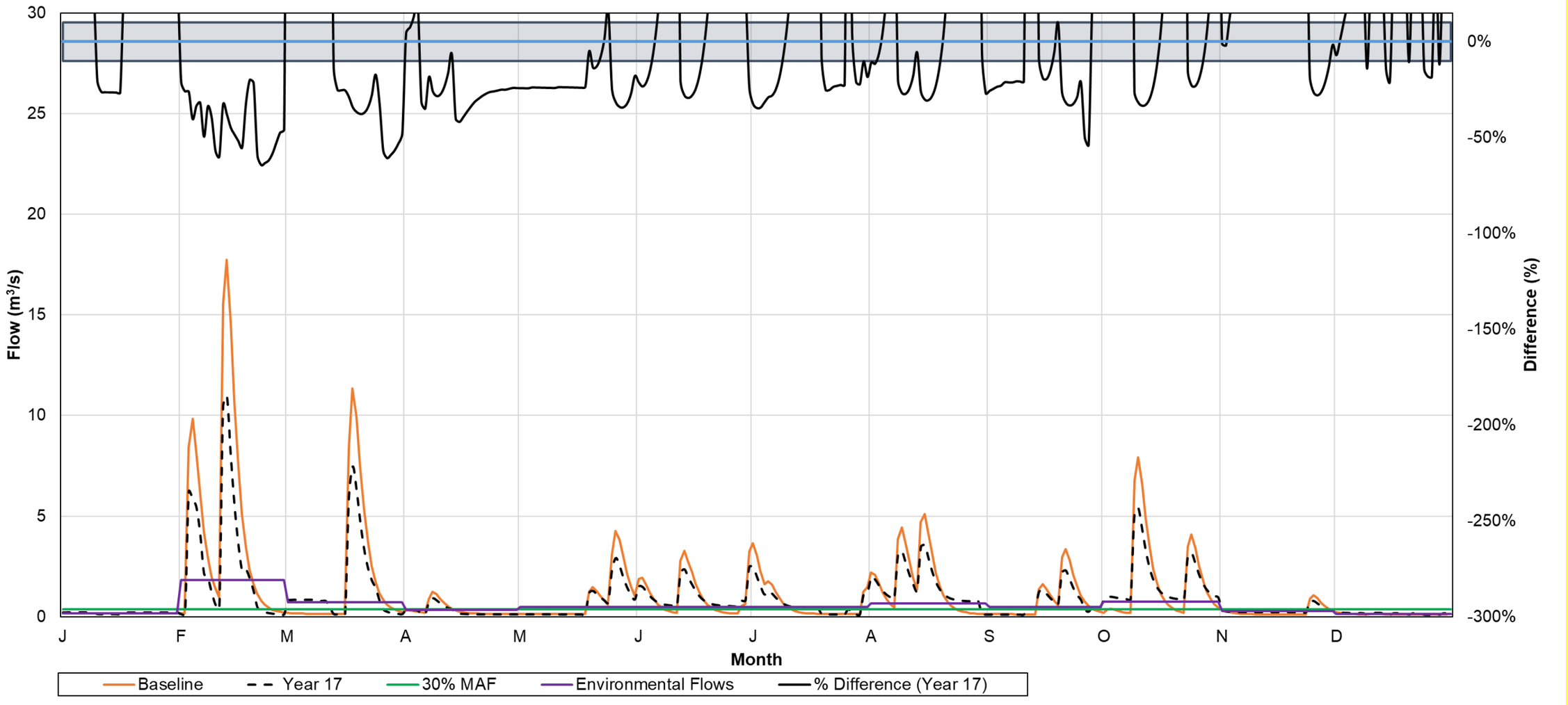
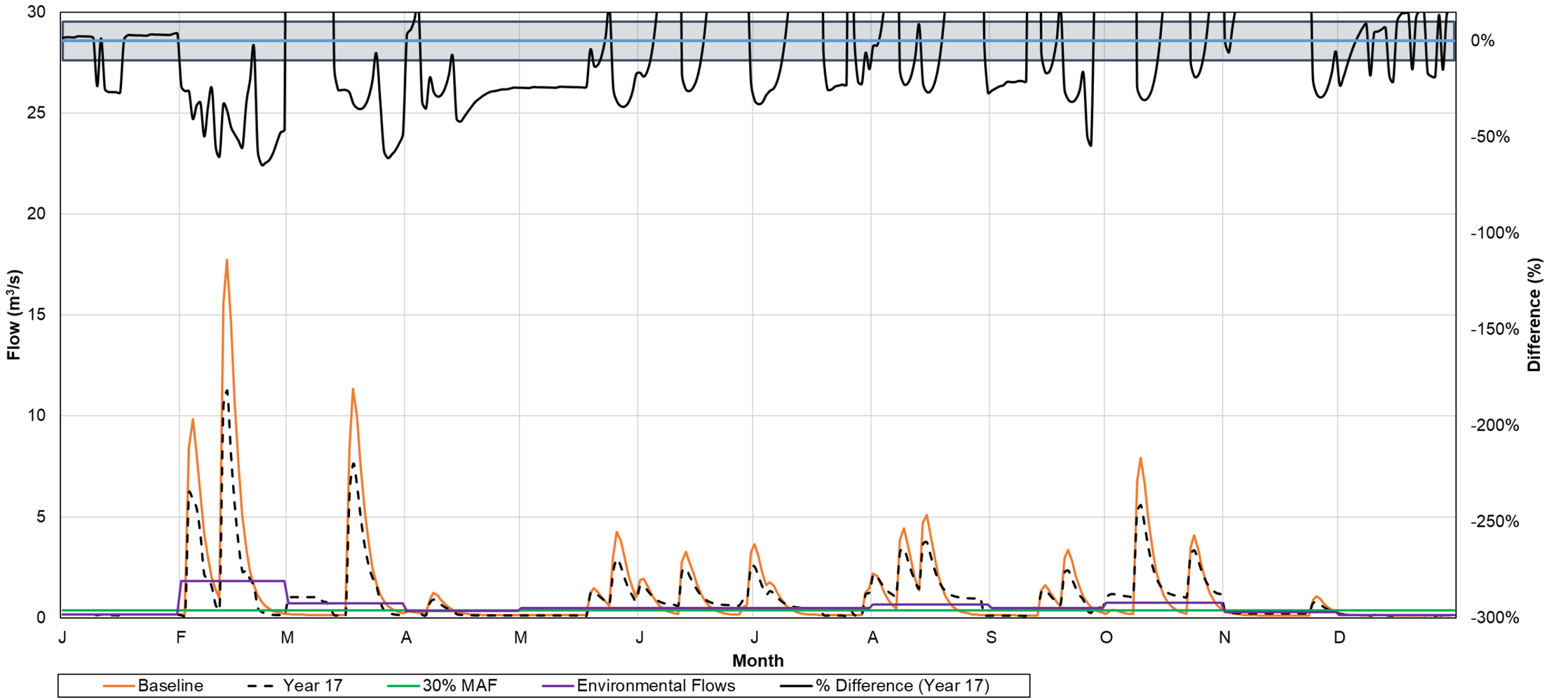


Figure SW Quan-01.3 Subwatershed ND8 Operations Year 17 Hydrograph for the Climate Change Condition and Pre-&Post- Flow Control Scenario



SW Quan-02a Site-Wide Water Balance Model – Runoff Coefficients

Comment Description (Context and Rationale):

There are questions about the runoff coefficients used in the site-wide water balance model and regional hydrological model, which directly translates into compounding uncertainty in flow predictions within the PA and the LSA.

The assumed runoff coefficient for baseline is not included in the list of assumed runoff coefficients for various mine site areas (Table 3-4) or specified in Appendix I. It could be speculated that it is assumed as 0.5 given that this is the value assumed for natural ground for all project phases (Table 3-4).

Section 6.1 of Appendix B.6 concludes that the climate normal streamflow estimate represents a runoff coefficient of 41%, based on an environmental water balance for the PA using the USGS Thornthwaite method. Runoff coefficients for stations considered in the regional analysis (Table 5.11), range from 0.38 to 0.51.

It is unclear why the selected runoff coefficient for natural ground is 0.5 when the environmental water balance estimates a runoff coefficient of 41% and 0.5 is the higher end of the range at regional hydrometric stations.

Further, Section 6.3.6 of Appendix C.5 indicates that during closure, flows in the receiving environment are predicted to increase over baseline. These changes are predicted despite the increased loss of water to evaporation from the pit lake and the increased capture of groundwater volumes by the pit (relevant during pit filling). These predictions raise additional uncertainty around the assumptions for natural ground (0.5).

An overestimation of the runoff coefficient for baseline conditions (i.e. natural ground) may substantially underestimate the potential effects to surface water flows associated with the project. This uncertainty has the potential to affect the evaluation of habitat loss for fish and species of importance to Indigenous peoples within the PA and LSA.

Reference to TISG and IS:

TISG: Section 8.6.1

IS: Appendix I – Section 5.0, Appendix C.5 – Section 6.3.6

Required Information to Resolve Comment:

1) Confirm IAAC's assumption that the runoff coefficient for baseline is synonymous with natural ground.

2) *Provide clarification for the selected runoff coefficient used for baseline in Appendix I (i.e. confirmation of what value was used and why).*

3) *Demonstrate that the selected baseline runoff coefficient is adequate for application to the PA by comparing flow estimates from the baseline site-wide water balance model with flow measured at the local hydrometric stations.*

4) *Provide a sensitivity analysis to the baseline runoff coefficient to decrease the level of uncertainty in the predicted changes to flows presented in Appendix C.5 of the Impact Statement (Section 6.3.6).*

Canada Nickel's Response:

1) *Confirm IAAC's assumption that the runoff coefficient for baseline is synonymous with natural ground.*

See Attachment SW Quan-02 Ausenco Memorandum: Clarification to water balance comments on the Impact Statement for the Crawford Nickel Project.

2) *Provide clarification for the selected runoff coefficient used for baseline in Appendix I (i.e. confirmation of what value was used and why).*

See Attachment SW Quan-02 Ausenco Memorandum: Clarification to water balance comments on the Impact Statement for the Crawford Nickel Project.

3) *Demonstrate that the selected baseline runoff coefficient is adequate for application to the PA by comparing flow estimates from the baseline site-wide water balance model with flow measured at the local hydrometric stations.*

See Attachment SW Quan-02 Ausenco Memorandum: Clarification to water balance comments on the Impact Statement for the Crawford Nickel Project.

4) *Provide a sensitivity analysis to the baseline runoff coefficient to decrease the level of uncertainty in the predicted changes to flows presented in Appendix C.5 of the Impact Statement (Section 6.3.6).*

See Attachment SW Quan-02 Ausenco Memorandum: Clarification to water balance comments on the Impact Statement for the Crawford Nickel Project.

SW Quan-02b Site-Wide Water Balance Model – Inconsistent Facility Footprints

Comment Description (Context and Rationale):

There is uncertainty in the site-wide water balance model, and associated water quality model, due to inconsistencies in the facility footprints during the transition from operations to reclamation.

The site-wide water balance model (and associated water quality model) use the footprint of each mine facility and its change over time to predict changes to water quantity (and associated water quality). Each mine facility at each project phase is assigned a distinct water quality. The mass load associated with each mine facility is dependent on the predicted water quantity and the assigned water quality. Appendix B (of Appendix I) includes a table with an overview of mine facility footprints through the mine life.

During the period when facilities transition from operations to reclamation, the total area of some of the rock impoundment, stockpiles, and Tailings Management Facility (TMF) does not appear to be maintained. For example, Appendix B (of Appendix I) suggests a deficit in the total rock impoundment (operational or reclaimed) in year 33, relative to year 29 and 34, which both have a higher total). It is unclear how the areas unaccounted for are considered in the site-wide water balance model and how this may influence changes to water quantity during this period.

Considering the flows from these facilities have the potential to convey large mass load of contaminants, this has the potential to substantially influence water quality predictions. This contributes to compounding uncertainty in predicted changes to water quality and quantity and associated effects to fish and fish habitat and Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.6.2

IS: Appendix I – Appendix B

Required Information to Resolve Comment:

1) *Provide the rationale for not accounting for the footprint areas for some mine facilities where the total area does not appear to be maintained through time. Describe the potential influence of the excluded areas on the site-wide water balance and water quality models.*

2) *Explain the assumptions with respect to the transition (timeframe) from operational to reclaimed conditions and the impact on predicted changes to water quantity.*

Canada Nickel's Response:

1) *Provide the rationale for not accounting for the footprint areas for some mine facilities where the total area does not appear to be maintained through time. Describe the potential influence of the excluded areas on the site-wide water balance and water quality models.*

See Attachment SW Quan-02 Ausenco Memorandum: Clarification to water balance comments on the Impact Statement for the Crawford Nickel Project.

2) *Explain the assumptions with respect to the transition (timeframe) from operational to reclaimed conditions and the impact on predicted changes to water quantity.*

See Attachment SW Quan-02 Ausenco Memorandum: Clarification to water balance comments on the Impact Statement for the Crawford Nickel Project.

Attachments

Canada Nickles's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project (Received May 30, 2025)
Surface Water Quantity, where Changes May Affect Fish Habitat and Indigenous Peoples
December 23, 2025

Attachment SW Quan-01 2025 Hydrology Monitoring: Rating Curve and Hydrological Model Memorandum

CANADA NICKEL COMPANY

Stantec

Stantec

Memo

To:	Mathieu Boucher, Environmental Manager Canada Nickel Company	From:	Andrew Sinclair/Navid Kimiaghalam Stantec Consulting Ltd., Markham
Project/File:	160901195	Date:	December 23, 2025

Reference: Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model Update

Stantec Consulting Ltd. (Stantec) was retained by Canada Nickel Company to develop the Surface Water Resources Baseline Report (Stantec 2024a) to support the Impact Statement for the Crawford Nickel Project, located approximately 42 km north of Timmins, Ontario.

On May 30, 2025, comments were received as part of the Impact Assessment Agency of Canada (IAAC) Comments on the Impact Statement for the Crawford Nickel Project. The following comments related to the baseline hydrologic model were received, and are responded to in this memo*:*

- ***SW Quan-01a-1:*** *Provide results of model validation at stations SW-1, SW-2b, SW-3, SW-4, SW-5, SW-6b, SW-7, SW-8, and SW-9. The results should include graphical comparison of measured and modelled flows, and a table summarizing the statistical performance metrics over the entire monitoring period.*
- ***SW Quan-01a-2:*** *Clarify the units of the root mean square error included in Tables B1.4 to B1.6.*
- ***SW Quan-01a-3:*** *Based on the results of the model validation against local hydrometric data, quantify the level of uncertainty in the estimated flows and flow changes at different locations within the LSA, as well as in any modelling that included streamflow data such as the assimilative capacity assessment and site-wide water balance model.*
- ***SW Quan-01a-4:*** *Quantify the uncertainty of the low flow (7Q20) predictions based on a comparison of monitoring data collected on-site as part of the baseline program to regional flow data.*
- ***SW Quan-01b-1:*** *Provide an explanation of any differences in hydrological watershed parameters (for example, discharge peak timing and quantity) between observed on-site water flows and flows modelled in HEC-HMS under baseline and climate-adjusted baseline conditions.*
- ***SW Quan-01b-2:*** *Provide any HEC-HMS model results that can explain this difference, such as the modelled depth of snowpack time-series in the climate-adjusted baseline, compared with the baseline.*

- ***SW Quan-01b-3:*** *Provide a sensitivity analysis to quantify the changes to water quantity under existing climate baseline and describe whether the estimated changes to flows are more conservative than under climate-adjusted baseline conditions.*
- ***SW Quan-01c-1:*** *Provide additional information to demonstrate the accuracy of the reach lengths reported in Table 4.6 and, if incorrect, quantify any uncertainty that this model input may have added to the hydrological model predictions.*
- ***SW Quan-01d-1:*** *Based on predicted daily changes to flows, provide summary tables for key nodes in the watersheds, extending from the PA to the model outlets, and including the key junctions (confluences) within the reach (refer to Figures A.2 and A.3 for HEC-HMS model schematic with all watershed and confluences). The summary tables should be presented on a monthly basis for both baseline and climate- adjusted conditions, representative of years for all project phases, and include:*
    - *Monthly average flows (baseline, operations, decommissioning and abandonment);*
    - *Changes to monthly average flows as a result of the project (expressed as a %);*
    - *Quantification of the number of days when the 10% change in flow threshold is exceeded.*

This memorandum has been prepared in response to the above IAAC comments on the Impact Statement. Table 1 provides a summary of the section that is used to address the concerns noted in the above IAAC comments and outlines the influence that the comment has on the assessment.

Table 1 Summary of Key Information Used to Address IAAC comments on Surface Water Quantity

Comment	Influence on the Assessment	Where Information is Addressed in this Technical Memorandum
SW Quan-01a-1	The Project site has nine established hydrometric flow monitoring stations situated along Jocko Creek (2 stations), the North Driftwood River (4 stations), and the West Buskegau River (3 stations). Separate hydrological models (HEC HMS) were developed for the three watersheds (Jocko Creek, North Driftwood River and West Buskegau River) that may be impacted by the mine operation. Updated continuous flow data is presented based on revised rating curves It is then used at the hydrometric monitoring sites in Jocko Creek, North Driftwood River and West Buskegau River to validate the hydrological model results by comparison of the monitoring and modelled flow results.	• Section 1 • Section 2
SW Quan-01a-2		• Section 1 • Section 2
SW Quan-01a-3		• Section 1 • Section 2
SW Quan-01a-4		• Section 3

Comment	Influence on the Assessment	Where Information is Addressed in this Technical Memorandum
SW Quan-01b-1	A sensitivity analysis of baseline and project HEC-HMS model results for model runs using daily climate data from 1999 with and without climate change adjustments is conducted to assess snowpack and snowmelt results.	• Section 4.1
SW Quan-01b-2		
SW Quan-01b-3		• Section 4.2
SW Quan-01c	A sensitivity analysis to quantify uncertainty regarding reach length inputs is conducted.	• Section 5
SW Quan-01d.1	Based on revised water balance and hydrologic model results, Impact Statement monthly flow summary tables have been updated for the operations and pit full life of mine phases	• Section 4.3

1 2021 to 2024 Hydrometric Station Rating Curves

A total of 11 stations have been installed at the Project site, with Solinst Leveloggers® installed at each station to monitor continuous water levels and atmospheric pressure data at a 30-minute frequency. The continuous water levels, water temperature, atmospheric pressure and air temperature data were processed in Aquarius™ hydrometric analysis software to barometrically compensate the Levelogger® water level data and was also offset to compensate for differences between installed depth and thalweg channel depth and/or staff gauge measurements. Manual measurements of streamflow were conducted at 9 stations using the Mid-Section Area-Velocity Method and all wadable flow measurements were captured with a FlowTracker2. During high flow events, either the Sontek M9 or the Sontek RS5 current profilers were utilized for data collection. The *in situ* continuous water levels and manual flow measurements were used to develop rating curves in the Aquarius™ software. The rating curve estimates continuous flows based on the relationship between water level and manual flow measurements. The detailed methodology and information regarding the stations is presented in the IS Surface Water Resources Baseline Report (Appendix C.5; Stantec 2024a).

Additional manual measurements for water level and flow were taken during the ice-free period in 2024 and 2025, and the rating curves were updated. The old and revised rating curves with the number of manual measurements are provided in Table 2. Additional 2024 and 2025 manual flow measurements at SW-1, SW-3 and SW-9 when evaluated with 2021 to 2023 measurements for rating curve development, observed data quality issues (e.g., erroneous manual flow measurements, conflicting stage and discharge measurements, poor statistical rating curve results), and an accurate rating curve could not be developed to predict continuous flow data at these locations. The previously developed rating curve equation at SW-9 has been superseded with the addition of additional stage: discharge data. Canada Nickel continues to monitor baseline flows at these locations and is working to develop accurate rating curves prior to the start of construction to support project design and monitoring. The presence of ice cover typically alters channel hydraulics making the open flow stage-discharge relationship not applicable for deriving winter flows. Uncertainty exists in the rating curves when predicted flows exceed the maximum manual flow rate monitored. Flows exceeding the banks would enter the floodplain, altering the flow regime, reducing the accuracy of estimated flow rates and represent a zone of uncertainty for the rating curves. The revised rating curves are given in Figure 1 to Figure 5. Within Table 2, the total number of data points used in the generation of the station specific rating curve may be less than those reported to have been collected, due to parsing of data used in the rating curve generation.

Table 2 Rating Curve Results Summary

Watershed	Station	Equation[1,2]		R^2 (revised equation)	Total Data Points[4]
		Old	Revised		
Jocko Creek	SW-7	$X = 0.6227(Y)^{3.723}$	$X = 0.4905(Y)^{3.3737}$	0.77	16(7)
	SW-8	$X = 0.4051(Y)^{3.2593}$	$X = 0.4536(Y)^{3.0758}$	0.92	16 (7)
North Driftwood	SW-1	N/A[3]	N/A[3]	-	10(9)
	SW-2b	$X = 1.7922(Y)^{2.428}$	$X = 1.4947(Y)^{2.366}$	0.97	15 (7)
	SW-3	N/A[3]	N/A[3]	-	11(8)
	SW-9	$X = 9.740(Y)^{8.201}$	N/A[3]	-	5(4)
West Buskegau	SW-4	$X = 0.420(Y)^{2.307}$	$X = 0.3137(Y)^{3.5252}$	0.66	9(5)
	SW-5	$X = 6.259(Y - 0.5)^{1.343}$	$X = 2.3715(Y - 0.109)^{1.882}$	0.99	15(8)
	SW-6b	$X = 5.937(Y - 0.6)^{1.110}$	$X = 5.0286(Y - 0.5314)^{1.292}$	0.99	12 (7)

Notes:

[1] X = Discharge (m^3/s) and Y = Thalweg Depth (m).

[2] The rating curve equations are applicable to ice-free periods alone.

[3] SW-1, SW-3 and SW-9 have no presented rating curve equation due to reduced data quality - no relationship established to date.

[4] Additional measurements taken in 2024 and 2025 for updating the rating curve in brackets.

Reference: **Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model**

Figure 1 SW-7 Revised Rating Curve – Jocko Creek

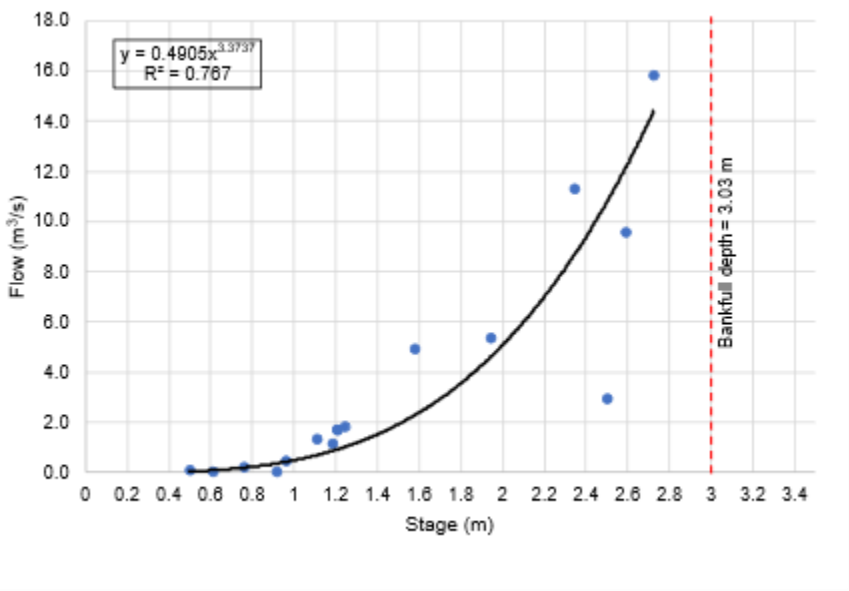


Figure 2 SW-8 Revised Rating Curve – Jocko Creek

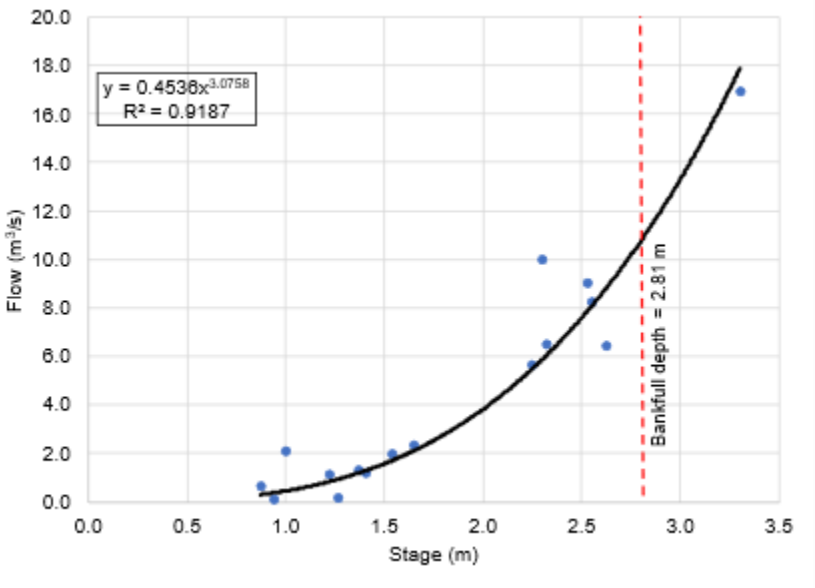


Figure 3 SW-2b Revised Rating Curve – North Driftwood River

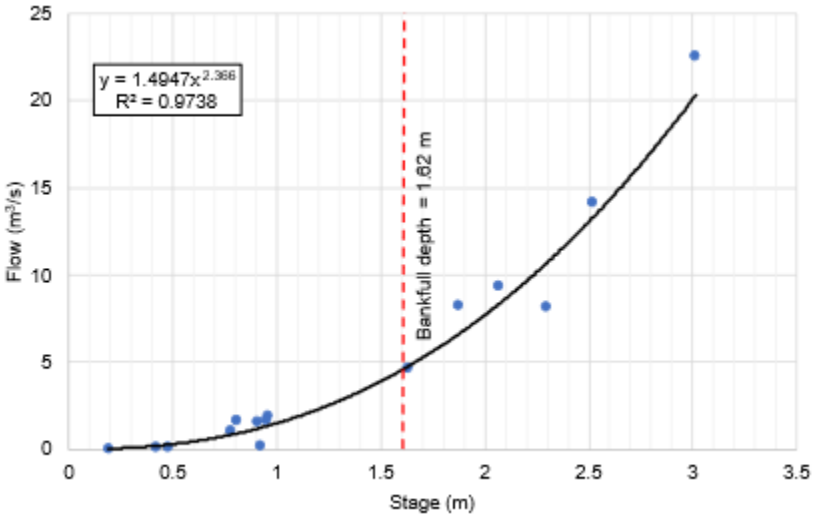


Figure 4 SW-5 Revised Rating Curve – West Buskegau River

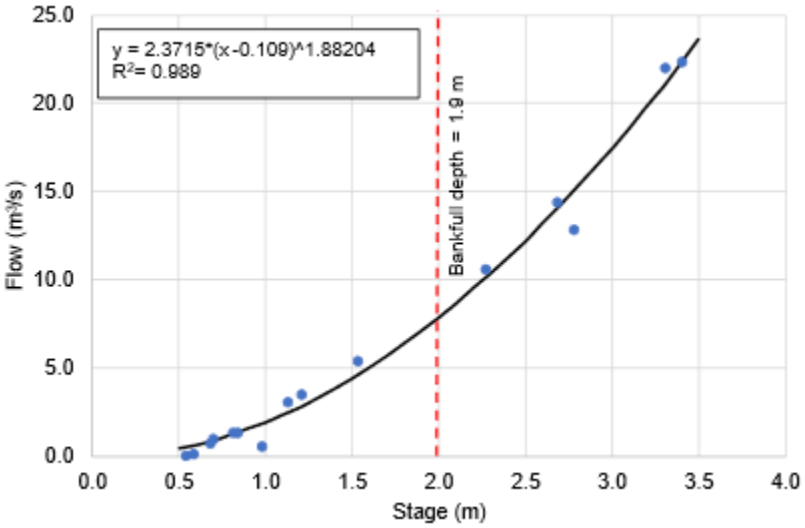
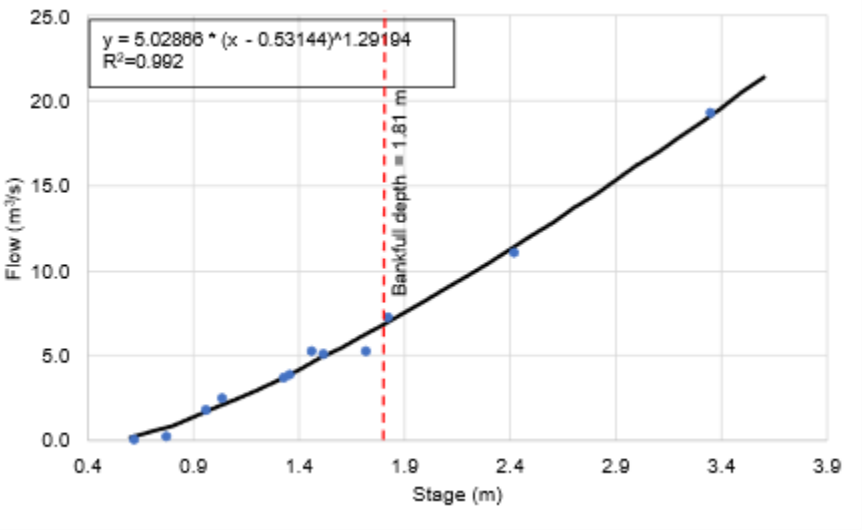


Figure 5 SW-6b Revised Rating Curve – West Buskegau River



The five stations considered here have rating curves with satisfactory coefficients of determination (R^2) ranging from 0.77 to 0.99. SW-4 rating curve R^2 value of 0.66 is too low to provide confidence that the rating curve is accurate, and it was not used to predict continuous flows at the monitoring station. The hydrographs from these stations generated from the associated rating curves are presented in Attachment A. Updated hydrometric summary sheets for these stations are given in Attachment B. For SW-8, low flows appear biased high. The rating curve diverges from observed discharges at the low end, although recorded water levels are consistent. Additional low-flow gauging during dry periods could improve the SW-8 rating curve.

Validation is based on the available 2022 to 2024 data and is limited to open-water conditions. Periods with ice cover were excluded since the developed rating curves are not valid under ice, due to absence of adequate under-ice measurements for rating curve development. Additional segments were omitted where the logger record had low confidence. These periods are flagged on the hydrographs as uncertain.

2 HEC-HMS Model Validation (SW Quan-01a.1, 2 and 3)

A separate HEC-HMS model was developed for each of the three following watersheds: Jocko Creek, North Driftwood River, and West Buskegau River, which were calibrated using hydrometric data from WSC station 04MD004 at Porcupine River (Stantec 2024a). Details about model parameters, watershed characteristics and model set up can be found in Stantec (2024a). The HEC-HMS model uses meteorological data from Timmins Climate station (6078262), and the Timmins A station (6078286) was used to infill the missing Timmins Climate data. The model results were compared with average daily flow data generated using the revised rating curves for the validation period and the model can capture precipitation events adequately.

The level of uncertainty in modeled flows for the hydrologic models for each of the three watersheds (Jocko Creek, North Driftwood River and West Buskegau River) was quantified using root mean square error (RMSE), Nash-Sutcliffe Efficiency (NSE) statistics, and R^2 as presented in Table 3 to Table 7. RMSE measures the average magnitude of errors between observed and predicted values, with lower values indicating a better fit between the model and observed data. NSE, on the other hand, assesses how well the model predicts the observed data relative to the mean of the observed values, with values closer to 1 indicating a better model fit. Hydrographs from each of the three models and the monitored continuous flow at stations with valid rating curves during the validation period are shown in Figure 6 to Figure 10.

Validation results for each watershed are presented below.

2.1 Jocko Creek

Jocko Creek has two monitoring stations with established rating curves, SW-7 and SW-8, where SW-8 is the most downstream monitoring location. Hydrographs for these stations are shown in Figure 6 and Figure 7, and validation statistics for the ice-free period, when the rating curves are valid, are provided in Table 3 and Table 4.

- **SW-7:** Model performance during the ice-free period is satisfactory with an NSE of 0.45. The model reproduces the mean flow closely, while low flows are biased high. The model hydrograph shows a small relative lag (1 day earlier in the model due to the model's daily time step) to the rating-curve hydrograph, however event timing and overall peak patterns are captured. Recorded high flows occur during spring freshet, and those peaks carry added uncertainty due to possibility of ice jams and backwater that can influence logger measurements. Some common sources of error between model results and field observations include differences between precipitation recorded at the weather station and precipitation in the flow station watersheds, the daily timestep of the model and the observed one-day lag in model results from observations and other errors sources such as uncertain flow estimates in the very low and high above bankfull portions of the rating curves.

- **SW-8:** Model performance during the ice-free period is satisfactory with an NSE of 0.43. Event timing and general peak patterns are captured, and average flows are reproduced closely. Similar to SW-7, the model shows a small lag. The rating curve tends to overestimate low flows during fall 2023, resulting in deviations from observed discharges. Low-flow estimates at SW-8 should be interpreted with care. Refinement of the rating curve at SW-8, use of local meteorological inputs and future reduction in the model timestep are expected to further improve agreement.

Figure 6 Jocko Creek Model Validation – SW-7 (2022-2024)

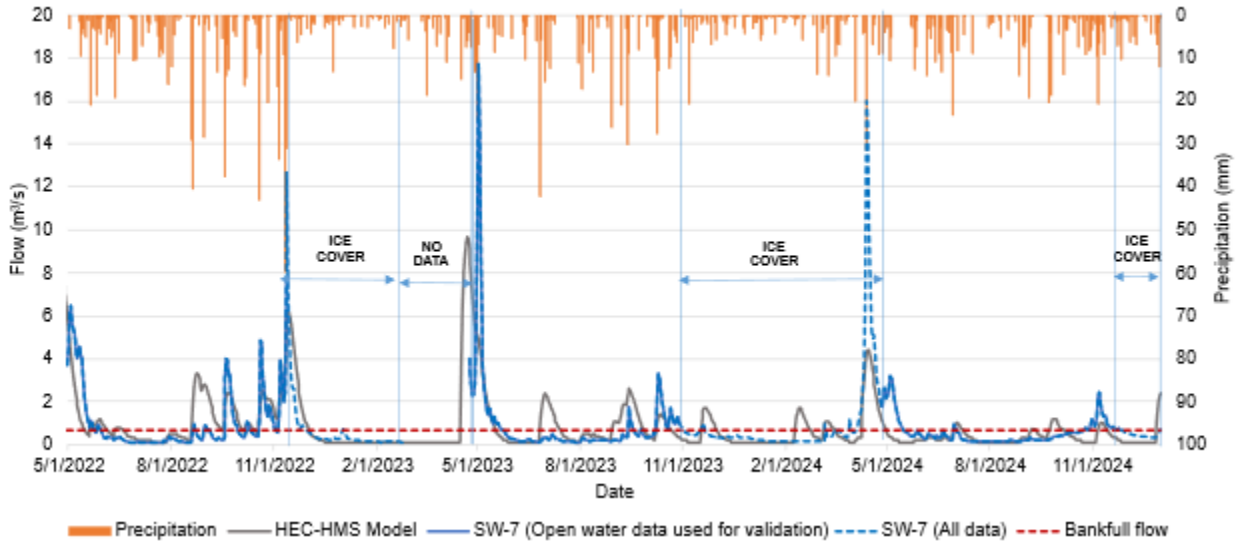


Table 3 Jocko Creek Watershed HEC-HMS Model Validation Statistics – SW-7 (2022-2024)

Statistical Parameter	Rating Curve Hydrograph	Model
Nash-Sutcliffe Efficiency	-	0.45
RMSE (m^3/s)	-	1.23
R^2	-	0.46
Mean Flow (m^3/s)	0.96	0.92
Minimum Flow (m^3/s)	0.07	0.20
Maximum Flow (m^3/s)	17.71	9.10

Figure 7 Jocko Creek Model Validation – SW-8 (2022-2024)

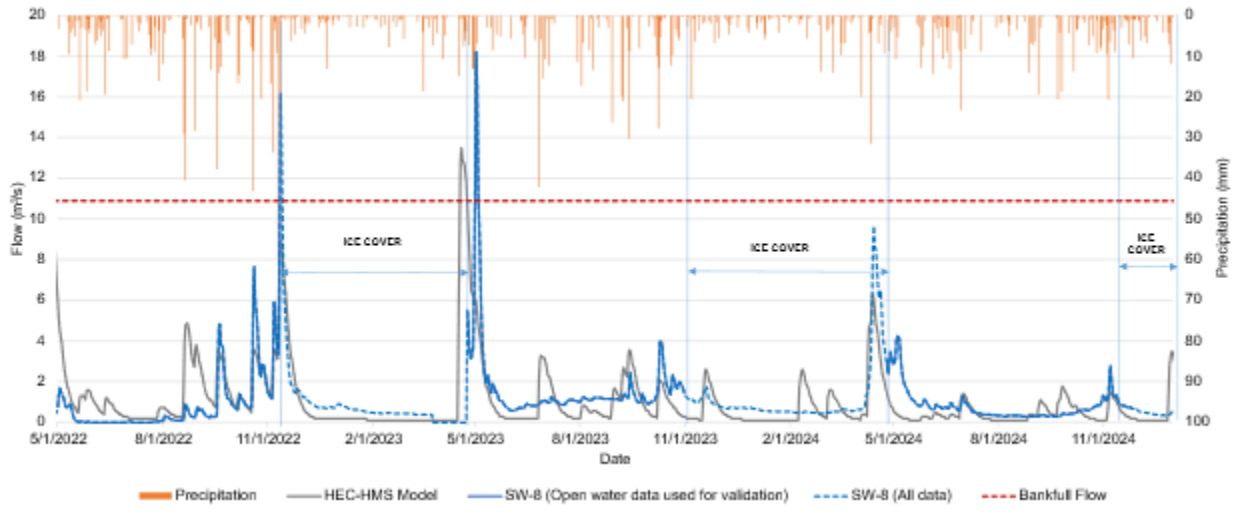


Table 4 Jocko Creek Watershed HEC-HMS Model Validation Statistics – SW-8 (2022-2024)

Statistical Parameter	Rating Curve Hydrograph	Model
Nash-Sutcliffe Efficiency	-	0.43
RMSE (m^3/s)	-	1.44
R^2	-	0.45
Mean Flow (m^3/s)	1.28	1.14
Minimum Flow (m^3/s)	0.00	0.10
Maximum Flow (m^3/s)	18.22	10.70

2.2 West Buskegau River

The West Buskegau River watershed has two monitoring stations with established rating curves, SW-5 and SW-6b. SW-6b is the most downstream station. Hydrographs for these stations are presented in Figure 8 and Figure 9, and corresponding validation statistics for the ice-free period are summarized in Table 5 and Table 6. The watershed has a larger drainage area than Jocko Creek and is located farther from the climate station. For both stations, the agreement between simulated and observed flows is good during fall 2022, fall 2023, and summer 2024, periods when the rating curves also respond well to precipitation events used in the model.

- **SW-5:** The model captures the timing of peaks and responses to major precipitation events that are reflected in the rating-curve hydrographs. Model performance with NSE values of 0.11 indicates that while overall trends are reproduced, differences arise from uncertainty in the climate inputs and the one-day lag between simulated and observed peaks. Mean and low flows are represented well. During the spring melt the model captures the peak, but it occurs earlier than observed. The timing offset may reflect differences in the climate inputs and uncertainty in logger readings during melt conditions with ice, backwater, and fluctuating stage.
- **SW-6b:** Model performance with an NSE of 0.12 indicates that overall trends are reproduced, with differences linked to uncertainty in the climate inputs and a one-day lag between simulated and observed peaks. Mean flow is underestimated while low flows are slightly overestimated. Similar to SW-5, the model however captures the timing of peaks and the responses to major precipitation events that are reflected in the rating-curve hydrographs.

Figure 8 West Buskegau Model Validation – SW-5 (2022-2024)

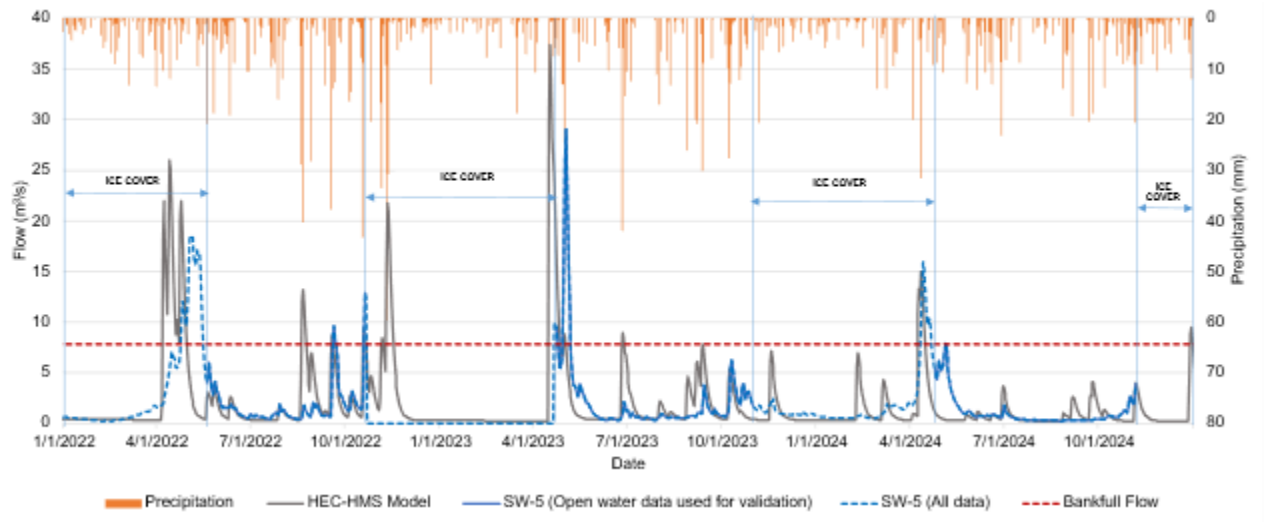


Table 5 West Buskegau River Watershed HEC-HMS Model Validation Statistics – SW-5 (2022-2024)

Statistical Parameter	Rating Curve Hydrograph	Model
Nash-Sutcliffe Efficiency	-	0.11
RMSE (m^3/s)	-	2.81
R^2	-	0.25
Mean Flow (m^3/s)	1.91	1.75
Minimum Flow (m^3/s)	0.26	0.20
Maximum Flow (m^3/s)	29.04	24.20

Figure 9 West Buskegau Model Validation - SW-6b (2022-2024)

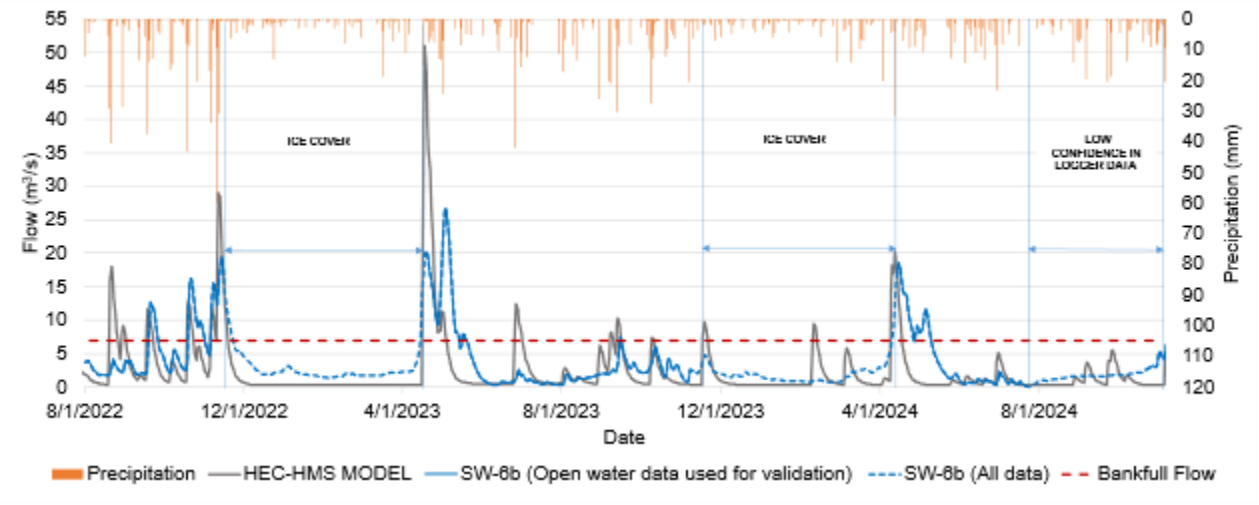


Table 6 West Buskegau River Watershed HEC-HMS Model Validation Statistics – SW-6b (2022-2024)

Statistical Parameter	Rating Curve Hydrograph	Model
Nash-Sutcliffe Efficiency	-	0.12
RMSE (m^3/s)	-	4.71
R^2	-	0.36
Mean Flow (m^3/s)	4.38	3.39
Minimum Flow (m^3/s)	0.03	0.40
Maximum Flow (m^3/s)	26.76	39.10

2.3 North Driftwood River

North Driftwood River watershed has a single monitoring station with an established rating curve, SW-2b, located at the downstream end of the watershed. The station is approximately 40 km from the Timmins climate station used as model input. Water levels at SW-2b show the weakest response to precipitation events during 2023 and 2024, whereas events in fall 2022 are well captured by both the rating-curve record and the model. Similar magnitude storms in later years are simulated by the model but do not appear in the observed record, resulting in reduced model performance. Spring melt peaks are captured but occur earlier in the model, which may reflect differences in the climate forcing and uncertainty in the logger record during melt conditions affected by ice or backwater.

These findings suggest that the meteorological conditions at North Driftwood watershed differ more from those at Timmins, introducing uncertainty from both the climate inputs and the rating curve. Model accuracy could be improved by incorporating meteorological data sources closer to the watershed, by installing a local climate station for direct temperature and precipitation monitoring.

Figure 10 North Driftwood Model Validation – SW-2b (2022-2024)

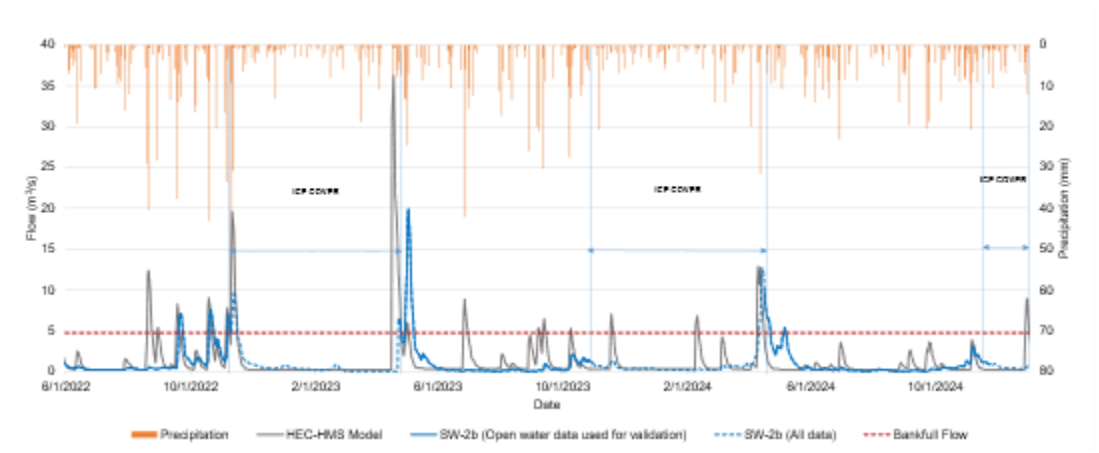


Table 7 North Driftwood River Watershed HEC-HMS Model Validation Statistics – SW-2b (2022-2024)

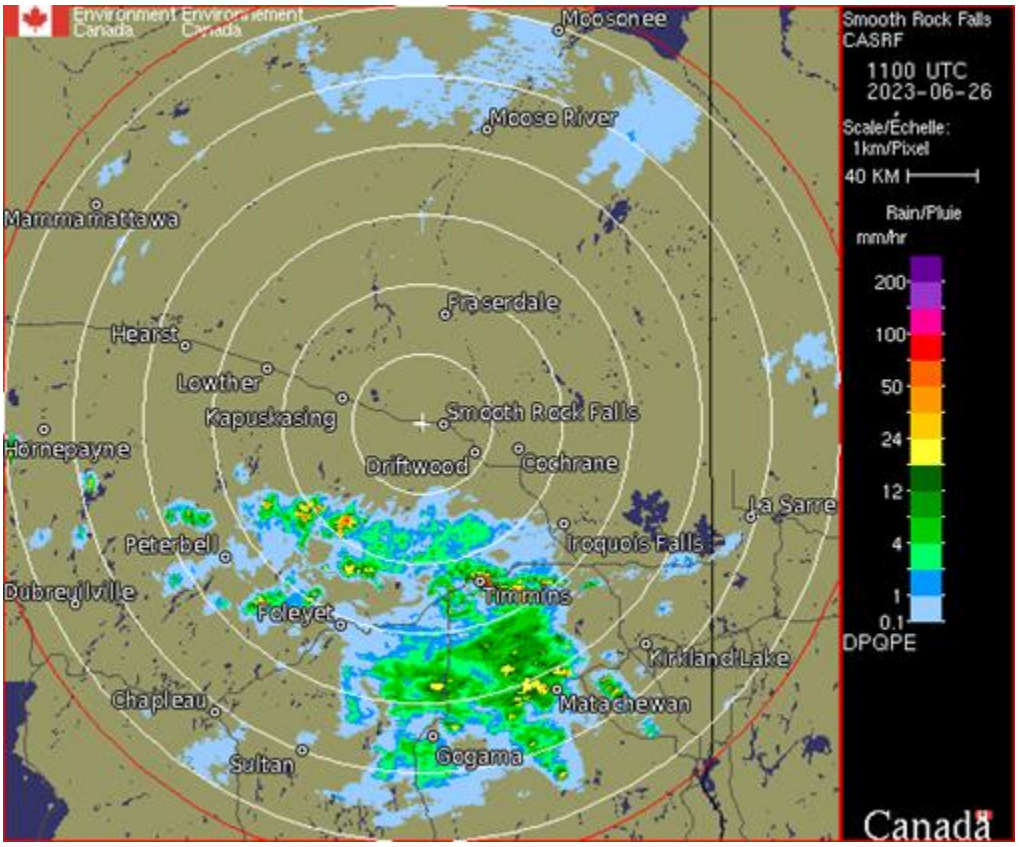
Statistical Parameter	Rating Curve Hydrograph	Model
Nash-Sutcliffe Efficiency	-	-0.06
RMSE (m^3/s)	-	2.25
R^2	-	0.17
Mean Flow (m^3/s)	1.11	1.21
Minimum Flow (m^3/s)	0.05	0.20
Maximum Flow (m^3/s)	19.95	13.60

Overall, the hydrological models adequately represent the peak timing and pattern in flow observed at the hydrometric stations in each watershed. Variances between the model and rating curve hydrographs could be attributed to differences in localized rainfall patterns. It is noted that as the watershed models represent larger drainage areas (North Driftwood River and West Buskegau River), statistical results tend to decrease in value. A lag in timing of peak flow is observed across the three watersheds, which could be improved with a higher temporal resolution of the climate and hydrology model representing sub-daily flows, which will be developed during the detailed design phase to support development of accurate receiver to final discharge point flow ratios as part of discharge rate controls. During spring melt the models capture peak magnitude, though timing differs, which could be due to uncertainty in the temperature and precipitation inputs, including snowfall, the timing and intensity of melt-season rainfall and snowmelt, and the temporal resolution of those data. Measurement conditions under ice and backwater can also affect stage observations and introduce uncertainty, as backwater and ice jams can cause stage shifts that are not representative of flow. Overall, the model responds to precipitation events satisfactorily by capturing the peak values observed at the hydrometric stations, and model performance could also be improved using meteorological data that captures local events accurately, as those extracted from the Timmins climate stations might not be most representative, given the Timmins Climate and Timmins A station are at a distance of 27.73 km and 26.2 km respectively from the southern portion of the site. Installing a local climate station within the project area would provide *in situ* meteorological observations and more accurate inputs for the model and accurate recording of climate events in the Project Area.

In the 26 July 2023 event recorded at Timmins, 42.1 mm of rainfall produced little or no stage response at the monitored stations, while a comparable event on 18 October 2022 produced a clear rise in water level. The rating curve converts changes in water level to discharge, so events that do not raise stage at the station will not appear in the observations even if the model shows a response. This behaviour is evident in several storms where there is no observed change in level, while similar events at other times produced clear rises. To understand the magnitude and spatial extent of these storms, the Environment and Climate Change Canada (ECCC) weather radar was reviewed to map storm intensity and track to confirm whether storm cores passed over the monitored watersheds. Figure 11 shows the ECCC radar field near Smooth Rock Falls during the 26 July 2023 storm, with the highest intensity over Timmins and weaker echoes over the monitored reaches, indicating the storm core did not pass over the stations.

Despite these limitations, the models reproduce events that have effects on the system, including peak flows and watershed response, to a satisfactory level. Impact assessment relies on model-to-model comparisons under different scenarios. Given that the models capture peak behaviour and event response, using differences between model scenarios is appropriate for assessing potential changes.

Figure 11 Historical Weather Radar – Northeast Ontario (near Timmins/Smooth Rock Falls) – June 26, 2023 (ECCC 2025)



3 Low Flow Predictions (SW Quan-01a.4)

Stantec conducted analysis on monitoring data for the most downstream stations in Jocko Creek, West Buskegau and North Driftwood Rivers to estimate local low flows and perform a comparison to Regional assessment low flow statistic results (Appendix B.6 in the Impact Statement) and low flow statistics derived using the regional regression methodology enumerated in the Ministry of Natural Resources (MNR) publication entitled “Extreme Flow Statistics Flood Flow and Low Flow Statistics for the Southwestern Hudson Bay and Nelson River Watersheds” (Ministry of Natural Resources and Forestry 2013). MNR developed a relationship between the 7 day mean drought and drainage area for the Southwestern Hudson-James Bay Watershed System which encompasses the Project Area. That relationship is presented below as Equation 1:

$$y = 0.0005 * (Drainage\ Area)^{1.1402}$$

Equation 1

where,

y = Mean Drought (Low Flows)

Table 8 presents the calculated 7-day mean low flows at select stations derived using MNR regional equations.

The seven-day, 20-year low flow (7Q20) is the minimum seven-day average flow expected to occur, once in twenty years. It is derived by computing the annual series of seven-day moving average minima from a continuous daily flow record, then fitting a frequency distribution to that series to estimate the twenty -year non-exceedance value. The standard practice is to use at least ten years of continuous record, and preferably twenty years to support a stable frequency estimate in accordance with MECP Procedure B-1-5 (MOE 1990, MOE 1994, MNRF 2013). Table 9 presents the 7Q20 low flows at the downstream stations at each watershed derived from the regional regression. Detailed methodology can be found in the Surface Water Resources Baseline Report (Stantec 2024a).

A direct comparison to a 7Q20 computed from on site observations is not possible as the on-site hydrometric records are less than five years in length, and hence insufficient to derive the estimate. To compare the regression values with observations, 7-day average flows were computed for recent low flow periods and evaluated against the regression-based estimates at the select stations. The climate normal precipitation at the site is 801.8 mm, while total recorded precipitation was 712.6 mm in 2024 and precipitation was 713.7 mm in 2023. These two dry years correspond to approximately a 3-year return period event and represent more frequent low-flow conditions. For 2024, the period from mid July to the end of August was selected, and for 2023 the period from mid July to the end of July was selected for comparison, when precipitation and the flow hydrographs were low. The 7-day average flows from these periods are given in Table 9Table 10.

Table 8 Calculated 7-day Mean Low Flows at Select Stations derived using MNR Regional Regression Equations

Watershed	Station	Drainage Area (km^2)	7-Day Mean Low Flow(m^3/s)
Jocko Creek	SW-8	92.5	0.09
North Driftwood	SW-2b	105.5	0.10
West Buskegau	SW-6b	199.0	0.21

Table 9 Low Flows at Select Stations derived using Regional Regression Equations (Stantec 2024a)

Watershed	Station	Drainage Area (km^2)	Mean Annual Flow (m^3/s)	Minimum Annual Flow (m^3/s)	Low Flow estimated using Regression (m^3/s)	
					7Q10	7Q20
Jocko Creek	SW-8	92.5	1.13	0.58	0.15	0.13
North Driftwood	SW-2b	105.5	1.28	0.65	0.16	0.14
West Buskegau	SW-6b	199.0	2.38	1.17	0.28	0.24

Table 10 Observed 7 day Average Flows at Select Stations for the Evaluation Period

Watershed	Station	7Q20 from Regional Regression (m^3/s)	Minimum 7-day Average Flow (m^3/s)		Average Low Flow (m^3/s)	
			2023	2024	2023	2024
Jocko Creek	SW-8	0.13	0.90	0.30	1.00	0.35
North Driftwood	SW-2b	0.14	0.06	0.06	0.08	0.14
West Buskegau	SW-6b	0.24	0.41	0.38	0.57	0.60

The results are summarized below for each station:

- **SW-6b:** The 7Q20 presented in the Surface Water Resources Baseline Report (Appendix B.6 of the Impact Statement) is 0.03 m^3/s greater than the MNR regional 7-day mean drought (low flow). The similarity between the two regression values indicate that the low flow values presented in the Baseline are in line with low flow values derived using published MNR equations. Observed 7-day minima are higher than either regression, with the observed values being approximately twice the Baseline regional calculated 7-day average. This is expected with the use of a long return-period statistic that reflects rare low flows, with the short on-site windows capturing seasonal lows but not extreme conditions.

- **SW-8:** The 7Q20 presented in the Surface Water Resources Baseline Report is 0.04 m^3/s greater than the MNR regional 7-day mean drought (low flow). The similarity between the two regression values indicate that the low flow values presented in the Baseline are in line with low flow values derived using published MNR equations. The observed 7-day minima are substantially higher than the calculated regional 7-day mean low flow. This is expected because the regional 7-day mean utilizes a long period of record, while the observed flows represent more, seasonal low-flow events over a much shorter period of record. The upstream catchment areas of SW-6b, SW-2b, and SW-8 were mapped using the Ontario Watershed Information Tool (OWIT) (Ministry of Natural Resources and Forestry 2024) which provides information regarding the proportion of land within the upstream catchment area that is classified as a wetland or lake feature. SW-8 has a drainage area comparable to SW-2b but has more lakes and wetlands. SW-8 has a drainage area approximately half that of SW-6b but contains proportionally more lakes and wetlands. This indicates that the primary driver in flow changes for SW-8 isn't precipitation but rather the attenuating effect of hydrologic features with storage capacity within the upstream catchment area (wetlands and lakes). One should consider that there is a higher measurement uncertainty at SW-8 than SW-2b and SW-6b at very low stages, as the rating curve relies on flow measurements more closely concentrated on the mean because of this attenuating lake effect that augments baseflows during low flow periods. As discussed in Section 2.1, the SW-8 rating curve tends to overestimate low flows and that low-flow estimates at SW-8 should be interpreted with care.

- Additionally, SW-8 is located closer to Timmins than either SW-2b or SW-6. As discussed in Section 4.1.4.3.1 of Appendix B.6 of the IS, it is understood that there are variations in weather patterns within the Project Area that cause variations in the hydrologic response at various climate stations. As SW-8 is located closer to Timmins and the Timmins climate station it is the more indicative station in terms of hydrologic response to precipitation recorded in Timmins.

- **SW-2b:** The 7Q20 presented in the Surface Water Resources Baseline Report is 0.04 m^3/s greater than the MNR regional 7-day mean drought (low flow). The similarity between the two regression values indicate that the low flow values presented in the Baseline are in line with low flow values derived using published MNR equations. The observed average 7-day minima are lower than the calculated regional 7-day drought flows by 0.04 m^3/s in both years, a decrease of about 40 percent (%), and its average low flows bound the regional value, below in 2023 and above in 2024. This suggests that the river falls to smaller sustained flows during dry spells and recovers less between storms. It is understood that SW2-b has fewer lakes and wetlands than both SW-6b and SW-8, which would support baseflow through the summer. The observed data at SW-2b is understood to be the more credible value as it uses data more local to the Project Area.

Overall, the regional mean 7-day drought flows provide an appropriate benchmark and the local site minima illustrate local variability. The low flow values presented in the Surface Water Resources Baseline Report were less than 0.05 m^3/s greater than those calculated from the MNR regression equations. The Baseline 7Q20 values use regional data in closer proximity to the Project Area than the MNR equation which is applicable to the Southwestern Hudson-James Bay Watershed. As such, the small variability seen is expected. This approach is reasonable for mixing zone evaluation as it applies a conservative low flow metric while acknowledging site specific variability and data limitations.

4 Climate Adjusted HEC-HMS Sensitivity Analysis (SW Quan-01b)

4.1 Modelled flows

To account for the extended mine life and globally driven changes in climate, climate change effects were integrated into the development of a future climate year which was downscaled to daily meteorological conditions. The HEC-HMS hydrological model setup with climate change adjusted meteorological inputs (air temperature, precipitation) at a daily scale is used to estimate baseline conditions from which Project change could be assessed. The existing HEC-HMS models were updated for 2022, 2023, and 2024 using temperature and precipitation adjustments for climate change. The model was rerun for each year under baseline and climate-adjusted baseline scenarios. Model results are compared to the baseline model and observed flows at selected stations with reliable rating curves.

Seasonal air temperature adjustments applied were +3.9 °C in spring, +3.7 °C in summer, +3.6 °C in fall, and +5.3 °C in winter. Daily precipitation was increased by 14%. The number of warmer days increased, with the average count of days above 0 °C rising from 202.5 to 233.5 over 2022 to 2024 (Stantec 2024a). This implies more rainfall, less snowfall, and an earlier and more prolonged melt season.

Figure 12 presents monthly precipitation contributions for the baseline and climate-adjusted scenarios. With climate change larger rain fractions through late fall to spring and reduced snow fractions in winter are observed. This pattern is expected under higher temperatures with a 14% increase in daily precipitation. Station SW-6b is shown as a representative example (Figure 11). The increase in days above freezing shifts precipitation phase toward rain and advances melt onset. Average daily flows increase through autumn and early winter due to higher rainfall (Figure 12). Spring peaks are reduced because a larger share of the snowpack melts earlier and over a longer window and peak timing advances by several days in melt-dominated months. The climate-adjusted hydrograph shows a lower and broader spring response, followed by more frequent autumn peaks. Hydrographs for the other stations are provided in Attachment C.

Figure 12 Average Total Snowfall and Rainfall for 2022-2024 Climate Dataset

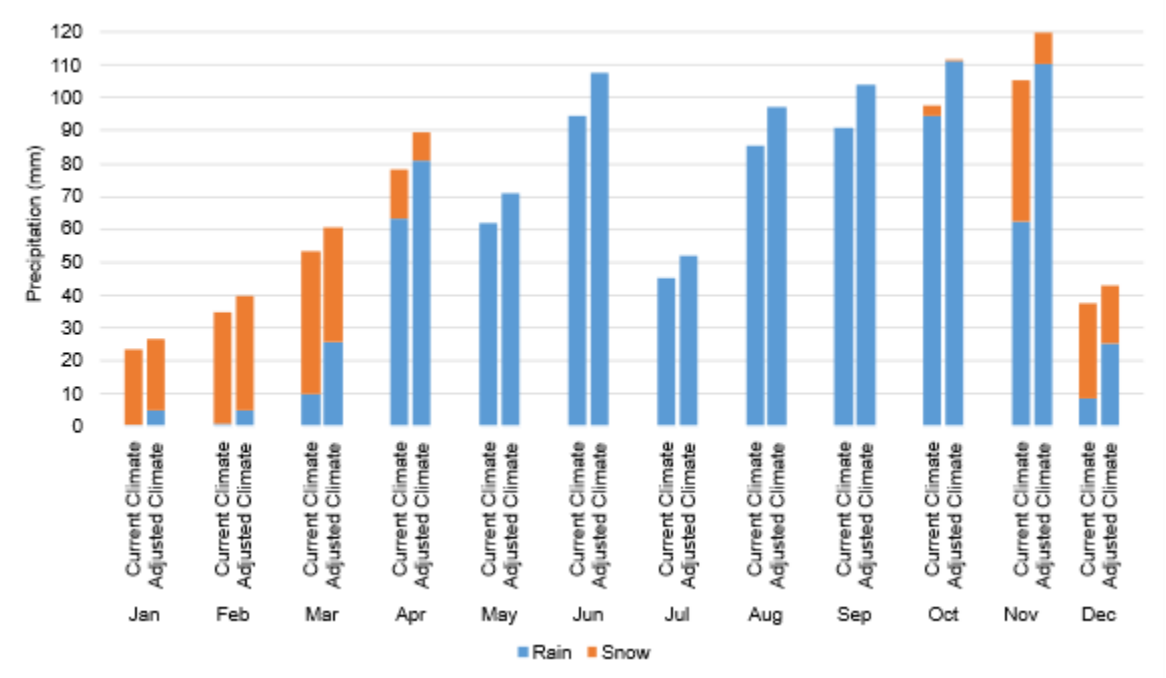


Figure 13 Hydrographs at SW-6b for 2022-2024

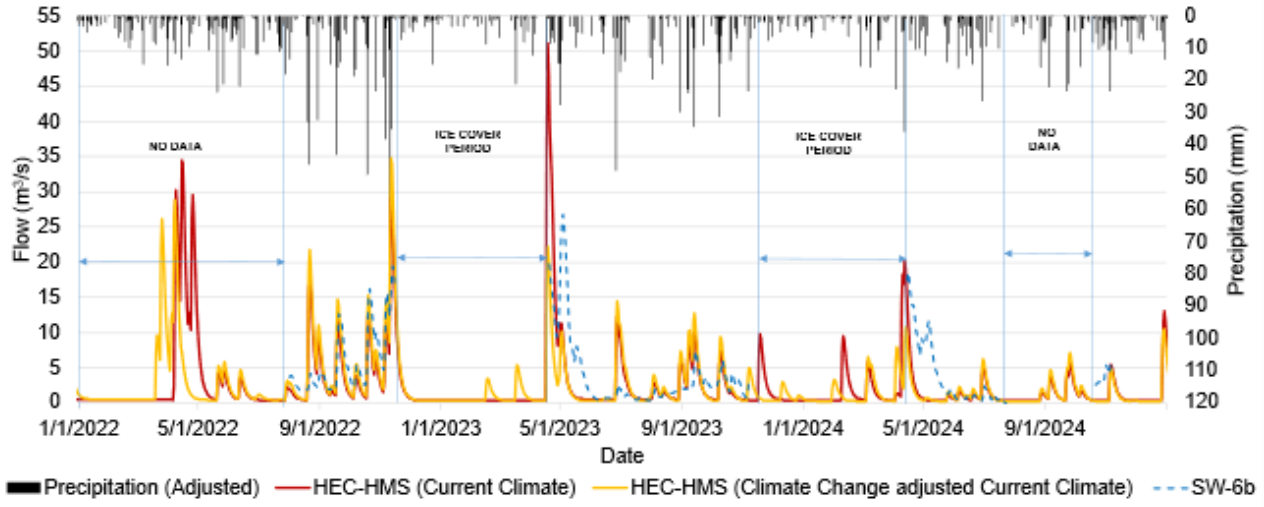
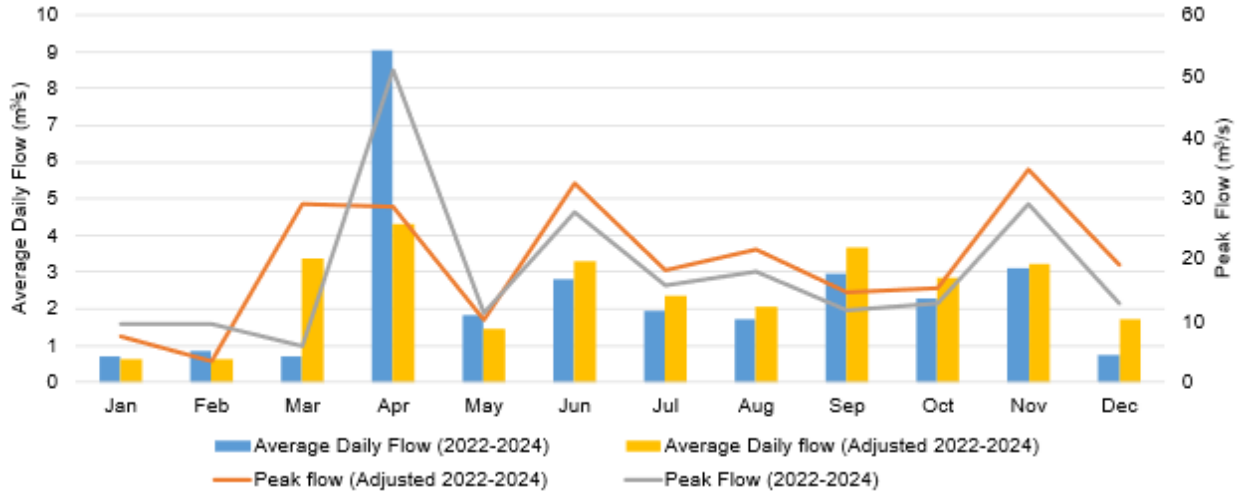


Figure 14 Average Daily and Peak Flows at SW-6b for 2022-2024 under Baseline and Climate Change Scenarios



4.2 Flow Changes Along Reaches for Climate Scenarios

The watershed baseline condition and Project scenario HEC-HMS model daily hydrologic flow results were compared to quantify and assess changes in flow during different mine phases for the watersheds. A sensitivity analysis was completed to evaluate how estimated changes to flow differ when the model is run under the existing climate baseline versus a climate-adjusted baseline. This comparison helps determine whether the estimated changes under existing climate baseline conditions are more conservative than those obtained when climate adjustments are applied.

Modelled daily flows from the climate-adjusted baseline and Project scenario models were assessed using a 10% daily flow change screening threshold. The same evaluation was completed for the existing climate baseline using water balance outputs updated with non-adjusted climate data. Days with simulated flow reductions greater than 10% relative to the corresponding baseline were identified and compared to environmental flows derived from that baseline. This approach is consistent with the flow change evaluation framework presented in Stantec (2024b). Table 11 through Table 14 summarize the number of days with flow reductions and increases greater than 10% along the selected reaches in North Driftwood River and West Buskegau River watersheds for both the existing climate and the climate-adjusted models across the modeled mine-life stages. In response to GW-01b, the HEC-HMS model was updated for mine years after Year 17 using seepage rates provided by the groundwater model for these stages and the flow change predictions were revised. Pit flow contributions at pit full conditions were also updated in the hydrologic model, and updated values reflecting these changes are provided in the tables.

Table 11 Non-Climate Change Adjusted and Climate Change Adjusted North Driftwood River Flow Changes

		Construction (Modelled Years -3 to -1 – Year -1)					Operations Phase 1 (Modelled Years 1 to 4 – Year 2)					Operations Phase 2 (Modelled Years 4 to 18 – Year 17)					Operations Phase 2 (Modelled Years 18 to 30 – Year 23)				
		+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases
Climate Change adjusted	ND1	0	-	0	91	No	0	-	0	119	No	20	-	0	203	No	0	-	0	136	No
	ND3	0	-	0	118	No	0	-	0	151	No	30	-	0	209	No	13	-	0	158	No
	ND5	15	-	3	205	No	21	-	17	215	No	105	-	61	224	No	103	-	65	200	No
	ND8	34	-	10	238	No	38	-	27	224	No	109	-	63	229	No	103	-	68	208	No
	ND18	123	-	76	17	No	**123**	-	76	17	No	0	-	0	365	Yes	0	-	0	365	Yes
Non- Climate Change Adjusted	ND1	0	0	0	122	No	0	0	0	151	No	33	+13	20	196	No	0	0	0	144	No
	ND3	0	0	0	146	No	0	0	0	186	No	53	+23	36	207	No	7	-6	0	162	No
	ND5	6	-9	1	227	No	11	-10	8	246	No	98	-7	76	220	No	29	-74	14	199	No
	ND8	8	-26	2	248	No	12	-26	9	308	No	115	+6	88	216	No	33	-70	17	191	No
	ND18	37	-86	10	64	No	37	-86	10	64	No	0	0	0	365	Yes	0	0	0	365	Yes

Table 12 Non-Climate Change Adjusted and Climate Change Adjusted North Driftwood River Flow Changes - Continued

		Operations Phase 3 (Modelled Years 30 to 41 – Year 35)					End of Operations (Modelled Year 41)					Passive Closure (Modelled Year 46 onward – Year 47)					Pit Filled				
		+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases
Climate Change adjusted	ND1	0	-	0	71	No	0	-	0	61	No	0	-	0	29	No	0	-	0	130	No
	ND3	17	-	0	84	No	22	-	0	69	No	23	-	1	32	No	10	-	0	148	No
	ND5	128	-	83	109	No	130	-	76	90	No	135	-	83	35	No	76	-	45	216	No
	ND8	126	-	83	105	No	270	-	178	47	No	126	-	77	57	No	69	-	39	232	No
	ND18	0	-	0	365	Yes	0	-	0	365	Yes	0	-	0	365	Yes	0	-	0	365	Yes
Non- Climate Change Adjusted	ND1	0	0	0	92	No	0	0	0	69	No	0	0	0	148	No	0	0	0	200	No
	ND3	6	-11	0	113	No	8	-14	0	90	No	5	-18	0	176	No	4	-6	0	224	No
	ND5	47	-81	19	147	No	64	-66	26	200	No	43	-92	15	239	No	30	-46	11	281	No
	ND8	45	-81	19	123	No	57	-213	21	194	No	33	-93	11	254	No	19	-50	7	289	No
	ND18	0	0	0	365	Yes	0	0	0	365	Yes	0	0	0	365	Yes	0	0	0	365	Yes

Table 13 Non-Climate Change Adjusted and Climate Change Adjusted West Buskegau River Flow Changes

		Construction (Modelled Years -3 to -1 – Year -1)					Operations Phase 1 (Modelled Years 1 to 4 – Year 2)					Operations Phase 2 (Modelled Years 4 to 18 – Year 17)					Operations Phase 2 (Modelled Years 18 to 30 – Year 23)				
		+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases
Climate Change adjusted	WB1	0	-	0	106	No	0	-	0	88	No	0	-	0	151	No	0	-	0	145	No
	WB5	40	-	35	160	No	36	-	26	169	No	19	-	0	219	No	24	-	0	213	No
	WB9	18	-	15	205	No	27	-	21	223	No	8	-	0	249	No	9	-	0	245	No
	WB14	0	-	0	0	No	0	-	0	0	No	0	-	0	37	No	0	-	0	0	No
Non- Climate Change Adjusted	WB1	0	0	0	162	No	0	0	0	126	No	2	+2	0	170	No	2	+2	0	172	No
	WB5	19	-21	9	204	No	19	-17	9	204	No	17	-2	3	232	No	14	-10	1	234	No
	WB9	17	-1	12	232	No	32	+5	25	226	No	8	0	0	265	No	7	-2	0	268	No
	WB14	0	0	0	0	No	0	0	0	0	No	0	0	0	0	No	0	0	0	0	No

Table 14 Non-Climate Change Adjusted and Climate Change Adjusted West Buskegau River Flow Changes - Continued

		Operations Phase 3 (Modelled Years 30 to 41 – Year 35)					End of Operations (Modelled Year 41)					Passive Closure (Modelled Year 46 onward – Year 47)					Pit Filled				
		+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases	+10% Reduction days	Difference in +10% Reduction days compared to Climate change adjusted scenario	+10% Reduction & Below Environmental Flow	+10% Increase days	Q100 Flood Flow Increases
Climate Change adjusted	WB1	0	-	0	3	No	0	-	0	0	No	0	-	0	0	No	0	-	0	61	No
	WB5	2	-	0	30	No	3	-	0	13	No	0	-	0	12	No	0	-	0	100	No
	WB9	0	-	0	56	No	0	-	0	31	No	0	-	0	22	No	0	-	0	117	No
	WB14	0	-	0	0	No	0	-	0	157	No	0	-	0	184	No	0	-	0	0	No
Non- Climate Change Adjusted	WB1	0	0	0	0	No	0	0	0	0	No	0	0	0	0	No	0	0	0	73	No
	WB5	1	-1	0	0	No	1	-2	0	11	No	0	0	0	11	No	0	0	0	119	No
	WB9	0	0	0	13	No	0	0	0	31	No	0	0	0	170	No	0	0	0	234	No
	WB14	0	0	0	0	No	0	0	0	0	No	0	0	0	0	No	0	0	0	0	No

Existing climate and climate-adjusted baselines produce different hydrologic regimes as discussed in Section 4.1. As a result, the frequency and magnitude of flow reductions between baseline and mine phases can vary between the two climate scenarios. The results show a mixed pattern across mine-life stages. Differences are more prominent in the North Driftwood watershed, which has more days with reductions above the threshold than the West Buskegau River watershed. For most years, the climate change adjusted model has more days with flow reductions greater than 10% than the corresponding existing-climate model. An exception occurs in Operations Phase 2 (Years 4 to 18), where the existing climate baseline shows more days with reductions above 10% (maximum difference of 23 days in ND3) than the climate-adjusted baseline.

Table 15 summarizes by month, the number of days when baseline flows are below the environmental flow and when Operations Phase 2 produces a flow reduction greater than 10% and below environmental flow for ND1 subwatershed (most downstream). Under the existing climate baseline, ND1 has 158 days below environmental flow compared to 135 days for climate adjusted baseline. The two climate settings generate distinct hydrologic regimes, which in turn influence the screening outcomes.

Table 15 North Driftwood River Flows – ND1 (Baseline & Operations Phase 2)

Month	Climate Change Adjusted		Non-Climate Change Adjusted	
	Number of Days below Environmental flow in Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow-Operations Phase 2 (No.)	Number of Days below Environmental flow in Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow-Operations Phase 2 (No.)
January	17	0	18	2
February	3	0	13	6
March	10	0	30	4
April	14	0	11	0
May	19	0	8	3
June	1	0	4	0
July	13	0	15	3
August	2	0	2	0
September	12	0	13	1
October	8	0	7	0
November	17	0	17	0
December	19	0	20	1
Total	**135**	**0**	**158**	**20**

4.3 Updated Flow Changes Along River Reaches (SW Quan-01d.1)

Summary tables of monthly flows and changes from baseline flows for key nodes in the watersheds, extending from the Project Area (PA) to the HEC-HMS model outlets, and including the key junctions (confluences) within the reach were presented in Appendix B.2 of Appendix C.5 in the IS. The changes to flows from baseline were predicted for the following life of mine phases:

- Construction Phase (Years -3 to -1; Year -1)
- Operations Phase 1 (Years 1 to 4; Year 2)
- Operations Phase 1 and 2 (Years 4 to 18; Year 17)
- Operations Phase 2 (Years 18 to 30; Year 23)
- Operations Phase 3 (Years 30 to 41; Year 35)
- Operations Phase 3 (Years 30 to 41; Year 41)
- Passive Closure (Years 41 to 47; Year 47)
- Pit Filled

For the West Buskegau River these monthly flows were presented for the following subwatersheds (listed from upstream to downstream:

- WB14 (upstream subwatershed with Project Area within the drainage area)
- WB9 (subwatershed with final discharge point discharges)
- WB5 (last subwatershed with the Project Area within the drainage area)
- WB1 (watershed model outlet)

For the North Driftwood River these monthly flows were presented for the following subwatersheds from upstream to downstream:

- ND18 (outlet of Martin Lake and start of North Driftwood River diversion with final discharge point)
- ND8 (outlet of North Driftwood River realignment and downstream of final discharge points)
- ND5 (last subwatershed with the Project Area within drainage area)
- ND3 (downstream of Project Area and Nesbitt Creek confluence)
- ND1 (watershed model outlet)

With the addition of discharge flow controls to the water balance and water quality model (detailed in SW Qual-02) and updated groundwater seepage inputs (detailed in GW-01b) to the hydrologic HEC-HMS models, the flow change assessment Appendix B.2 of Appendix C.5 in the Impact Statement was subsequently updated. The following two discharge flow control scenarios were developed:

- One-to-One (1-to-1) - Effluent discharge at each final discharge point (FDP) is managed to be below or equal to the estimated upstream receiver flow rate considering drainage area changes due to the Project. This approach was applied to the North Driftwood River and West Buskegau River FDPs.

- Pre- and Post-Development (Pre-&-Post) Scenario - In the most downstream subwatershed on the North Driftwood River (e.g., ND5) that has its drainage area reduced by the Project, the baseline monthly average flow is estimated in the HEC-HMS hydrologic model. With the Project water management infrastructure in place the receiver flow in the same downstream subwatershed is estimated with no FDP discharge using the HEC-HMS hydrologic model. The difference between the baseline and Project with no FDP HEC-HMS model results in the downstream subwatershed represents the max FDP discharges that can be released into that receiver. This potentially can represent a receiver to effluent flow ratio of less than 1 (e.g., 0.8). This approach is also referred to as hydrograph matching where the pre-development hydrograph is preserved in post-development. Changes in flow were assessed for this scenario in the North Driftwood River.

Modelled daily flows for the existing climate and climate-adjusted baseline and Project scenario models were assessed using a 10% daily flow change screening threshold as discussed in Section 4.2. Percent change in mean monthly flows for baseline and Project scenario models was also calculated for each subwatershed, life of mine phase, climate condition and flow control scenario. Attachment D presents the monthly summary results from the hydrologic model outputs for the following subwatersheds:

North Driftwood River

- ND18 (outlet of Martin Lake and start of North Driftwood River diversion with final discharge point)

- ND8 (outlet of North Driftwood River realignment and downstream of final discharge points)

- ND7 (support FFH-01 response assessment)

- ND6 (support FFH-01 response assessment)

- ND5 (last subwatershed with the Project Area within drainage area)

- ND3 (downstream of Project Area and Nesbitt Creek confluence)

- ND1 (watershed model outlet)

West Buskegau River

- WB14 (upstream subwatershed with Project Area within the drainage area)

- WB9 (subwatershed with final discharge point discharges)

- WB5 (last subwatershed with the Project Area within the drainage area)

- WB3 (outlet of the West Buskegau River discharging to Buskegau)
- WB1 (watershed model outlet)

The following life of mine phases were modelled and represent baseline, operations and decommissioning and abandonment life of mine phases and results are presented in the Attachment D tables:

- Baseline
- Operations Phase I and II – Mine Year 17 (full site footprint being managed via water management infrastructure and TMF in operation)
- Passive Closure (pit not filled)
- Pit Filled

The following climate scenarios that were modelled for each subwatershed and results are presented in the Attachment D tables:

- Existing climate for the year 1999 (Stantec 2024b)
- Climate change adjusted for the year 1999 (Stantec 2024b)

The following discharge flow control scenarios were modelled for each climate condition and subwatershed and results are presented in the Attachment D tables:

- 1-to-1
- Pre-&-Post

5 Reach Length Sensitivity (SW Quan-01c)

Reach lengths are used in the HEC-HMS model to define the channel routing and could affect peak timing, magnitude, and event volume. The variations in reach length are a source of model uncertainty, though their impact is typically modest. To quantify this uncertainty, a focused sensitivity analysis was conducted for the ND3 subbasin to illustrate potential effects on peak timing, peak magnitude, and event volume. Subbasin transform parameters, including lag times, were not altered and are not affected by any changes in reach length.

The model was rerun for 2022-2024 period with three alternative routing distances for ND3, and compared to the reported HEC-HMS baseline model with a reach length of 45,820 m. The tested reach lengths were 10,000 m, 20,000 m, and 30,000 m. In all cases, the peak flow event occurred on 18-Apr-2023, indicating that variations in reach length had little impact on the timing of the peak event.

Agreement with the baseline hydrograph was very high with coefficients of determination (R^2) ranging from 0.996 to 0.999. Changes in total volume were relatively small (0.13%-0.29%) across the three scenarios. Peak discharge differences were within about −1.3 % to +0.3%. The tested reach lengths and results are summarized in Table 16.

These results indicate that the variation in reach length produces only minor changes in hydrograph shape. Uncertainty from variation in reach lengths is low and is not expected to significantly affect predicted peak timing, peak magnitude, or event volume in ND3. By extension, the same conclusion is expected to hold for other watersheds.

Table 16 Results of Sensitivity Analysis of Reach Length on ND3 Hydrograph Metrics

Scenario	Reach length-ND3 (m)	Peak Discharge (m^3/s)	Change in Peak Flow (%)	Total flow Volume (m^3)	Change in Total Volume (%)	R^2
Baseline Model	45,820	39.3	-	219,796	-	-
1	10,000	39.8	-1.26	219,162	0.29	0.996
2	20,000	39.6	-0.76	219,349	0.20	0.998
3	30,000	39.2	0.26	219,510	0.13	0.999

Attachments:

Attachment A Hydrographs
Attachment B Hydrometric Monitoring Station Summaries
Attachment C Climate Change Adjusted Hydrographs
Attachment D SW Quan-01d.1 Monthly Flow Change Summary Tables

6 References

Ministry of Natural Resources and Forestry. 2013. *Extreme flow statistics: Flood flow and low flow statistics for the Southwestern Hudson Bay and Nelson River watersheds* [Technical release]. Queen's Printer for Ontario. Retrieved from https://www.publicdocs.mnr.gov.on.ca/mirb/Extreme%20Flow%20Analysis%20-%20Technical%20Release.pdf

Ministry of Natural Resources and Forestry. 2024. User Guide for Ontario Watershed Information Tool (OWIT). Ministry of Natural Resources and Forestry. Retrieved from https://www.ontario.ca/page/ontario-watershed-information-tool-owit

Stantec Consulting Ltd. 2024a. Crawford Nickel Project: Surface Water Resources Baseline Report.

Stantec Consulting Ltd. 2024b. Crawford Nickel Project: Technical Data Report – Surface Water Resources Assessment

December 23, 2025
Mathieu Boucher, Environmental Manager

Reference: **Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model**

Attachment A Hydrographs

Figure A-1 SW-2b

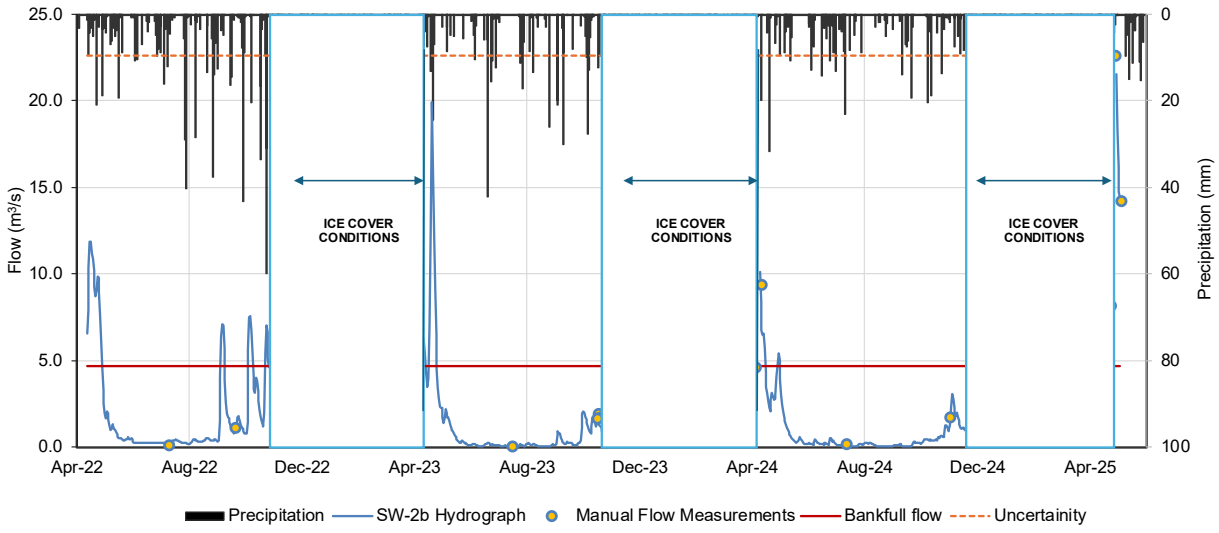


Figure A-2 SW-5

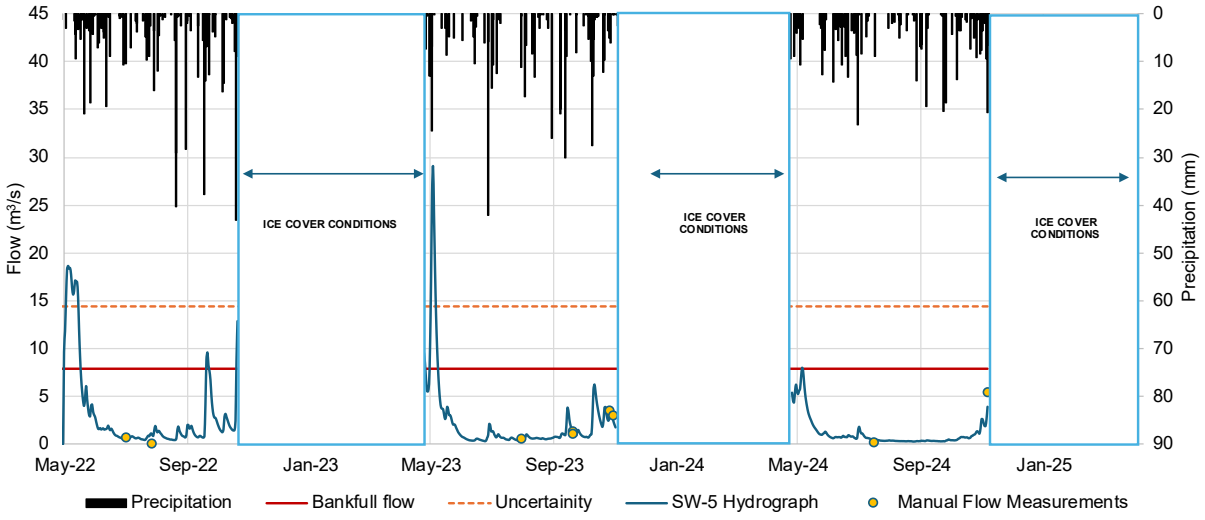


Figure A-3 SW-6b

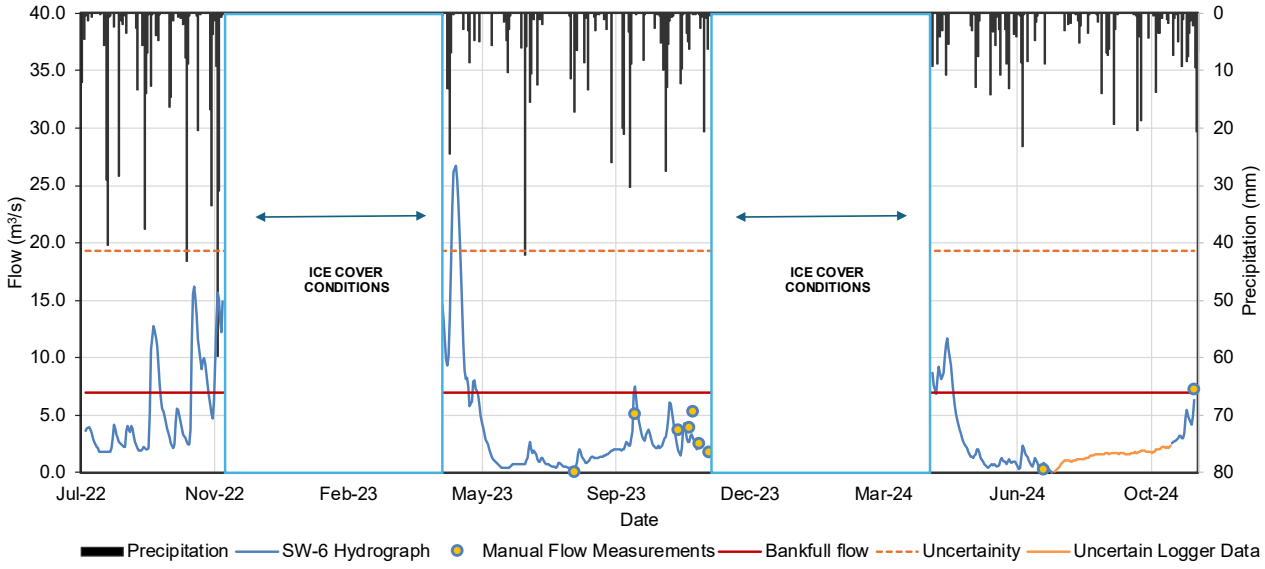


Figure A-4 SW-7 Hydrograph

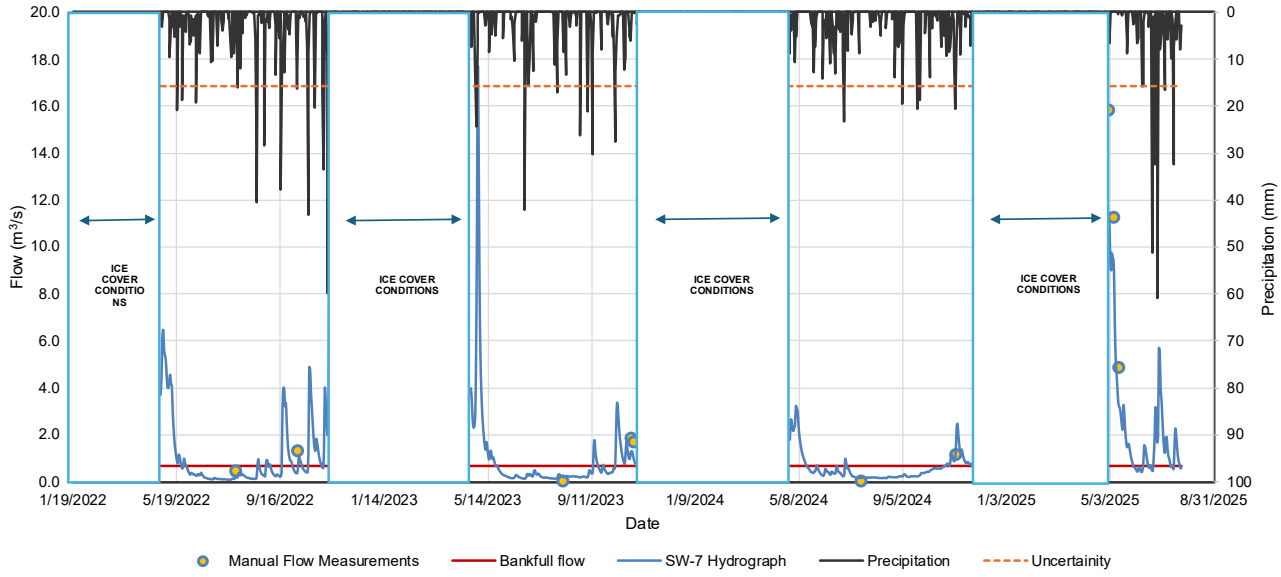
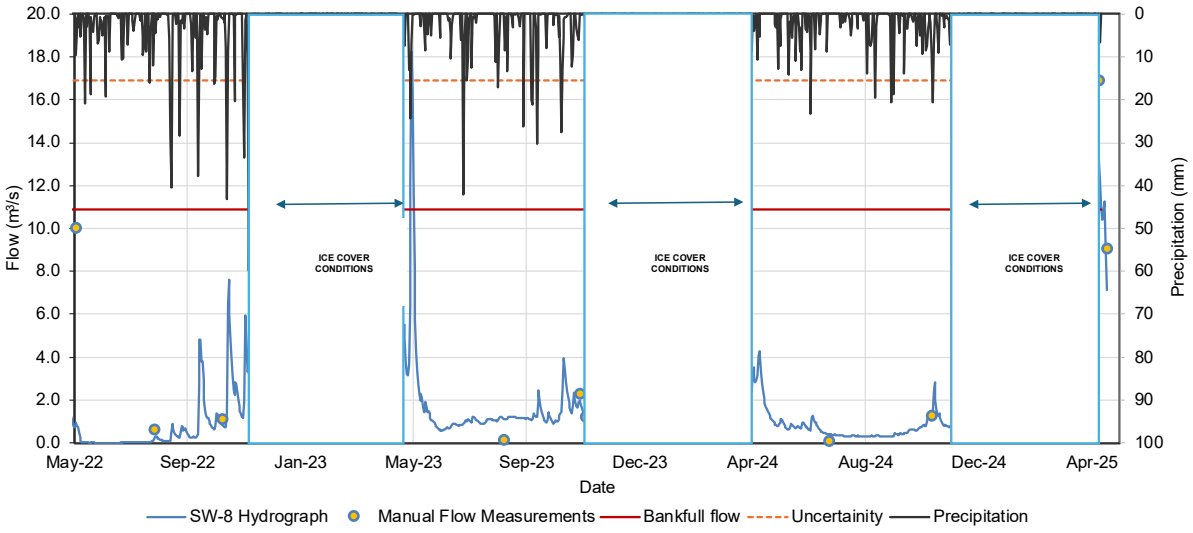
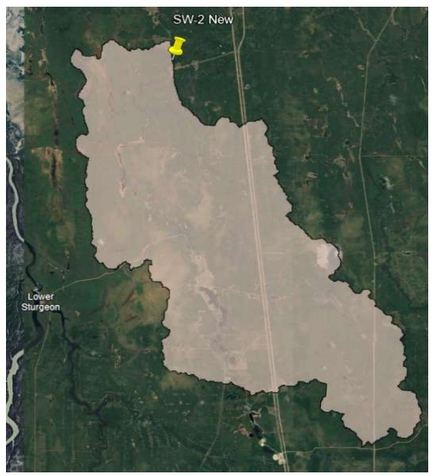


Figure A-5 SW-8 Hydrograph



Attachment B Hydrometric Monitoring Station Summaries

Hydrometric Monitoring Station SW-2b Summary			
Station ID	SW-2b	**Instrument**	Solinst Levelogger®
Location	North Driftwood	**Measurements**	Continuous levellogger (level and temperature)
Installation Date	April 2022	**Spot Measurements**	Flow, Stage
GPS Coordinates	48°53'57"N 81°25'03"W	**Main Channel**	Straight
Access	Route 655, access road	**Channel Bottom**	Cobbles, gravel
Drainage Area	105 km^2	**Flood Plain**	Left bank: grasses, confierous trees. Reight bank: vegetation, steep slope
Period of Record	April 2022 - Ongoing	**Comments**	Manual Flow Measurements - 8 m downstream of bridge
Active	Yes		



Map: SW-2b OWIT Drainage Area (MNRF 2023a)

Drainage Area (km^2)	105.242
Shape Factor ()	10.056
Length of Main Channel (km)	32.531
Maximum Channel Elevation (m)	299.360
Minimum Channel Elevation (m)	259.020
Slope of Main Channel (m/km)	1.240
Slope of Main Channel (%)	0.124
Area Lakes/Wetlands (km^2)	4.962
Area - Lakes (km^2)	0.653
Area - Wetlands (km^2)	4.308
Mean Elevation (m)	275.013
Maximum Elevation (m)	303.137
Mean Slope (%)	1.075
Annual Mean Temperature (°C)	1.800
Annual Precipitation (mm)	853.000

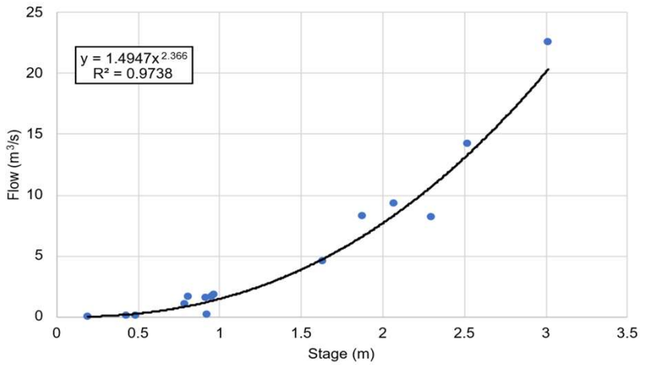
Table: OWIT Watershed Data (MNRF 2023a)



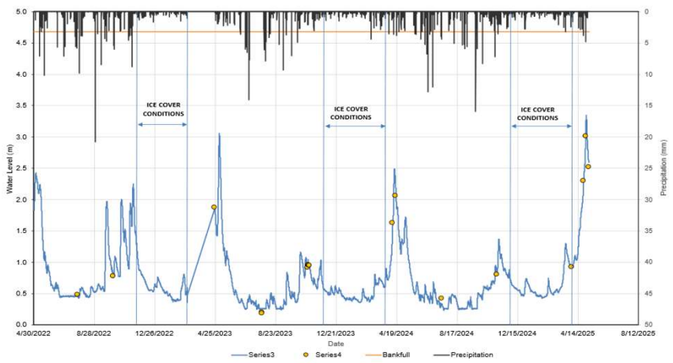
Photo 1: Looking Upstream



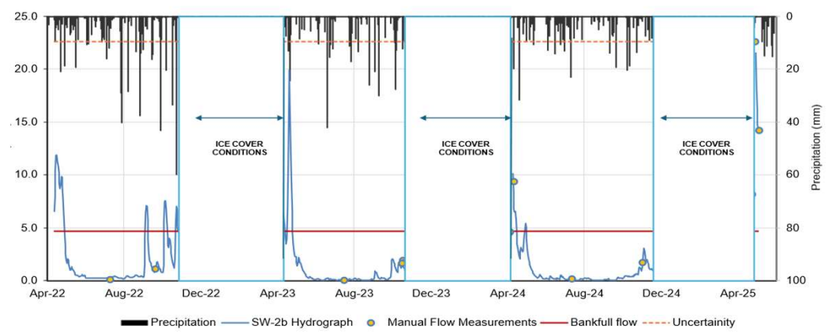
Photo 2: Looking Downstream



Open Water Stage - Discharge Curve

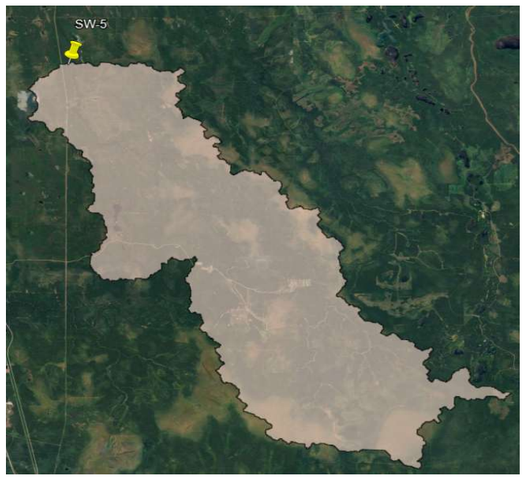


Continuous and Manual Water Levels



Continuous and Manual Flows

Hydrometric Monitoring Station SW-5 Summary			
Station ID	SW-5	**Instrument**	Solinst Levelogger®
Location	West Buskegau	**Measurements**	Continuous levellogger (level and temperature)
Installation Date	July 2021	**Spot Measurements**	Flow, Stage
GPS Coordinates	48°50'33"N 81°18'43"W	**Main Channel**	Straight
Access	Offroad, SHERP access	**Channel Bottom**	Saturated soils
Drainage Area	154 km^2	**Flood Plain**	Vegetated, forest
Period of Record	July 2021 - ongoing	**Comments**	
Active	Yes		



Map: SW-5 OWIT Drainage Area (MNRF 2023a)

Drainage Area (km^2)	153.786
Shape Factor ()	13.468
Length of Main Channel (km)	45.510
Maximum Channel Elevation (m)	303.070
Minimum Channel Elevation (m)	268.610
Slope of Main Channel (m/km)	0.760
Slope of Main Channel (%)	0.076
Area Lakes/Wetlands (km^2)	27.550
Area - Lakes (km^2)	0.485
Area - Wetlands (km^2)	27.065
Mean Elevation (m)	288.202
Maximum Elevation (m)	352.762
Mean Slope (%)	1.079
Annual Mean Temperature (°C)	1.900
Annual Precipitation (mm)	846.000

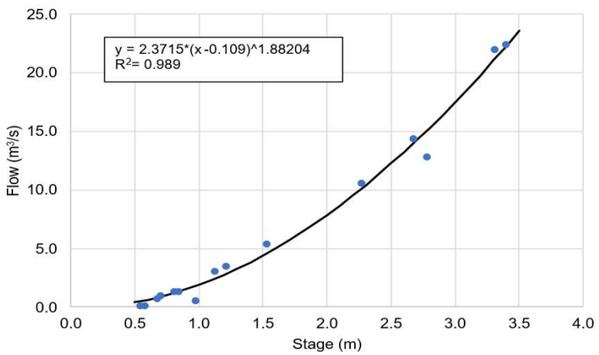
Table: OWIT Watershed Data (MNRF 2023a)



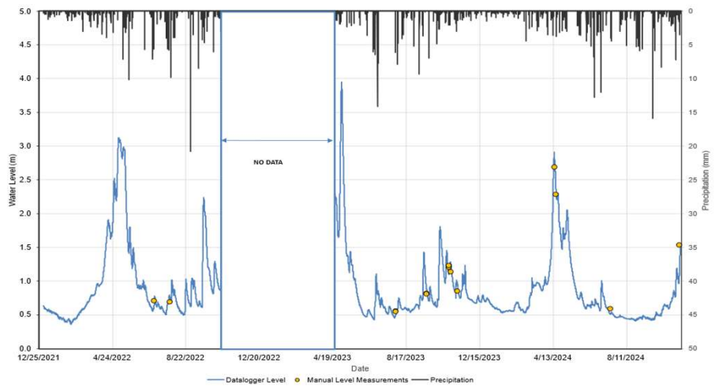
Photo 1: Looking Upstream



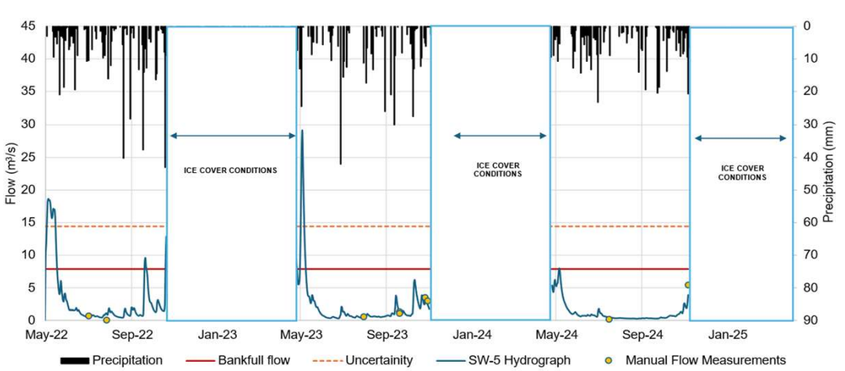
Photo 2: Looking Downstream



Open Water Stage - Discharge Curve



Continuous and Manual Water Levels



Continuous and Manual Flows

Hydrometric Monitoring Station SW-6b Summary			
Station ID	SW-6b	**Instrument**	Solinst Levelogger®
Location	West Buskegau	**Measurements**	Continuous levellogger (level and temperature)
Installation Date	August 2022	**Spot Measurements**	Flow, Stage
GPS Coordinates	48°53'59"N 81°18'33"W	**Main Channel**	Straight
Access	Offroad, SHERP access	**Channel Bottom**	Saturated soils
Drainage Area	199 km^2	**Flood Plain**	Well vegetated with grasses and trees
Period of Record	August 2022 - Ongoing	**Comments**	
Active	Yes		



Map: SW-6b OWIT Drainage Area (MNRF 2023a)

Drainage Area (km^2)	197.694
Shape Factor ()	15.429
Length of Main Channel (km)	55.228
Maximum Channel Elevation (m)	303.070
Minimum Channel Elevation (m)	263.360
Slope of Main Channel (m/km)	0.720
Slope of Main Channel (%)	0.072
Area Lakes/Wetlands (km^2)	28.363
Area - Lakes (km^2)	0.485
Area - Wetlands (km^2)	27.878
Mean Elevation (m)	285.284
Maximum Elevation (m)	352.762
Mean Slope (%)	1.067
Annual Mean Temperature (°C)	1.825
Annual Precipitation (mm)	850.000

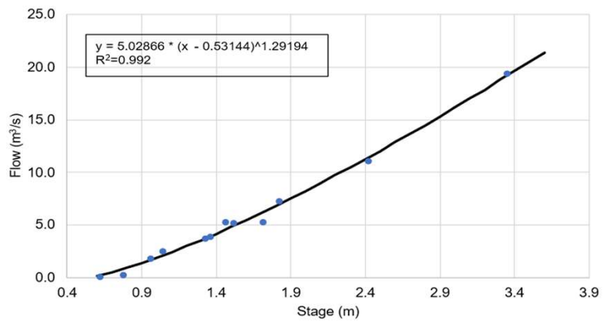
Table: OWIT Watershed Data (MNRF 2023a)



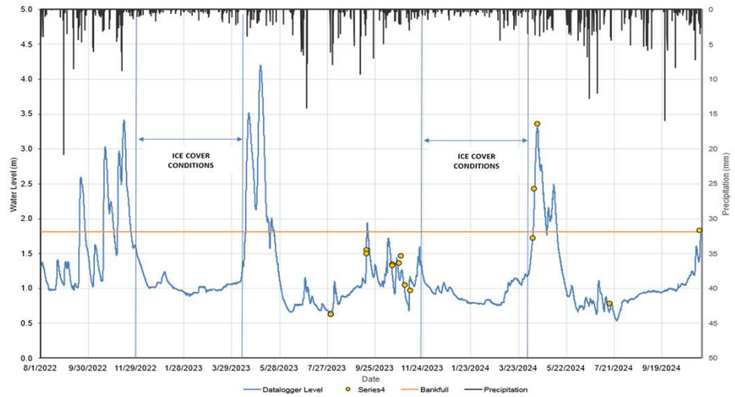
Photo 1: Looking Upstream



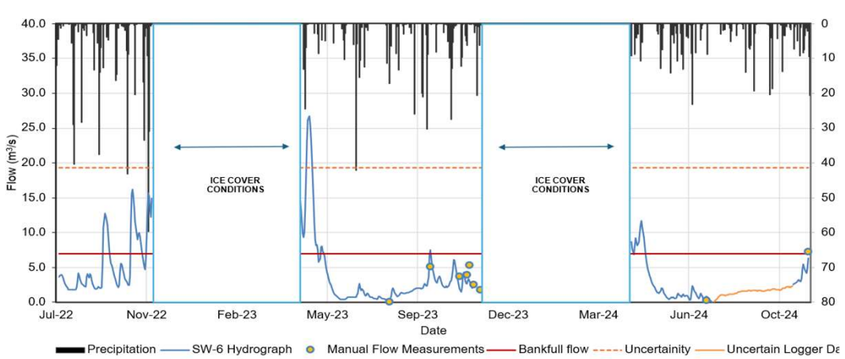
Photo 2: Looking Downstream



Open Water Stage - Discharge Curve

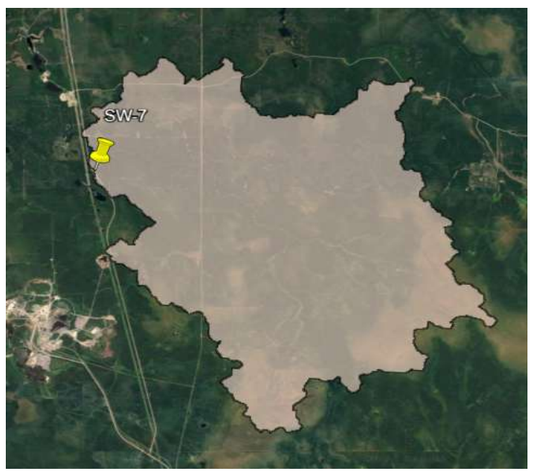


Continuous and Manual Water Levels



Continuous and Manual Flows

Hydrometric Monitoring Station SW-7 Summary			
Station ID	SW-7	**Instrument**	Solinst Levelogger®
Location	Jocko Creek	**Measurements**	Continuous levellogger (level and temperature)
Installation Date	April 2022	**Spot Measurements**	Flow, Stage
GPS Coordinates	48°43'51"N 81°21'08"W	**Main Channel**	Straight, Box Culvert
Access	Route 655, next to highway	**Channel Bottom**	Cobbles, gravel
Drainage Area	72.3 km^2	**Flood Plain**	Gravel
Period of Record	April 2022 - Ongoing	**Comments**	Station is located ~10 m upstream from 4.2 m wide box culvert entrance (crossing with highway 655).
Active	Yes		



Map: SW-7 OWIT Drainage Area (MNRF 2023a)

Drainage Area (km^2)	71.897
Shape Factor ()	5.368
Length of Main Channel (km)	19.646
Maximum Channel Elevation (m)	293.670
Minimum Channel Elevation (m)	272.040
Slope of Main Channel (m/km)	1.100
Slope of Main Channel (%)	0.110
Area Lakes/Wetlands (km^2)	25.546
Area - Lakes (km^2)	0.118
Area - Wetlands (km^2)	25.428
Mean Elevation (m)	289.878
Maximum Elevation (m)	322.350
Mean Slope (%)	1.000
Annual Mean Temperature (°C)	2.000
Annual Precipitation (mm)	849.000

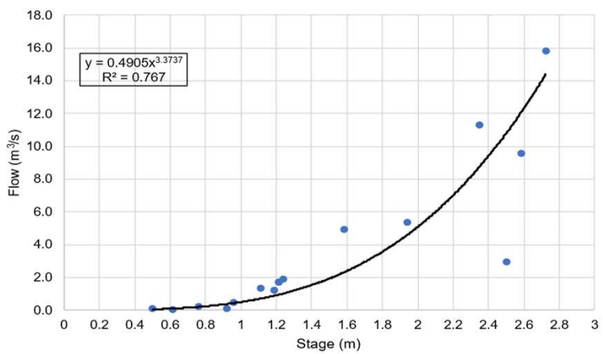
Table: OWIT Watershed Data (MNRF 2023a)



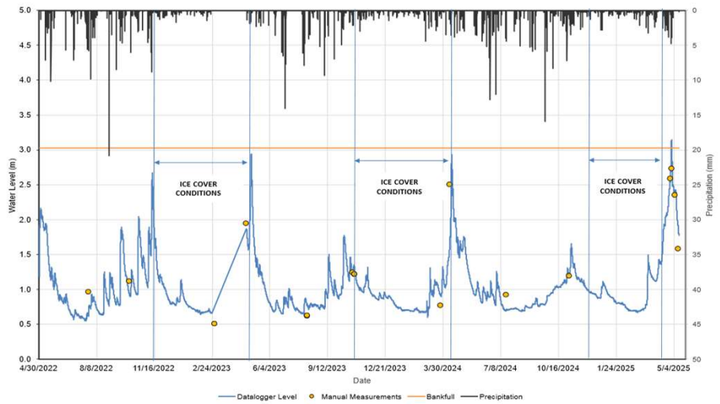
Photo 1: Looking Upstream



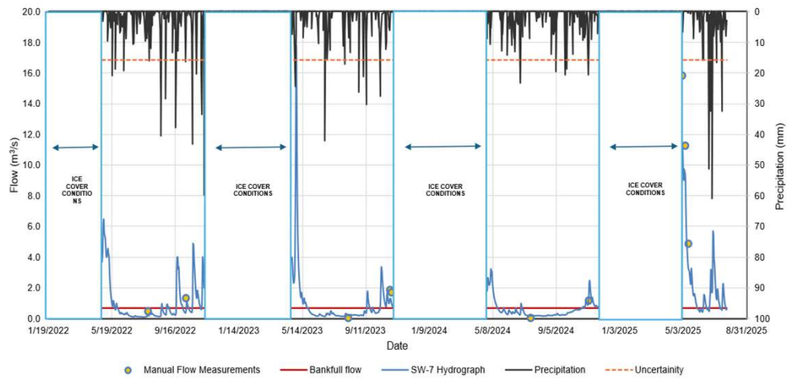
Photo 2: Looking Downstream



Open Water Stage - Discharge Curve

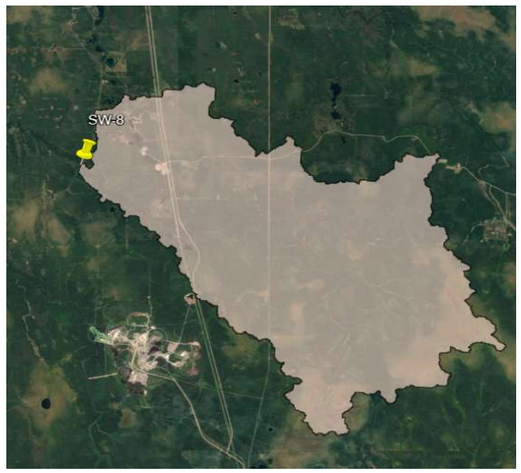


Continuous and Manual Water Levels



Continuous and Manual Flows

Hydrometric Monitoring Station SW-8 Summary			
Station ID	SW-8	**Instrument**	Solinst Levelogger®
Location	Jocko Creek	**Measurements**	Continuous levellogger (level and temperature)
Installation Date	April 2022	**Spot Measurements**	Flow, Stage
GPS Coordinates	48°45'05"N 81°23'59"W	**Main Channel**	Straight
Access	Route 655, access road, offroad access	**Channel Bottom**	Gravels, soft bed material
Drainage Area	92.5 km^2	**Flood Plain**	Vegetated, treed, steep side slopes
Period of Record	April 2022 - Ongoing	**Comments**	
Active	Yes		



Map: SW-8 OWIT Drainage Area (MNRF 2023a)

Drainage Area (km^2)	92.026
Shape Factor ()	8.079
Length of Main Channel (km)	27.267
Maximum Channel Elevation (m)	293.670
Minimum Channel Elevation (m)	263.070
Slope of Main Channel (m/km)	1.120
Slope of Main Channel (%)	0.112
Area Lakes/Wetlands (km^2)	28.498
Area - Lakes (km^2)	0.517
Area - Wetlands (km^2)	27.981
Mean Elevation (m)	288.447
Maximum Elevation (m)	322.350
Mean Slope (%)	1.217
Annual Mean Temperature (°C)	1.950
Annual Precipitation (mm)	850.000

Table: OWIT Watershed Data (MNRF 2023a)

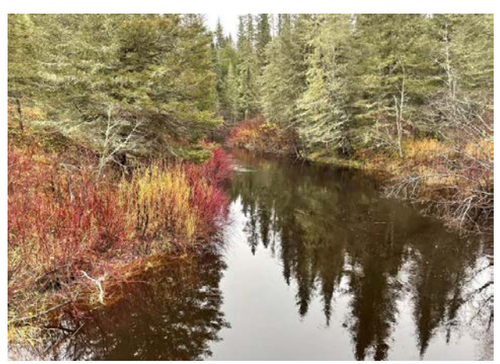
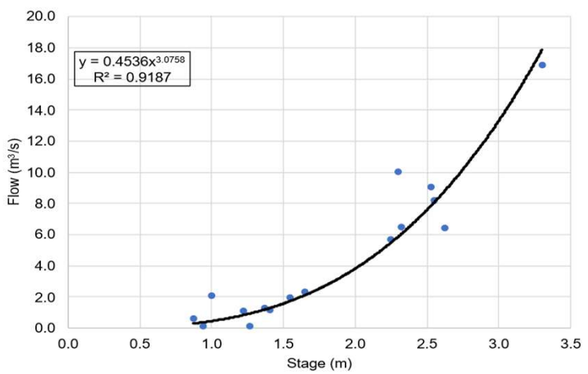


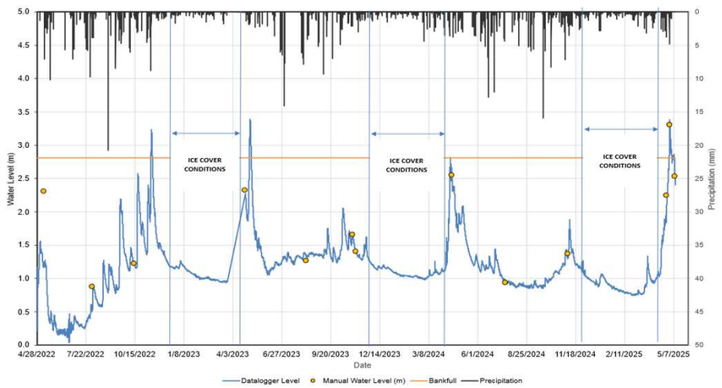
Photo 1: Looking Upstream



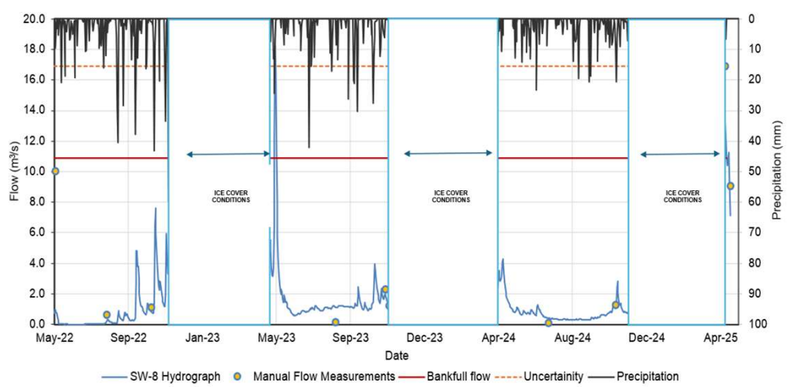
Photo 2: Looking Downstream



Open Water Stage - Discharge Curve



Continuous and Manual Water Levels



Continuous and Manual Flows

Attachment C Climate Change Adjusted Hydrographs

Figure 1 Hydrographs at SW-2b for 2022-2024

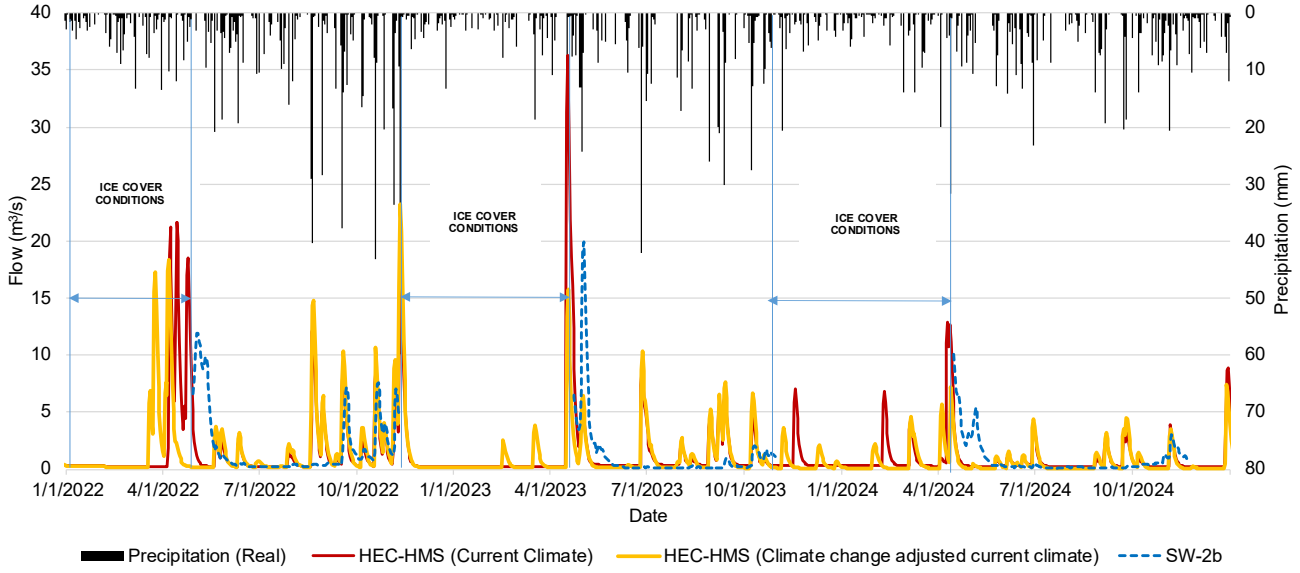


Figure 2 Hydrographs at SW-5 for 2022-2024

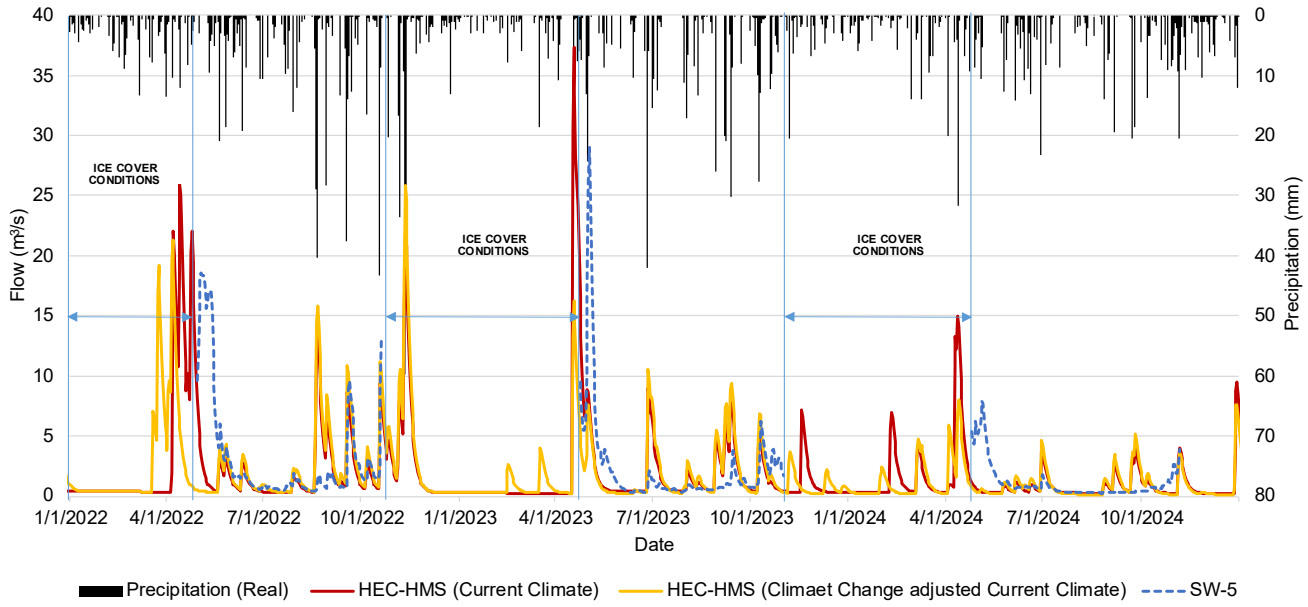


Figure 3 **Hydrographs at SW-7 for 2022-2024**

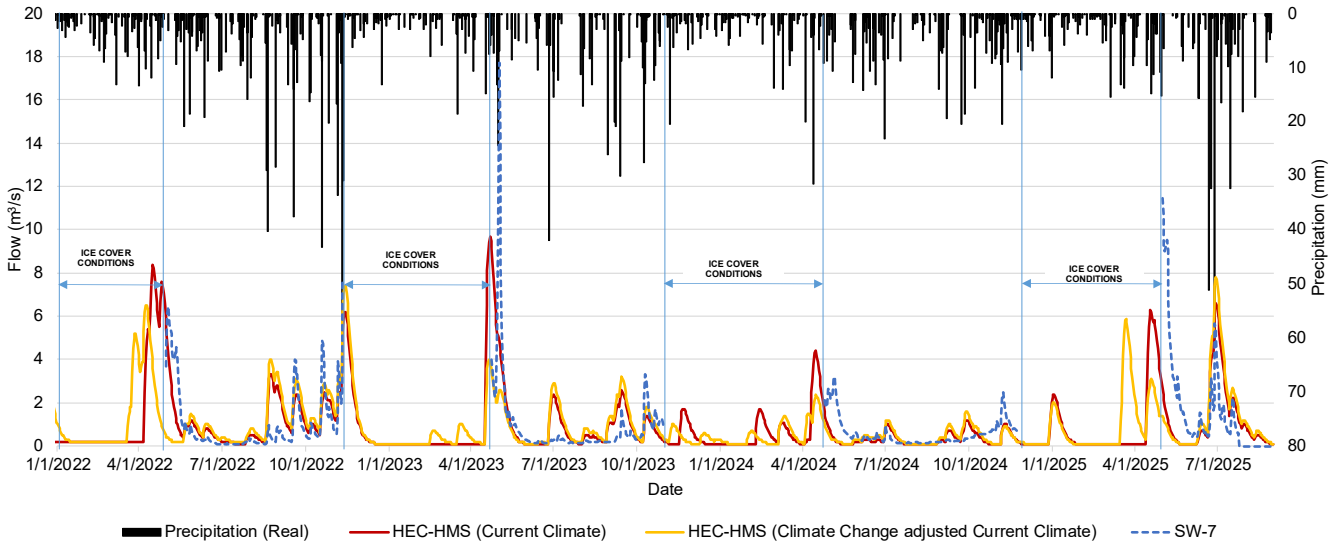
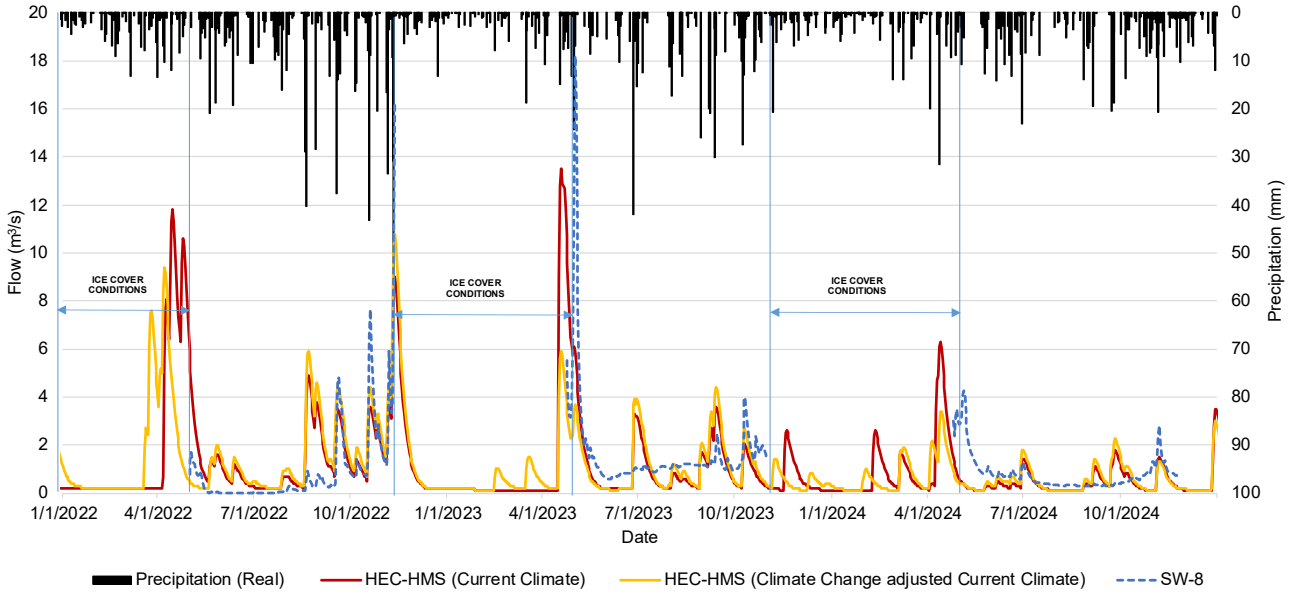


Figure 4 **Hydrographs at SW-8 for 2022-2024**



December 23, 2025
Mathieu Boucher, Environmental Manager

Reference: **Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model**

Attachment D SW Quan-01d.1 Monthly Flow Change Summary Tables

D.1 North Driftwood River

D.1.1 ND1

D.1.1.1 EXISTING CLIMATE

Table D.1.1 North Driftwood River Flows – ND1 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.89	0.89	0.86	-3%	**3**	0	**3**	1.00	12%	0	**31**	0	1.22	37%	0	**31**	0
February	28	0.86	0.86	1.11	29%	**6**	**16**	**6**	0.96	12%	0	**28**	0	1.15	33%	0	**28**	0
March	31	0.86	0.86	1.23	43%	**5**	**23**	**4**	0.98	13%	0	**31**	0	1.14	33%	0	**31**	0
April	30	30.35	12.14	26.47	-13%	**13**	0	**4**	30.45	0%	0	**4**	0	30.56	1%	0	**6**	0
May	31	3.49	2.07	3.26	-7%	**7**	0	**3**	3.67	5%	0	**6**	0	3.90	12%	0	**12**	0
June	30	3.88	2.07	3.83	-1%	0	**5**	0	4.03	4%	0	**4**	0	4.36	12%	0	**11**	0
July	31	2.70	2.07	2.59	-4%	**6**	**2**	**3**	2.81	4%	0	**9**	0	2.99	11%	0	**13**	0
August	31	5.56	2.22	5.45	-2%	0	**7**	0	5.65	2%	0	**2**	0	5.92	7%	0	**6**	0
September	30	2.83	2.07	2.66	-6%	**3**	**1**	0	2.96	5%	0	**8**	0	3.18	12%	0	**13**	0
October	31	6.97	2.79	6.78	-3%	**4**	**8**	0	7.10	2%	0	**4**	0	7.54	8%	0	**10**	0
November	30	2.47	2.07	2.33	-6%	**7**	0	0	2.60	5%	0	**5**	0	2.79	13%	0	**16**	0
December	31	1.36	1.36	1.28	-6%	**2**	0	**2**	1.44	6%	0	**16**	0	1.60	18%	0	**23**	0

December 23, 2025
Mathieu Boucher, Environmental Manager

Reference: **Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model**

Table D.1.2 North Driftwood River Flows – ND1 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.89	0.89	0.82	-7%	**4**	0	**4**	1.00	12%	0	**31**	0	1.22	37%	0	**31**	0
February	28	0.86	0.86	1.14	33%	**6**	**16**	**6**	0.96	12%	0	**28**	0	1.15	33%	0	**28**	0
March	31	0.86	0.86	1.33	54%	**5**	**22**	**4**	0.98	13%	0	**31**	0	1.14	33%	0	**31**	0
April	30	30.35	12.14	26.46	-13%	**13**	0	**4**	30.45	0%	0	**4**	0	30.56	1%	0	**6**	0
May	31	3.49	2.07	3.27	-6%	**6**	0	**2**	3.67	5%	0	**6**	0	3.90	12%	0	**12**	0
June	30	3.88	2.07	3.92	1%	0	**9**	0	4.03	4%	0	**4**	0	4.36	12%	0	**11**	0
July	31	2.70	2.07	2.63	-3%	**2**	**4**	**1**	2.81	4%	0	**9**	0	2.99	11%	0	**13**	0
August	31	5.56	2.22	5.63	1%	0	**11**	0	5.65	2%	0	**2**	0	5.92	7%	0	**6**	0
September	30	2.83	2.07	2.69	-5%	**3**	**1**	**1**	2.96	5%	0	**8**	0	3.18	12%	0	**13**	0
October	31	6.97	2.79	6.96	0%	**3**	**11**	0	7.10	2%	0	**4**	0	7.54	8%	0	**10**	0
November	30	2.47	2.07	2.32	-6%	**7**	0	0	2.60	5%	0	**5**	0	2.79	13%	0	**16**	0
December	31	1.36	1.36	1.25	-8%	**3**	0	**3**	1.44	6%	0	**16**	0	1.60	18%	0	**23**	0

D.1.1.2 CLIMATE CHANGE

Table D.1.3 North Driftwood River Flows – ND1 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.64	0.64	0.66	4%	0	0	0	0.65	2%	0	0	0	0.87	36%	0	**21**	0
February	28	16.98	6.79	15.01	-12%	**16**	0	0	17.00	0%	0	**4**	0	17.19	1%	0	**6**	0
March	31	7.62	3.05	7.18	-6%	**6**	**12**	0	7.64	0%	0	**2**	0	7.82	3%	0	**5**	0
April	30	2.28	1.92	2.19	-4%	0	0	0	2.28	0%	0	0	0	2.39	5%	0	**4**	0
May	31	2.65	1.92	2.43	-8%	**4**	0	0	2.73	3%	0	**4**	0	2.99	13%	0	**10**	0
June	30	4.68	1.92	4.59	-2%	0	**7**	0	4.68	0%	0	**3**	0	5.04	8%	0	**9**	0
July	31	3.28	1.92	3.13	-5%	**4**	**4**	0	3.27	0%	0	**3**	0	3.49	7%	0	**7**	0
August	31	6.67	2.67	6.44	-3%	**1**	**5**	0	6.66	0%	0	**3**	0	6.93	4%	0	**6**	0
September	30	3.10	1.92	2.92	-6%	**4**	**3**	0	3.12	1%	0	**4**	0	3.39	9%	0	**14**	0
October	31	7.19	2.88	7.00	-3%	**4**	**10**	0	7.22	0%	0	**4**	0	7.69	7%	0	**13**	0
November	30	1.76	1.76	1.78	1%	0	**9**	0	1.75	0%	0	**2**	0	1.97	12%	0	**16**	0
December	31	0.71	0.71	0.73	3%	0	**2**	0	0.71	0%	0	0	0	0.90	27%	0	**19**	0

December 23, 2025
Mathieu Boucher, Environmental Manager

Reference: **Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model**

Table D.1.4 North Driftwood River Flows – ND1 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.64	0.64	0.63	-1%	0	0	0	0.65	2%	0	0	0	0.87	36%	0	**21**	0
February	28	16.98	6.79	15.05	-11%	**13**	0	0	17.00	0%	0	**4**	0	17.19	1%	0	**6**	0
March	31	7.62	3.05	7.29	-4%	**6**	**12**	0	7.64	0%	0	**2**	0	7.82	3%	0	**5**	0
April	30	2.28	1.92	2.19	-4%	0	0	0	2.28	0%	0	0	0	2.39	5%	0	**4**	0
May	31	2.65	1.92	2.43	-8%	**4**	0	0	2.73	3%	0	**4**	0	2.99	13%	0	**10**	0
June	30	4.68	1.92	4.69	0%	0	**9**	0	4.68	0%	0	**3**	0	5.04	8%	0	**9**	0
July	31	3.28	1.92	3.17	-3%	**2**	**6**	0	3.27	0%	0	**3**	0	3.49	7%	0	**7**	0
August	31	6.67	2.67	6.63	-1%	0	**9**	0	6.66	0%	0	**3**	0	6.93	4%	0	**6**	0
September	30	3.10	1.92	2.94	-5%	**3**	**3**	0	3.12	1%	0	**4**	0	3.39	9%	0	**14**	0
October	31	7.19	2.88	7.18	0%	**3**	**11**	0	7.22	0%	0	**4**	0	7.69	7%	0	**13**	0
November	30	1.76	1.76	1.77	1%	**2**	**8**	0	1.75	0%	0	**2**	0	1.97	12%	0	**16**	0
December	31	0.71	0.71	0.70	-1%	0	0	0	0.71	0%	0	0	0	0.90	27%	0	**19**	0

D.1.2 ND3

D.1.2.1 EXISTING CLIMATE

Table D.1.5 North Driftwood River Flows – ND3 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.69	0.69	0.66	-4%	**4**	0	**4**	0.79	16%	0	**31**	0	1.01	48%	0	**31**	0
February	28	0.66	0.66	0.91	37%	**8**	**16**	**8**	0.77	16%	0	**28**	0	0.96	44%	0	**28**	0
March	31	0.67	0.67	1.04	56%	**6**	**23**	**5**	0.78	17%	0	**31**	0	0.95	41%	0	**31**	0
April	30	21.98	8.79	18.10	-18%	**17**	0	**5**	22.08	0%	**4**	**5**	0	22.18	1%	**4**	**6**	0
May	31	2.66	1.52	2.43	-9%	**11**	0	**6**	2.84	7%	0	**10**	0	3.07	15%	0	**15**	0
June	30	2.86	1.52	2.80	-2%	**5**	**9**	0	3.00	5%	0	**6**	0	3.33	17%	0	**13**	0
July	31	2.00	1.52	1.89	-6%	**12**	**5**	**6**	2.10	5%	0	**13**	0	2.29	14%	0	**21**	0
August	31	4.06	1.62	3.95	-3%	**6**	**10**	0	4.16	2%	0	**5**	0	4.42	9%	0	**8**	0
September	30	2.11	1.52	1.94	-8%	**12**	**1**	**5**	2.24	6%	0	**14**	0	2.46	17%	0	**18**	0
October	31	5.11	2.04	4.91	-4%	**5**	**10**	0	5.23	2%	**1**	**4**	0	5.67	11%	0	**12**	0
November	30	1.85	1.52	1.70	-8%	**7**	0	0	1.97	7%	0	**8**	0	2.17	17%	0	**18**	0
December	31	1.01	1.01	0.93	-7%	**6**	0	**4**	1.09	9%	0	**21**	0	1.25	24%	0	**23**	0

December 23, 2025
Mathieu Boucher, Environmental Manager

Reference: **Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model**

Table D.1.6 North Driftwood River Flows – ND3 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.69	0.69	0.62	-9%	**8**	0	**8**	0.79	16%	0	**31**	0	1.01	48%	0	**31**	0
February	28	0.66	0.66	0.95	43%	**7**	**17**	**7**	0.77	16%	0	**28**	0	0.96	44%	0	**28**	0
March	31	0.67	0.67	1.14	70%	**7**	**22**	**6**	0.78	17%	0	**31**	0	0.95	41%	0	**31**	0
April	30	21.98	8.79	18.10	-18%	**17**	0	**5**	22.08	0%	**4**	**5**	0	22.18	1%	**4**	**6**	0
May	31	2.66	1.52	2.44	-8%	**10**	0	**5**	2.84	7%	0	**10**	0	3.07	15%	0	**15**	0
June	30	2.86	1.52	2.90	1%	**1**	**11**	0	3.00	5%	0	**6**	0	3.33	17%	0	**13**	0
July	31	2.00	1.52	1.93	-4%	**8**	**6**	**4**	2.10	5%	0	**13**	0	2.29	14%	0	**21**	0
August	31	4.06	1.62	4.13	2%	**2**	**14**	0	4.16	2%	0	**5**	0	4.42	9%	0	**8**	0
September	30	2.11	1.52	1.97	-7%	**11**	**1**	**7**	2.24	6%	0	**14**	0	2.46	17%	0	**18**	0
October	31	5.11	2.04	5.10	0%	**5**	**13**	0	5.23	2%	**1**	**4**	0	5.67	11%	0	**12**	0
November	30	1.85	1.52	1.70	-8%	**7**	0	0	1.97	7%	0	**8**	0	2.17	17%	0	**18**	0
December	31	1.01	1.01	0.90	-10%	**16**	0	**12**	1.09	9%	0	**21**	0	1.25	24%	0	**23**	0

D.1.2.2 CLIMATE CHANGE

Table D.1.7 North Driftwood River Flows – ND3 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.46	0.46	0.49	6%	0	**12**	0	0.48	3%	0	0	0	0.69	50%	0	**25**	0
February	28	12.30	4.92	10.33	-16%	**16**	0	0	12.31	0%	**8**	**4**	0	12.50	2%	**4**	**6**	0
March	31	5.54	2.22	5.10	-8%	**9**	**12**	0	5.55	0%	**5**	**2**	0	5.74	4%	**5**	**5**	0
April	30	1.64	1.39	1.55	-6%	0	0	0	1.64	0%	0	**2**	0	1.75	7%	0	**4**	0
May	31	1.97	1.39	1.74	-11%	**6**	0	0	2.04	4%	**1**	**4**	0	2.31	17%	0	**12**	0
June	30	3.36	1.39	3.27	-3%	**4**	**9**	0	3.36	0%	0	**3**	0	3.71	11%	0	**10**	0
July	31	2.37	1.39	2.22	-6%	**7**	**7**	0	2.36	0%	0	**3**	0	2.58	9%	0	**8**	0
August	31	4.82	1.93	4.59	-5%	**9**	**8**	0	4.80	0%	**3**	**4**	**1**	5.08	5%	**1**	**10**	0
September	30	2.26	1.39	2.08	-8%	**8**	**3**	0	2.29	1%	**2**	**4**	0	2.56	13%	0	**15**	0
October	31	5.22	2.09	5.03	-4%	**5**	**11**	0	5.25	1%	**5**	**4**	0	5.72	10%	0	**14**	0
November	30	1.26	1.26	1.28	2%	**3**	**12**	0	1.26	0%	0	**2**	0	1.47	17%	0	**20**	0
December	31	0.50	0.50	0.52	4%	0	**7**	0	0.50	0%	0	0	0	0.70	39%	0	**19**	0

December 23, 2025
Mathieu Boucher, Environmental Manager

Reference: **Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model**

Table D.1.8 North Driftwood River Flows – ND3 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.46	0.46	0.45	-2%	0	0	0	0.48	3%	0	0	0	0.69	50%	0	**25**	0
February	28	12.30	4.92	10.37	-16%	**16**	0	0	12.31	0%	**8**	**4**	0	12.50	2%	**4**	**6**	0
March	31	5.54	2.22	5.21	-6%	**9**	**12**	0	5.55	0%	**5**	**2**	0	5.74	4%	**5**	**5**	0
April	30	1.64	1.39	1.54	-6%	**1**	0	0	1.64	0%	0	**2**	0	1.75	7%	0	**4**	0
May	31	1.97	1.39	1.75	-11%	**5**	0	0	2.04	4%	**1**	**4**	0	2.31	17%	0	**12**	0
June	30	3.36	1.39	3.36	0%	**2**	**11**	0	3.36	0%	0	**3**	0	3.71	11%	0	**10**	0
July	31	2.37	1.39	2.26	-5%	**6**	**8**	0	2.36	0%	0	**3**	0	2.58	9%	0	**8**	0
August	31	4.82	1.93	4.77	-1%	**4**	**10**	0	4.80	0%	**3**	**4**	**1**	5.08	5%	**1**	**10**	0
September	30	2.26	1.39	2.11	-7%	**7**	**4**	0	2.29	1%	**2**	**4**	0	2.56	13%	0	**15**	0
October	31	5.22	2.09	5.21	0%	**4**	**13**	0	5.25	1%	**5**	**4**	0	5.72	10%	0	**14**	0
November	30	1.26	1.26	1.28	1%	**5**	**11**	**1**	1.26	0%	0	**2**	0	1.47	17%	0	**20**	0
December	31	0.50	0.50	0.49	-2%	0	0	0	0.50	0%	0	0	0	0.70	39%	0	**19**	0

D.1.3 ND5

D.1.3.1 EXISTING CLIMATE

Table D.1.9 North Driftwood River Flows – ND5 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.43	0.43	0.40	-6%	**6**	0	**6**	0.54	25%	0	**31**	0	0.75	76%	0	**31**	0
February	28	0.42	0.42	0.66	59%	**12**	**15**	**12**	0.52	25%	0	**28**	0	0.73	76%	0	**28**	0
March	31	0.43	0.43	0.80	85%	**8**	**22**	**7**	0.55	27%	0	**31**	0	0.69	60%	0	**31**	0
April	30	10.35	4.14	6.48	-37%	**30**	0	**22**	10.42	1%	**13**	**10**	**9**	10.52	2%	**13**	**11**	**9**
May	31	1.26	0.75	1.03	-19%	**26**	0	**17**	1.44	14%	**2**	**23**	0	1.67	32%	**2**	**27**	0
June	30	1.41	0.75	1.35	-4%	**9**	**13**	0	1.55	11%	**2**	**11**	0	1.87	33%	0	**21**	0
July	31	1.01	0.75	0.90	-11%	**16**	**10**	**6**	1.11	10%	0	**19**	0	1.30	28%	0	**25**	0
August	31	2.02	0.81	1.91	-5%	**11**	**12**	**1**	2.11	4%	**8**	**10**	**1**	2.36	17%	**6**	**15**	**1**
September	30	1.15	0.75	0.98	-14%	**18**	**5**	**10**	1.28	11%	**3**	**17**	0	1.50	30%	**3**	**21**	0
October	31	2.56	1.02	2.37	-7%	**12**	**15**	0	2.67	5%	**13**	**11**	**5**	3.11	22%	**6**	**18**	**1**
November	30	0.93	0.75	0.77	-16%	**13**	0	**7**	1.05	13%	**2**	**22**	0	1.24	34%	0	**25**	0
December	31	0.48	0.48	0.41	-15%	**17**	0	**15**	0.57	18%	0	**26**	0	0.73	51%	0	**28**	0

Table D.1.10 North Driftwood River Flows – ND5 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.43	0.43	0.37	-14%	**31**	0	**31**	0.54	25%	0	**31**	0	0.75	76%	0	**31**	0
February	28	0.42	0.42	0.70	67%	**10**	**16**	**10**	0.52	25%	0	**28**	0	0.73	76%	0	**28**	0
March	31	0.43	0.43	0.90	108%	**9**	**22**	**8**	0.55	27%	0	**31**	0	0.69	60%	0	**31**	0
April	30	10.35	4.14	6.48	-37%	**30**	0	**22**	10.42	1%	**13**	**10**	**9**	10.52	2%	**13**	**11**	**9**
May	31	1.26	0.75	1.04	-18%	**25**	0	**17**	1.44	14%	**2**	**23**	0	1.67	32%	**2**	**27**	0
June	30	1.41	0.75	1.45	3%	**6**	**16**	0	1.55	11%	**2**	**11**	0	1.87	33%	0	**21**	0
July	31	1.01	0.75	0.94	-7%	**13**	**11**	**5**	1.11	10%	0	**19**	0	1.30	28%	0	**25**	0
August	31	2.02	0.81	2.10	4%	**8**	**16**	0	2.11	4%	**8**	**10**	**1**	2.36	17%	**6**	**15**	**1**
September	30	1.15	0.75	1.01	-12%	**18**	**4**	**11**	1.28	11%	**3**	**17**	0	1.50	30%	**3**	**21**	0
October	31	2.56	1.02	2.56	0%	**8**	**16**	0	2.67	5%	**13**	**11**	**5**	3.11	22%	**6**	**18**	**1**
November	30	0.93	0.75	0.76	-17%	**13**	**1**	**7**	1.05	13%	**2**	**22**	0	1.24	34%	0	**25**	0
December	31	0.48	0.48	0.38	-21%	**31**	0	**30**	0.57	18%	0	**26**	0	0.73	51%	0	**28**	0

D.1.3.2 CLIMATE CHANGE

Table D.1.11 North Driftwood River Flows – ND5 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.21	0.21	0.23	12%	**6**	**24**	**6**	0.22	4%	0	0	0	0.44	110%	0	**31**	0
February	28	5.94	2.38	3.98	-33%	**27**	0	**13**	5.94	0%	**18**	**4**	**13**	6.16	4%	**17**	**7**	**12**
March	31	2.41	0.96	1.97	-18%	**18**	**13**	**9**	2.41	0%	**14**	**2**	**9**	2.57	7%	**9**	**16**	**4**
April	30	0.45	0.45	0.36	-20%	**27**	0	**20**	0.45	0%	**11**	**2**	**9**	0.56	24%	**7**	**13**	**5**
May	31	1.15	0.63	0.92	-20%	**25**	0	**18**	1.21	5%	**5**	**4**	0	1.49	29%	**1**	**26**	0
June	30	1.36	0.63	1.28	-6%	**12**	**14**	0	1.37	1%	**19**	**5**	**13**	1.73	27%	**9**	**13**	**5**
July	31	0.99	0.63	0.84	-15%	**18**	**10**	**8**	0.97	-2%	**12**	**3**	**8**	1.20	21%	**6**	**16**	**4**
August	31	2.22	0.89	2.00	-10%	**14**	**11**	**1**	2.19	-1%	**19**	**5**	**11**	2.47	11%	**10**	**12**	**7**
September	30	1.06	0.63	0.89	-17%	**23**	**5**	**12**	1.08	2%	**9**	**4**	**4**	1.36	28%	**3**	**21**	**1**
October	31	2.45	0.98	2.28	-7%	**12**	**15**	0	2.47	1%	**18**	**4**	**12**	2.94	20%	**9**	**16**	**5**
November	30	0.36	0.36	0.38	5%	**7**	**19**	**1**	0.35	-2%	**10**	**2**	**8**	0.57	59%	**4**	**20**	**2**
December	31	0.17	0.17	0.19	12%	**4**	**19**	**3**	0.17	-1%	**4**	0	0	0.37	113%	**1**	**25**	0

Table D.1.12 North Driftwood River Flows – ND5 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.21	0.21	0.20	-4%	**6**	0	**6**	0.22	4%	0	0	0	0.44	110%	0	**31**	0
February	28	5.94	2.38	4.01	-32%	**28**	0	**14**	5.94	0%	**18**	**4**	**13**	6.16	4%	**17**	**7**	**12**
March	31	2.41	0.96	2.08	-14%	**18**	**13**	**9**	2.41	0%	**14**	**2**	**9**	2.57	7%	**9**	**16**	**4**
April	30	0.45	0.45	0.36	-20%	**27**	0	**20**	0.45	0%	**11**	**2**	**9**	0.56	24%	**7**	**13**	**5**
May	31	1.15	0.63	0.93	-19%	**25**	0	**18**	1.21	5%	**5**	**4**	0	1.49	29%	**1**	**26**	0
June	30	1.36	0.63	1.37	1%	**10**	**15**	0	1.37	1%	**19**	**5**	**13**	1.73	27%	**9**	**13**	**5**
July	31	0.99	0.63	0.88	-11%	**17**	**11**	**8**	0.97	-2%	**12**	**3**	**8**	1.20	21%	**6**	**16**	**4**
August	31	2.22	0.89	2.18	-2%	**11**	**13**	**1**	2.19	-1%	**19**	**5**	**11**	2.47	11%	**10**	**12**	**7**
September	30	1.06	0.63	0.91	-14%	**20**	**5**	**11**	1.08	2%	**9**	**4**	**4**	1.36	28%	**3**	**21**	**1**
October	31	2.45	0.98	2.46	0%	**10**	**17**	0	2.47	1%	**18**	**4**	**12**	2.94	20%	**9**	**16**	**5**
November	30	0.36	0.36	0.37	3%	**8**	**18**	**2**	0.35	-2%	**10**	**2**	**8**	0.57	59%	**4**	**20**	**2**
December	31	0.17	0.17	0.16	-5%	**9**	**3**	**5**	0.17	-1%	**4**	0	0	0.37	113%	**1**	**25**	0

D.1.1 ND6

D.1.1.1 EXISTING CLIMATE

Table D.1.13 North Driftwood River Flows – ND6 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.39	0.39	0.35	-10%	**6**	0	**6**	0.48	25%	0	**31**	0	0.69	80%	0	**31**	0
February	28	0.37	0.37	0.61	62%	**13**	**12**	**13**	0.47	25%	0	**28**	0	0.69	84%	0	**28**	0
March	31	0.39	0.39	0.75	91%	**9**	**21**	**8**	0.49	26%	0	**31**	0	0.63	61%	0	**31**	0
April	30	8.86	3.54	5.22	-41%	**30**	0	**22**	9.15	3%	**12**	**9**	**8**	9.25	4%	**11**	**12**	**7**
May	31	1.11	0.65	0.87	-22%	**27**	**1**	**17**	1.28	15%	0	**23**	0	1.51	36%	0	**27**	0
June	30	1.23	0.65	1.18	-4%	**10**	**15**	0	1.38	12%	0	**15**	0	1.69	38%	0	**24**	0
July	31	0.88	0.65	0.78	-12%	**18**	**11**	**8**	0.98	11%	0	**21**	0	1.17	33%	0	**26**	0
August	31	1.74	0.70	1.66	-4%	**11**	**14**	**1**	1.85	7%	**5**	**12**	0	2.10	21%	**3**	**16**	0
September	30	1.01	0.65	0.84	-16%	**19**	**5**	**11**	1.13	12%	0	**18**	0	1.35	34%	0	**21**	0
October	31	2.20	0.88	2.06	-6%	**10**	**17**	0	2.35	7%	**9**	**11**	**2**	2.79	26%	**3**	**19**	0
November	30	0.81	0.65	0.66	-19%	**14**	0	**7**	0.93	14%	0	**23**	0	1.12	38%	0	**26**	0
December	31	0.43	0.43	0.35	-17%	**24**	0	**22**	0.51	20%	0	**27**	0	0.67	57%	0	**29**	0

December 23, 2025
Mathieu Boucher, Environmental Manager

Reference: **Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model**

Table D.1.14 North Driftwood River Flows – ND6 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.39	0.39	0.31	-19%	**31**	0	**31**	0.48	25%	0	**31**	0	0.69	80%	0	**31**	0
February	28	0.37	0.37	0.64	71%	**12**	**15**	**12**	0.47	25%	0	**28**	0	0.69	84%	0	**28**	0
March	31	0.39	0.39	0.84	115%	**9**	**20**	**8**	0.49	26%	0	**31**	0	0.63	61%	0	**31**	0
April	30	8.86	3.54	5.22	-41%	**30**	0	**22**	9.15	3%	**12**	**9**	**8**	9.25	4%	**11**	**12**	**7**
May	31	1.11	0.65	0.88	-21%	**25**	**1**	**17**	1.28	15%	0	**23**	0	1.51	36%	0	**27**	0
June	30	1.23	0.65	1.28	4%	**8**	**17**	0	1.38	12%	0	**15**	0	1.69	38%	0	**24**	0
July	31	0.88	0.65	0.81	-8%	**17**	**12**	**8**	0.98	11%	0	**21**	0	1.17	33%	0	**26**	0
August	31	1.74	0.70	1.85	6%	**7**	**17**	0	1.85	7%	**5**	**12**	0	2.10	21%	**3**	**16**	0
September	30	1.01	0.65	0.87	-13%	**18**	**6**	**11**	1.13	12%	0	**18**	0	1.35	34%	0	**21**	0
October	31	2.20	0.88	2.25	2%	**8**	**19**	0	2.35	7%	**9**	**11**	**2**	2.79	26%	**3**	**19**	0
November	30	0.81	0.65	0.65	-21%	**16**	0	**10**	0.93	14%	0	**23**	0	1.12	38%	0	**26**	0
December	31	0.43	0.43	0.32	-24%	**31**	0	**30**	0.51	20%	0	**27**	0	0.67	57%	0	**29**	0

D.1.1.2 CLIMATE CHANGE

Table D.1.15 North Driftwood River Flows – ND6 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.18	0.18	0.21	17%	**7**	**24**	**7**	0.19	8%	0	0	0	0.41	129%	0	**31**	0
February	28	5.07	2.03	3.25	-36%	**28**	0	**14**	5.20	3%	**18**	**4**	**13**	5.43	7%	**16**	**7**	**11**
March	31	2.05	0.82	1.67	-18%	**18**	**12**	**9**	2.11	3%	**12**	**2**	**8**	2.26	10%	**9**	**17**	**5**
April	30	0.38	0.38	0.31	-20%	**25**	**2**	**19**	0.40	4%	**6**	**2**	**4**	0.50	31%	**4**	**16**	**3**
May	31	1.00	0.53	0.78	-22%	**27**	**1**	**18**	1.07	7%	**4**	**4**	0	1.34	34%	**1**	**26**	0
June	30	1.17	0.53	1.12	-4%	**11**	**17**	0	1.22	4%	**18**	**6**	**13**	1.57	34%	**6**	**15**	**4**
July	31	0.84	0.53	0.72	-14%	**17**	**10**	**8**	0.84	1%	**10**	**6**	**6**	1.07	27%	**5**	**17**	**3**
August	31	1.88	0.75	1.73	-8%	**13**	**13**	**1**	1.91	2%	**18**	**5**	**10**	2.19	16%	**10**	**14**	**7**
September	30	0.91	0.53	0.76	-17%	**21**	**6**	**12**	0.95	4%	**9**	**12**	**5**	1.23	35%	**3**	**23**	**1**
October	31	2.10	0.84	1.98	-6%	**12**	**17**	0	2.16	3%	**16**	**5**	**11**	2.62	25%	**6**	**19**	**3**
November	30	0.30	0.30	0.33	10%	**6**	**21**	0	0.31	3%	**8**	**12**	**6**	0.53	74%	**1**	**21**	0
December	31	0.14	0.14	0.17	19%	**3**	**20**	**3**	0.15	5%	**2**	**16**	0	0.34	138%	0	**27**	0

Table D.1.16 North Driftwood River Flows – ND6 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.18	0.18	0.17	-3%	**6**	0	**6**	0.19	8%	0	0	0	0.41	129%	0	**31**	0
February	28	5.07	2.03	3.29	-35%	**27**	0	**13**	5.20	3%	**18**	**4**	**13**	5.43	7%	**16**	**7**	**11**
March	31	2.05	0.82	1.78	-13%	**17**	**12**	**9**	2.11	3%	**12**	**2**	**8**	2.26	10%	**9**	**17**	**5**
April	30	0.38	0.38	0.30	-20%	**25**	**1**	**19**	0.40	4%	**6**	**2**	**4**	0.50	31%	**4**	**16**	**3**
May	31	1.00	0.53	0.79	-21%	**27**	**1**	**18**	1.07	7%	**4**	**4**	0	1.34	34%	**1**	**26**	0
June	30	1.17	0.53	1.21	4%	**9**	**17**	0	1.22	4%	**18**	**6**	**13**	1.57	34%	**6**	**15**	**4**
July	31	0.84	0.53	0.76	-10%	**17**	**12**	**8**	0.84	1%	**10**	**6**	**6**	1.07	27%	**5**	**17**	**3**
August	31	1.88	0.75	1.91	1%	**10**	**15**	**1**	1.91	2%	**18**	**5**	**10**	2.19	16%	**10**	**14**	**7**
September	30	0.91	0.53	0.78	-14%	**20**	**7**	**12**	0.95	4%	**9**	**12**	**5**	1.23	35%	**3**	**23**	**1**
October	31	2.10	0.84	2.16	3%	**9**	**19**	0	2.16	3%	**16**	**5**	**11**	2.62	25%	**6**	**19**	**3**
November	30	0.30	0.30	0.32	7%	**6**	**21**	0	0.31	3%	**8**	**12**	**6**	0.53	74%	**1**	**21**	0
December	31	0.14	0.14	0.14	-1%	**11**	**8**	**8**	0.15	5%	**2**	**16**	0	0.34	138%	0	**27**	0

D.1.1 ND7

D.1.1.1 EXISTING CLIMATE

Table D.1.17 North Driftwood River Flows – ND7 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.36	0.36	0.33	-10%	**6**	0	**6**	0.46	26%	0	**31**	0	0.67	84%	0	**31**	0
February	28	0.35	0.35	0.58	65%	**13**	**11**	**13**	0.45	26%	0	**28**	0	0.67	89%	0	**28**	0
March	31	0.37	0.37	0.72	96%	**9**	**21**	**8**	0.47	28%	0	**31**	0	0.60	63%	0	**31**	0
April	30	8.45	3.38	4.81	-43%	**30**	0	**22**	8.74	3%	**12**	**10**	**8**	8.84	5%	**11**	**12**	**7**
May	31	1.06	0.62	0.81	-23%	**27**	**1**	**17**	1.22	15%	**2**	**23**	0	1.46	38%	0	**27**	0
June	30	1.17	0.62	1.12	-4%	**10**	**15**	0	1.32	13%	0	**16**	0	1.63	40%	0	**23**	0
July	31	0.84	0.62	0.73	-13%	**18**	**11**	**8**	0.94	12%	0	**21**	0	1.13	34%	0	**26**	0
August	31	1.65	0.66	1.58	-4%	**12**	**14**	**2**	1.77	7%	**5**	**12**	0	2.01	22%	**3**	**16**	0
September	30	0.96	0.62	0.79	-17%	**20**	**6**	**11**	1.08	13%	0	**18**	0	1.30	36%	0	**21**	0
October	31	2.10	0.84	1.96	-7%	**11**	**17**	0	2.25	7%	**9**	**11**	**2**	2.68	28%	**4**	**18**	0
November	30	0.77	0.62	0.61	-21%	**14**	0	**8**	0.89	15%	0	**24**	0	1.08	40%	0	**26**	0
December	31	0.40	0.40	0.33	-18%	**27**	0	**25**	0.49	21%	0	**28**	0	0.64	60%	0	**29**	0

Table D.1.18 North Driftwood River Flows – ND7 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.36	0.36	0.29	-20%	**31**	0	**31**	0.46	26%	0	**31**	0	0.67	84%	0	**31**	0
February	28	0.35	0.35	0.62	75%	**12**	**12**	**12**	0.45	26%	0	**28**	0	0.67	89%	0	**28**	0
March	31	0.37	0.37	0.82	122%	**10**	**20**	**9**	0.47	28%	0	**31**	0	0.60	63%	0	**31**	0
April	30	8.45	3.38	4.81	-43%	**30**	0	**22**	8.74	3%	**12**	**10**	**8**	8.84	5%	**11**	**12**	**7**
May	31	1.06	0.62	0.83	-22%	**25**	**1**	**17**	1.22	15%	**2**	**23**	0	1.46	38%	0	**27**	0
June	30	1.17	0.62	1.22	4%	**8**	**17**	0	1.32	13%	0	**16**	0	1.63	40%	0	**23**	0
July	31	0.84	0.62	0.77	-8%	**17**	**12**	**8**	0.94	12%	0	**21**	0	1.13	34%	0	**26**	0
August	31	1.65	0.66	1.77	7%	**9**	**17**	**1**	1.77	7%	**5**	**12**	0	2.01	22%	**3**	**16**	0
September	30	0.96	0.62	0.82	-14%	**19**	**6**	**11**	1.08	13%	0	**18**	0	1.30	36%	0	**21**	0
October	31	2.10	0.84	2.14	2%	**8**	**19**	0	2.25	7%	**9**	**11**	**2**	2.68	28%	**4**	**18**	0
November	30	0.77	0.62	0.60	-22%	**16**	0	**10**	0.89	15%	0	**24**	0	1.08	40%	0	**26**	0
December	31	0.40	0.40	0.30	-26%	**31**	0	**30**	0.49	21%	0	**28**	0	0.64	60%	0	**29**	0

D.1.1.2 CLIMATE CHANGE

Table D.1.19 North Driftwood River Flows – ND7 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.17	0.17	0.20	17%	**7**	**24**	**7**	0.18	7%	0	0	0	0.40	134%	0	**31**	0
February	28	4.84	1.94	3.02	-38%	**28**	0	**14**	4.96	3%	**18**	**4**	**13**	5.20	7%	**16**	**7**	**11**
March	31	1.96	0.78	1.58	-19%	**18**	**12**	**9**	2.01	3%	**13**	**2**	**9**	2.16	10%	**9**	**17**	**5**
April	30	0.36	0.36	0.29	-21%	**25**	**2**	**19**	0.38	3%	**6**	**2**	**4**	0.48	33%	**4**	**16**	**3**
May	31	0.95	0.51	0.74	-23%	**27**	**1**	**18**	1.02	7%	**5**	**4**	0	1.30	36%	**2**	**26**	0
June	30	1.11	0.51	1.06	-4%	**11**	**17**	0	1.16	4%	**18**	**6**	**13**	1.51	36%	**7**	**15**	**4**
July	31	0.80	0.51	0.68	-15%	**17**	**10**	**8**	0.80	1%	**10**	**3**	**6**	1.03	28%	**5**	**18**	**3**
August	31	1.80	0.72	1.64	-9%	**14**	**13**	**1**	1.82	2%	**18**	**5**	**10**	2.10	17%	**11**	**14**	**7**
September	30	0.87	0.51	0.72	-18%	**21**	**6**	**12**	0.90	4%	**9**	**4**	**5**	1.19	37%	**3**	**23**	**1**
October	31	2.00	0.80	1.88	-6%	**12**	**17**	0	2.06	3%	**16**	**5**	**11**	2.52	26%	**7**	**19**	**4**
November	30	0.29	0.29	0.32	10%	**6**	**21**	0	0.30	2%	**8**	**2**	**6**	0.51	77%	**1**	**21**	0
December	31	0.14	0.14	0.16	20%	**6**	**20**	**6**	0.14	4%	**3**	**1**	0	0.33	144%	**1**	**27**	0

Table D.1.20 North Driftwood River Flows – ND7 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.17	0.17	0.16	-3%	**6**	0	**6**	0.18	7%	0	0	0	0.40	134%	0	**31**	0
February	28	4.84	1.94	3.06	-37%	**27**	0	**13**	4.96	3%	**18**	**4**	**13**	5.20	7%	**16**	**7**	**11**
March	31	1.96	0.78	1.69	-14%	**17**	**12**	**9**	2.01	3%	**13**	**2**	**9**	2.16	10%	**9**	**17**	**5**
April	30	0.36	0.36	0.29	-21%	**25**	**2**	**19**	0.38	3%	**6**	**2**	**4**	0.48	33%	**4**	**16**	**3**
May	31	0.95	0.51	0.74	-22%	**27**	**1**	**18**	1.02	7%	**5**	**4**	0	1.30	36%	**2**	**26**	0
June	30	1.11	0.51	1.16	4%	**9**	**17**	0	1.16	4%	**18**	**6**	**13**	1.51	36%	**7**	**15**	**4**
July	31	0.80	0.51	0.72	-10%	**17**	**11**	**8**	0.80	1%	**10**	**3**	**6**	1.03	28%	**5**	**18**	**3**
August	31	1.80	0.72	1.82	1%	**10**	**15**	**1**	1.82	2%	**18**	**5**	**10**	2.10	17%	**11**	**14**	**7**
September	30	0.87	0.51	0.74	-15%	**20**	**7**	**12**	0.90	4%	**9**	**4**	**5**	1.19	37%	**3**	**23**	**1**
October	31	2.00	0.80	2.07	3%	**9**	**19**	0	2.06	3%	**16**	**5**	**11**	2.52	26%	**7**	**19**	**4**
November	30	0.29	0.29	0.31	7%	**6**	**20**	0	0.30	2%	**8**	**2**	**6**	0.51	77%	**1**	**21**	0
December	31	0.14	0.14	0.14	-1%	**11**	**10**	**8**	0.14	4%	**3**	**1**	0	0.33	144%	**1**	**27**	0

D.1.2 ND8

D.1.2.1 EXISTING CLIMATE

Table D.1.21 North Driftwood River Flows – ND8 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.34	0.34	0.30	-11%	**6**	0	**6**	0.44	28%	0	**31**	0	0.65	90%	0	**31**	0
February	28	0.33	0.33	0.56	69%	**15**	**11**	**15**	0.42	28%	0	**28**	0	0.65	96%	0	**28**	0
March	31	0.35	0.35	0.70	102%	**9**	**21**	**8**	0.45	30%	0	**31**	0	0.58	66%	0	**31**	0
April	30	7.92	3.17	4.29	-46%	**30**	0	**22**	8.21	4%	**13**	**11**	**8**	8.31	5%	**11**	**12**	**7**
May	31	0.99	0.58	0.75	-25%	**27**	**1**	**17**	1.16	16%	**2**	**23**	0	1.39	40%	**1**	**27**	0
June	30	1.10	0.58	1.05	-4%	**10**	**15**	0	1.25	14%	0	**16**	0	1.56	42%	0	**23**	0
July	31	0.78	0.58	0.68	-13%	**18**	**11**	**8**	0.88	13%	0	**21**	0	1.07	37%	0	**26**	0
August	31	1.55	0.62	1.48	-5%	**12**	**14**	**2**	1.66	7%	**6**	**12**	0	1.91	23%	**3**	**17**	0
September	30	0.90	0.58	0.73	-18%	**21**	**6**	**11**	1.02	14%	**1**	**18**	0	1.24	38%	0	**21**	0
October	31	1.97	0.79	1.83	-7%	**11**	**17**	0	2.11	7%	**11**	**11**	**3**	2.55	29%	**4**	**18**	0
November	30	0.73	0.58	0.56	-22%	**14**	0	**8**	0.84	16%	0	**24**	0	1.03	42%	0	**26**	0
December	31	0.38	0.38	0.31	-19%	**31**	0	**30**	0.46	22%	0	**28**	0	0.62	64%	0	**29**	0

December 23, 2025
Mathieu Boucher, Environmental Manager

Reference: **Crawford Nickel Project – 2025 Hydrology Monitoring: Rating Curve and Hydrological Model**

Table D.1.22 North Driftwood River Flows – ND8 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.34	0.34	0.27	-22%	**31**	0	**31**	0.44	28%	0	**31**	0	0.65	90%	0	**31**	0
February	28	0.33	0.33	0.60	80%	**12**	**12**	**12**	0.42	28%	0	**28**	0	0.65	96%	0	**28**	0
March	31	0.35	0.35	0.80	129%	**10**	**20**	**9**	0.45	30%	0	**31**	0	0.58	66%	0	**31**	0
April	30	7.92	3.17	4.29	-46%	**30**	0	**22**	8.21	4%	**13**	**11**	**8**	8.31	5%	**11**	**12**	**7**
May	31	0.99	0.58	0.76	-23%	**25**	**1**	**17**	1.16	16%	**2**	**23**	0	1.39	40%	**1**	**27**	0
June	30	1.10	0.58	1.15	4%	**8**	**18**	0	1.25	14%	0	**16**	0	1.56	42%	0	**23**	0
July	31	0.78	0.58	0.72	-8%	**17**	**12**	**8**	0.88	13%	0	**21**	0	1.07	37%	0	**26**	0
August	31	1.55	0.62	1.66	7%	**9**	**18**	**1**	1.66	7%	**6**	**12**	0	1.91	23%	**3**	**17**	0
September	30	0.90	0.58	0.76	-15%	**19**	**6**	**11**	1.02	14%	**1**	**18**	0	1.24	38%	0	**21**	0
October	31	1.97	0.79	2.01	2%	**8**	**19**	0	2.11	7%	**11**	**11**	**3**	2.55	29%	**4**	**18**	0
November	30	0.73	0.58	0.55	-24%	**16**	0	**10**	0.84	16%	0	**24**	0	1.03	42%	0	**26**	0
December	31	0.38	0.38	0.27	-27%	**31**	0	**30**	0.46	22%	0	**28**	0	0.62	64%	0	**29**	0

D.1.2.2 CLIMATE CHANGE

Table D.1.23 North Driftwood River Flows – ND8 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.16	0.16	0.19	18%	**7**	**24**	**7**	0.17	7%	0	0	0	0.38	142%	0	**31**	0
February	28	4.54	1.82	2.72	-40%	**28**	0	**14**	4.66	3%	**18**	**4**	**13**	4.90	8%	**16**	**7**	**11**
March	31	1.84	0.74	1.46	-21%	**19**	**12**	**10**	1.89	3%	**13**	**2**	**9**	2.03	11%	**9**	**16**	**5**
April	30	0.34	0.34	0.27	-22%	**25**	**2**	**19**	0.35	3%	**6**	**2**	**4**	0.46	35%	**5**	**16**	**3**
May	31	0.89	0.48	0.68	-24%	**27**	**1**	**18**	0.96	7%	**5**	**4**	0	1.23	38%	**2**	**25**	0
June	30	1.05	0.48	1.00	-5%	**11**	**17**	0	1.10	5%	**18**	**6**	**13**	1.45	38%	**7**	**15**	**5**
July	31	0.75	0.48	0.63	-16%	**18**	**9**	**8**	0.75	1%	**10**	**3**	**6**	0.97	30%	**6**	**18**	**3**
August	31	1.68	0.67	1.53	-9%	**14**	**12**	**1**	1.71	2%	**19**	**5**	**10**	1.98	18%	**12**	**15**	**7**
September	30	0.81	0.48	0.66	-19%	**21**	**6**	**12**	0.85	4%	**10**	**6**	**5**	1.13	39%	**3**	**22**	**1**
October	31	1.87	0.75	1.76	-6%	**12**	**17**	0	1.94	3%	**16**	**5**	**11**	2.39	28%	**7**	**19**	**4**
November	30	0.27	0.27	0.30	11%	**6**	**21**	0	0.28	3%	**8**	**9**	**6**	0.49	82%	**1**	**21**	0
December	31	0.13	0.13	0.16	21%	**8**	**21**	**8**	0.13	4%	**3**	**12**	0	0.32	153%	**1**	**27**	0

Table D.1.24 North Driftwood River Flows – ND8 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.16	0.16	0.15	-3%	**6**	0	**6**	0.17	7%	0	0	0	0.38	142%	0	**31**	0
February	28	4.54	1.82	2.75	-39%	**27**	0	**13**	4.66	3%	**18**	**4**	**13**	4.90	8%	**16**	**7**	**11**
March	31	1.84	0.74	1.56	-15%	**18**	**12**	**10**	1.89	3%	**13**	**2**	**9**	2.03	11%	**9**	**16**	**5**
April	30	0.34	0.34	0.26	-23%	**25**	**2**	**19**	0.35	3%	**6**	**2**	**4**	0.46	35%	**5**	**16**	**3**
May	31	0.89	0.48	0.68	-24%	**27**	**1**	**18**	0.96	7%	**5**	**4**	0	1.23	38%	**2**	**25**	0
June	30	1.05	0.48	1.09	5%	**9**	**17**	0	1.10	5%	**18**	**6**	**13**	1.45	38%	**7**	**15**	**5**
July	31	0.75	0.48	0.67	-11%	**17**	**10**	**8**	0.75	1%	**10**	**3**	**6**	0.97	30%	**6**	**18**	**3**
August	31	1.68	0.67	1.71	1%	**10**	**14**	**1**	1.71	2%	**19**	**5**	**10**	1.98	18%	**12**	**15**	**7**
September	30	0.81	0.48	0.69	-15%	**21**	**7**	**12**	0.85	4%	**10**	**6**	**5**	1.13	39%	**3**	**22**	**1**
October	31	1.87	0.75	1.95	4%	**9**	**19**	0	1.94	3%	**16**	**5**	**11**	2.39	28%	**7**	**19**	**4**
November	30	0.27	0.27	0.29	7%	**6**	**20**	0	0.28	3%	**8**	**9**	**6**	0.49	82%	**1**	**21**	0
December	31	0.13	0.13	0.13	-1%	**11**	**10**	**8**	0.13	4%	**3**	**12**	0	0.32	153%	**1**	**27**	0

D.1.3 ND18

D.1.3.1 EXISTING CLIMATE

Table D.1.25 North Driftwood River Flows – ND18 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.06	0.06	0.12	105%	0	**31**	0	0.09	60%	0	**31**	0	0.09	60%	0	**31**	0
February	28	0.05	0.05	0.11	107%	0	**28**	0	0.09	60%	0	**28**	0	0.09	60%	0	**28**	0
March	31	0.06	0.06	0.12	103%	0	**31**	0	0.09	60%	0	**31**	0	0.09	60%	0	**31**	0
April	30	1.16	0.46	1.73	49%	0	**30**	0	1.71	47%	0	**30**	0	1.71	47%	0	**30**	0
May	31	0.16	0.09	0.26	68%	0	**31**	0	0.24	52%	0	**31**	0	0.24	52%	0	**31**	0
June	30	0.17	0.09	0.28	66%	0	**30**	0	0.26	51%	0	**30**	0	0.26	51%	0	**30**	0
July	31	0.12	0.09	0.21	74%	0	**31**	0	0.18	53%	0	**31**	0	0.18	53%	0	**31**	0
August	31	0.23	0.09	0.37	61%	0	**31**	0	0.35	50%	0	**31**	0	0.35	50%	0	**31**	0
September	30	0.14	0.09	0.24	70%	0	**30**	0	0.21	52%	0	**30**	0	0.21	52%	0	**30**	0
October	31	0.29	0.12	0.46	58%	0	**31**	0	0.44	49%	0	**31**	0	0.44	49%	0	**31**	0
November	30	0.11	0.09	0.20	76%	0	**30**	0	0.17	53%	0	**30**	0	0.17	53%	0	**30**	0
December	31	0.06	0.06	0.12	101%	0	**31**	0	0.09	59%	0	**31**	0	0.09	59%	0	**31**	0

Table D.1.26 North Driftwood River Flows – ND18 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.06	0.06	0.12	105%	0	**31**	0	0.09	60%	0	**31**	0	0.09	60%	0	**31**	0
February	28	0.05	0.05	0.11	107%	0	**28**	0	0.09	60%	0	**28**	0	0.09	60%	0	**28**	0
March	31	0.06	0.06	0.12	103%	0	**31**	0	0.09	60%	0	**31**	0	0.09	60%	0	**31**	0
April	30	1.16	0.46	1.73	49%	0	**30**	0	1.71	47%	0	**30**	0	1.71	47%	0	**30**	0
May	31	0.16	0.09	0.26	68%	0	**31**	0	0.24	52%	0	**31**	0	0.24	52%	0	**31**	0
June	30	0.17	0.09	0.28	66%	0	**30**	0	0.26	51%	0	**30**	0	0.26	51%	0	**30**	0
July	31	0.12	0.09	0.21	74%	0	**31**	0	0.18	53%	0	**31**	0	0.18	53%	0	**31**	0
August	31	0.23	0.09	0.37	61%	0	**31**	0	0.35	50%	0	**31**	0	0.35	50%	0	**31**	0
September	30	0.14	0.09	0.24	70%	0	**30**	0	0.21	52%	0	**30**	0	0.21	52%	0	**30**	0
October	31	0.29	0.12	0.46	58%	0	**31**	0	0.44	49%	0	**31**	0	0.44	49%	0	**31**	0
November	30	0.11	0.09	0.20	76%	0	**30**	0	0.17	53%	0	**30**	0	0.17	53%	0	**30**	0
December	31	0.06	0.06	0.12	101%	0	**31**	0	0.09	59%	0	**31**	0	0.09	59%	0	**31**	0

D.1.3.2 CLIMATE CHANGE

Table D.1.27 North Driftwood River Flows – ND18 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.02	0.02	0.07	187%	0	**31**	0	0.04	63%	0	**31**	0	0.04	77%	0	**31**	0
February	28	0.66	0.26	1.00	51%	0	**28**	0	0.97	47%	0	**28**	0	0.97	48%	0	**28**	0
March	31	0.27	0.11	0.42	59%	0	**31**	0	0.40	48%	0	**31**	0	0.40	49%	0	**31**	0
April	30	0.05	0.05	0.10	112%	0	**30**	0	0.08	54%	0	**30**	0	0.08	61%	0	**30**	0
May	31	0.14	0.07	0.23	70%	0	**31**	0	0.20	49%	0	**31**	0	0.21	52%	0	**31**	0
June	30	0.15	0.07	0.26	68%	0	**30**	0	0.23	49%	0	**30**	0	0.23	51%	0	**30**	0
July	31	0.11	0.07	0.19	77%	0	**31**	0	0.16	50%	0	**31**	0	0.16	53%	0	**31**	0
August	31	0.24	0.10	0.39	60%	0	**31**	0	0.36	48%	0	**31**	0	0.36	49%	0	**31**	0
September	30	0.12	0.07	0.21	74%	0	**30**	0	0.18	50%	0	**30**	0	0.18	53%	0	**30**	0
October	31	0.27	0.11	0.43	58%	0	**31**	0	0.41	48%	0	**31**	0	0.41	49%	0	**31**	0
November	30	0.04	0.04	0.09	130%	0	**30**	0	0.06	56%	0	**30**	0	0.06	64%	0	**30**	0
December	31	0.02	0.02	0.06	227%	0	**31**	0	0.03	67%	0	**31**	0	0.03	85%	0	**31**	0

Table D.1.28 North Driftwood River Flows – ND18 (Pre:Post Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.02	0.02	0.07	187%	0	**31**	0	0.04	63%	0	**31**	0	0.04	77%	0	**31**	0
February	28	0.66	0.26	1.00	51%	0	**28**	0	0.97	47%	0	**28**	0	0.97	48%	0	**28**	0
March	31	0.27	0.11	0.42	59%	0	**31**	0	0.40	48%	0	**31**	0	0.40	49%	0	**31**	0
April	30	0.05	0.05	0.10	112%	0	**30**	0	0.08	54%	0	**30**	0	0.08	61%	0	**30**	0
May	31	0.14	0.07	0.23	70%	0	**31**	0	0.20	49%	0	**31**	0	0.21	52%	0	**31**	0
June	30	0.15	0.07	0.26	68%	0	**30**	0	0.23	49%	0	**30**	0	0.23	51%	0	**30**	0
July	31	0.11	0.07	0.19	77%	0	**31**	0	0.16	50%	0	**31**	0	0.16	53%	0	**31**	0
August	31	0.24	0.10	0.39	60%	0	**31**	0	0.36	48%	0	**31**	0	0.36	49%	0	**31**	0
September	30	0.12	0.07	0.21	74%	0	**30**	0	0.18	50%	0	**30**	0	0.18	53%	0	**30**	0
October	31	0.27	0.11	0.43	58%	0	**31**	0	0.41	48%	0	**31**	0	0.41	49%	0	**31**	0
November	30	0.04	0.04	0.09	130%	0	**30**	0	0.06	56%	0	**30**	0	0.06	64%	0	**30**	0
December	31	0.02	0.02	0.06	227%	0	**31**	0	0.03	67%	0	**31**	0	0.03	85%	0	**31**	0

D.2 West Buskegau River

D.2.1 WB1

D.2.1.1 EXISTING CLIMATE

Table D.2.1 West Buskegau River Flows – WB1 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	1.17	1.17	1.82	56%	0	**31**	0	2.31	98%	0	0	0	2.44	109%	0	**12**	0
February	28	1.14	1.14	2.27	100%	0	**28**	0	17.07	1403%	0	0	0	17.20	1414%	0	**13**	0
March	31	1.14	1.14	1.89	65%	0	**31**	0	10.33	802%	0	0	0	10.43	811%	0	**10**	0
April	30	42.32	16.93	40.39	-5%	**1**	**2**	0	1.97	-95%	0	0	0	2.03	-95%	0	0	0
May	31	4.12	2.84	4.56	11%	0	**18**	0	4.10	-1%	0	0	0	4.26	3%	0	**4**	0
June	30	5.27	2.84	5.94	13%	0	**20**	0	6.26	19%	0	0	0	6.46	22%	0	**4**	0
July	31	3.68	2.84	4.29	16%	0	**25**	0	4.16	13%	0	0	0	4.28	16%	0	**3**	0
August	31	7.80	3.12	8.01	3%	0	**10**	0	9.04	16%	0	0	0	9.20	18%	0	**1**	0
September	30	3.91	2.84	4.36	12%	0	**21**	0	4.20	8%	0	0	0	4.35	11%	0	**4**	0
October	31	9.74	3.89	9.78	0%	0	**7**	0	9.90	2%	0	0	0	10.17	4%	0	**7**	0
November	30	3.22	2.84	3.81	18%	0	**24**	0	2.71	-16%	0	0	0	2.84	-12%	0	**5**	0
December	31	1.80	1.80	2.03	13%	0	**25**	0	1.24	-31%	0	0	0	1.36	-24%	0	**10**	0

D.2.1.2 CLIMATE CHANGE

Table D.2.2 West Buskegau River Flows – WB1 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	2.34	2.34	2.93	25%	0	**25**	0	2.31	-1%	0	0	0	2.44	4%	0	6	0
February	28	17.25	6.90	17.62	2%	0	**14**	0	17.07	-1%	0	0	0	17.20	0%	0	1	0
March	31	10.52	4.21	10.92	4%	0	**14**	0	10.33	-2%	0	0	0	10.43	-1%	0	3	0
April	30	1.99	1.99	2.50	25%	0	**26**	0	1.97	-1%	0	0	0	2.03	2%	0	3	0
May	31	4.15	2.48	4.69	13%	0	**23**	0	4.10	-1%	0	0	0	4.26	3%	0	4	0
June	30	6.32	2.53	7.01	11%	0	**17**	0	6.26	-1%	0	0	0	6.46	2%	0	6	0
July	31	4.23	2.48	5.01	19%	0	**23**	0	4.16	-2%	0	0	0	4.28	1%	0	3	0
August	31	9.18	3.67	9.40	2%	0	**9**	0	9.04	-2%	0	0	0	9.20	0%	0	1	0
September	30	4.26	2.48	4.81	13%	0	**23**	0	4.20	-1%	0	0	0	4.35	2%	0	5	0
October	31	10.04	4.02	10.12	1%	0	**8**	0	9.90	-1%	0	0	0	10.17	1%	0	6	0
November	30	2.74	2.48	3.40	24%	0	**25**	0	2.71	-1%	0	0	0	2.84	4%	0	10	0
December	31	1.26	1.26	1.58	25%	0	**31**	0	1.24	-1%	0	0	0	1.36	8%	0	13	0

D.2.2 WB3

D.2.2.1 EXISTING CLIMATE

Table D.2.3 West Buskegau River Flows – WB3 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.95	0.95	1.60	69%	0	**31**	0	0.98	4%	0	0	0	1.11	17%	0	**15**	0
February	28	0.92	0.92	2.06	124%	0	**28**	0	0.95	4%	0	0	0	1.07	16%	0	**13**	0
March	31	0.93	0.93	1.68	80%	0	**31**	0	0.97	4%	0	0	0	1.06	14%	0	**10**	0
April	30	33.50	13.40	31.58	-6%	**4**	**4**	0	32.95	-2%	0	**1**	0	33.01	-1%	0	**1**	0
May	31	3.31	2.26	3.75	13%	0	**20**	0	3.33	1%	0	0	0	3.46	5%	0	**5**	0
June	30	4.20	2.26	4.86	16%	0	**22**	0	4.21	0%	0	0	0	4.40	5%	0	**4**	0
July	31	2.93	2.26	3.54	21%	0	**27**	0	2.93	0%	0	0	0	3.04	4%	0	**4**	0
August	31	6.19	2.47	6.40	3%	0	**12**	0	6.13	-1%	0	0	0	6.27	1%	0	**2**	0
September	30	3.12	2.26	3.58	15%	0	**22**	0	3.12	0%	0	0	0	3.25	4%	0	**7**	0
October	31	7.73	3.09	7.77	1%	0	**9**	0	7.65	-1%	0	**1**	0	7.90	2%	0	**7**	0
November	30	2.57	2.26	3.17	23%	0	**25**	0	2.59	1%	0	0	0	2.70	5%	0	**8**	0
December	31	1.43	1.43	1.67	17%	0	**26**	0	1.46	2%	0	0	0	1.55	8%	0	**13**	0

D.2.2.2 CLIMATE CHANGE

Table D.2.4 West Buskegau River Flows – WB3 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	1.86	1.86	2.45	32%	0	**26**	0	1.82	-2%	0	0	0	1.95	5%	0	**6**	0
February	28	13.69	5.47	14.05	3%	0	**16**	0	13.51	-1%	0	0	0	13.64	0%	0	**3**	0
March	31	8.29	3.31	8.69	5%	0	**17**	0	8.09	-2%	0	0	0	8.18	-1%	0	**3**	0
April	30	1.57	1.57	2.08	32%	0	**27**	0	1.55	-2%	0	0	0	1.61	3%	0	**3**	0
May	31	3.31	1.96	3.85	16%	0	**23**	0	3.26	-1%	0	0	0	3.42	3%	0	**5**	0
June	30	5.00	2.00	5.69	14%	0	**20**	0	4.94	-1%	0	0	0	5.14	3%	0	**6**	0
July	31	3.33	1.96	4.12	24%	0	**25**	0	3.26	-2%	0	0	0	3.39	2%	0	**4**	0
August	31	7.25	2.90	7.47	3%	0	**11**	0	7.11	-2%	0	0	0	7.26	0%	0	**2**	0
September	30	3.37	1.96	3.93	17%	0	**24**	0	3.32	-2%	0	0	0	3.47	3%	0	**7**	0
October	31	7.95	3.18	8.03	1%	0	**10**	0	7.81	-2%	0	**1**	0	8.07	2%	0	**7**	0
November	30	2.17	1.96	2.83	30%	0	**26**	0	2.14	-1%	0	0	0	2.27	4%	0	**11**	0
December	31	0.98	0.98	1.30	32%	0	**31**	0	0.97	-2%	0	0	0	1.08	10%	0	**13**	0

D.2.3 WB5

D.2.3.1 EXISTING CLIMATE

Table D.2.5 West Buskegau River Flows – WB5 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.63	0.63	1.28	105%	0	**31**	0	0.66	6%	0	0	0	0.79	26%	0	**21**	0
February	28	0.61	0.61	1.75	188%	0	**28**	0	0.64	6%	0	0	0	0.77	26%	0	**14**	0
March	31	0.62	0.62	1.37	119%	0	**31**	0	0.66	6%	0	**1**	0	0.75	20%	0	**12**	0
April	30	18.23	7.29	16.32	-10%	**7**	**14**	0	17.69	-3%	0	**1**	0	17.75	-3%	0	**1**	0
May	31	1.97	1.27	2.41	22%	0	**22**	0	1.99	1%	0	**1**	0	2.13	8%	0	**7**	0
June	30	2.36	1.27	3.02	28%	0	**27**	0	2.36	0%	0	**2**	0	2.55	8%	0	**6**	0
July	31	1.68	1.27	2.29	36%	0	**29**	0	1.68	0%	0	**1**	0	1.79	7%	0	**7**	0
August	31	3.47	1.39	3.68	6%	0	**18**	0	3.41	-2%	0	**1**	0	3.55	2%	0	**3**	0
September	30	1.86	1.27	2.32	25%	0	**24**	0	1.86	0%	0	**1**	0	1.99	7%	0	**11**	0
October	31	4.35	1.74	4.40	1%	**3**	**15**	0	4.27	-2%	0	**2**	0	4.53	4%	0	**10**	0
November	30	1.49	1.27	2.09	40%	0	**26**	0	1.51	1%	0	**1**	0	1.62	9%	0	**12**	0
December	31	0.80	0.80	1.04	30%	0	**31**	0	0.83	3%	0	0	0	0.92	15%	0	**15**	0

D.2.3.2 CLIMATE CHANGE

Table D.2.6 West Buskegau River Flows – WB5 (1:1 Flow Control Regime)

Month	Days in Month	Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
		Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	1.04	1.04	1.63	57%	0	**28**	0	1.01	-3%	0	**1**	0	1.13	9%	0	**11**	0
February	28	7.66	3.06	8.03	5%	**2**	**19**	0	7.48	-2%	0	**3**	0	7.62	-1%	0	**4**	0
March	31	4.17	1.67	4.57	10%	**1**	**25**	0	3.97	-5%	0	0	0	4.05	-3%	0	**6**	0
April	30	0.80	0.80	1.31	63%	0	**30**	0	0.78	-3%	0	0	0	0.84	5%	0	**5**	0
May	31	2.00	1.05	2.53	27%	0	**26**	0	1.95	-3%	0	**1**	0	2.11	6%	0	**8**	0
June	30	2.60	1.05	3.29	27%	0	**24**	0	2.54	-2%	0	**2**	0	2.74	5%	0	**8**	0
July	31	1.72	1.05	2.51	46%	0	**28**	0	1.65	-4%	0	**1**	0	1.78	3%	0	**6**	0
August	31	3.87	1.55	4.09	6%	0	**17**	0	3.72	-4%	0	0	0	3.88	0%	0	**4**	0
September	30	1.86	1.05	2.42	30%	0	**26**	0	1.80	-3%	0	**1**	0	1.96	5%	0	**12**	0
October	31	4.33	1.73	4.41	2%	**3**	**16**	0	4.19	-3%	0	**2**	0	4.46	3%	0	**9**	0
November	30	1.11	1.05	1.77	60%	0	**27**	0	1.08	-3%	0	**1**	0	1.20	9%	0	**13**	0
December	31	0.42	0.42	0.74	75%	0	**31**	0	0.41	-4%	0	0	0	0.52	23%	0	**14**	0

D.2.4 WB6

D.2.4.1 EXISTING CLIMATE

Table D.2.7 West Buskegau River Flows – WB6 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.59	0.59	1.24	111%	0	**31**	0	0.62	5%	0	0	0	0.74	27%	0	**19**	0
February	28	0.57	0.57	1.70	199%	0	**28**	0	0.60	5%	0	0	0	0.73	28%	0	**14**	0
March	31	0.59	0.59	1.32	125%	0	**31**	0	0.62	6%	0	**1**	0	0.70	20%	0	**12**	0
April	30	16.69	6.67	14.59	-13%	**8**	**13**	0	15.95	-4%	**5**	**1**	0	16.01	-4%	**5**	**1**	0
May	31	1.84	1.17	2.26	23%	0	**22**	0	1.84	0%	0	**1**	0	1.98	8%	0	**7**	0
June	30	2.17	1.17	2.81	29%	0	**26**	0	2.16	-1%	0	**2**	0	2.34	8%	0	**6**	0
July	31	1.55	1.17	2.14	38%	0	**29**	0	1.53	-1%	0	**1**	0	1.64	6%	0	**6**	0
August	31	3.18	1.27	3.35	6%	0	**18**	0	3.08	-3%	0	**1**	0	3.23	2%	0	**3**	0
September	30	1.72	1.17	2.17	26%	0	**24**	0	1.70	-1%	0	**1**	0	1.83	7%	0	**11**	0
October	31	4.00	1.60	4.00	0%	**4**	**15**	0	3.87	-3%	**2**	**2**	0	4.13	3%	0	**9**	0
November	30	1.38	1.17	1.96	42%	0	**26**	0	1.38	0%	0	**1**	0	1.50	8%	0	**11**	0
December	31	0.74	0.74	0.97	31%	0	**31**	0	0.76	3%	0	0	0	0.85	15%	0	**15**	0

D.2.4.2 CLIMATE CHANGE

Table D.2.8 West Buskegau River Flows – WB6 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.95	0.95	1.54	62%	0	**28**	0	0.91	-5%	**2**	**1**	0	1.04	9%	0	**10**	0
February	28	7.03	2.81	7.33	4%	**4**	**19**	0	6.78	-4%	**8**	**3**	**2**	6.92	-2%	**5**	**4**	0
March	31	3.78	1.51	4.14	10%	**1**	**25**	0	3.53	-7%	**6**	0	0	3.61	-4%	**4**	**5**	0
April	30	0.73	0.73	1.23	68%	0	**30**	0	0.70	-5%	**1**	0	0	0.76	4%	0	**5**	0
May	31	1.84	0.96	2.36	28%	0	**26**	0	1.78	-4%	**4**	**1**	0	1.94	5%	**2**	**8**	0
June	30	2.38	0.96	3.04	28%	0	**24**	0	2.29	-4%	**2**	**2**	0	2.49	5%	0	**8**	0
July	31	1.56	0.96	2.33	49%	0	**28**	0	1.47	-6%	**1**	**1**	0	1.60	3%	0	**6**	0
August	31	3.52	1.41	3.70	5%	0	**17**	0	3.33	-5%	**8**	0	0	3.49	-1%	**3**	**4**	0
September	30	1.70	0.96	2.25	32%	0	**26**	0	1.63	-5%	**5**	**1**	0	1.79	5%	**4**	**12**	0
October	31	3.96	1.58	4.00	1%	**4**	**16**	0	3.78	-5%	**7**	**2**	0	4.04	2%	**4**	**9**	0
November	30	1.01	0.96	1.66	64%	0	**27**	0	0.97	-4%	**4**	**1**	0	1.10	8%	0	**13**	0
December	31	0.38	0.38	0.69	82%	0	**31**	0	0.36	-6%	0	0	0	0.47	25%	0	**14**	0

D.2.5 WB9

D.2.5.1 EXISTING CLIMATE

Table D.2.9 West Buskegau River Flows – WB9 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.52	0.52	1.21	131%	0	**31**	0	0.58	11%	0	**31**	0	0.71	35%	0	**31**	0
February	28	0.51	0.51	1.67	229%	0	**28**	0	0.57	11%	0	**28**	0	0.70	37%	0	**28**	0
March	31	0.53	0.53	1.29	146%	0	**31**	0	0.59	12%	0	**31**	0	0.67	27%	0	**31**	0
April	30	14.78	5.91	13.75	-7%	**5**	**16**	0	15.11	2%	0	**2**	0	15.16	3%	0	**4**	0
May	31	1.64	1.03	2.17	32%	0	**30**	0	1.74	7%	0	**15**	0	1.88	15%	0	**22**	0
June	30	1.94	1.03	2.70	40%	0	**29**	0	2.05	6%	0	**3**	0	2.23	15%	0	**12**	0
July	31	1.37	1.03	2.06	50%	0	**30**	0	1.45	5%	0	**12**	0	1.56	13%	0	**21**	0
August	31	2.81	1.13	3.19	13%	0	**22**	0	2.91	4%	0	**2**	0	3.05	9%	0	**9**	0
September	30	1.52	1.03	2.08	37%	0	**30**	0	1.61	6%	0	**13**	0	1.74	14%	0	**18**	0
October	31	3.54	1.42	3.80	7%	0	**20**	0	3.66	3%	0	**4**	0	3.92	11%	0	**15**	0
November	30	1.23	1.03	1.89	54%	0	**29**	0	1.31	6%	0	**8**	0	1.42	15%	0	**19**	0
December	31	0.66	0.66	0.93	41%	0	**31**	0	0.72	9%	0	**21**	0	0.81	23%	0	**24**	0

D.2.5.2 CLIMATE CHANGE

Table D.2.10 West Buskegau River Flows – WB9 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.84	0.84	1.49	77%	0	**31**	0	0.86	2%	0	**2**	0	0.98	17%	0	**13**	0
February	28	6.24	2.50	6.98	12%	0	**20**	0	6.44	3%	0	**3**	0	6.58	5%	0	**4**	0
March	31	3.33	1.33	3.94	18%	0	**27**	0	3.32	0%	0	**2**	0	3.40	2%	0	**6**	0
April	30	0.65	0.65	1.19	84%	0	**30**	0	0.66	2%	0	**1**	0	0.72	11%	0	**5**	0
May	31	1.63	0.85	2.27	39%	0	**29**	0	1.68	3%	0	**2**	0	1.84	13%	0	**10**	0
June	30	2.11	0.85	2.93	39%	0	**27**	0	2.17	3%	0	**3**	0	2.37	12%	0	**10**	0
July	31	1.38	0.85	2.25	63%	0	**29**	0	1.39	1%	0	**1**	0	1.52	10%	0	**11**	0
August	31	3.11	1.24	3.52	13%	0	**21**	0	3.15	1%	0	**2**	0	3.31	6%	0	**6**	0
September	30	1.51	0.85	2.16	43%	0	**28**	0	1.54	2%	0	**2**	0	1.70	13%	0	**12**	0
October	31	3.51	1.40	3.80	8%	0	**19**	0	3.57	2%	0	**2**	0	3.84	10%	0	**10**	0
November	30	0.90	0.85	1.61	79%	0	**29**	0	0.92	2%	0	**2**	0	1.04	16%	0	**15**	0
December	31	0.34	0.34	0.67	99%	0	**31**	0	0.34	1%	0	0	0	0.45	34%	0	**15**	0

D.2.6 WB14

D.2.6.1 EXISTING CLIMATE

Table D.2.11 West Buskegau River Flows – WB14 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.44	0.44	0.43	-1%	0	0	0	0.41	-7%	0	0	0	0.41	-7%	0	0	0
February	28	0.42	0.42	0.42	-1%	0	0	0	0.40	-7%	0	0	0	0.40	-7%	0	0	0
March	31	0.44	0.44	0.43	-1%	0	0	0	0.41	-6%	0	0	0	0.41	-6%	0	0	0
April	30	12.61	5.04	12.05	-4%	0	0	0	12.03	-5%	0	0	0	12.03	-5%	0	0	0
May	31	1.37	0.88	1.32	-4%	0	0	0	1.30	-6%	0	0	0	1.30	-6%	0	0	0
June	30	1.64	0.88	1.58	-4%	0	0	0	1.56	-5%	0	0	0	1.56	-5%	0	0	0
July	31	1.16	0.88	1.12	-3%	0	0	0	1.10	-5%	0	0	0	1.10	-5%	0	0	0
August	31	2.39	0.96	2.30	-4%	0	0	0	2.28	-5%	0	0	0	2.28	-5%	0	0	0
September	30	1.29	0.88	1.24	-4%	0	0	0	1.22	-5%	0	0	0	1.22	-5%	0	0	0
October	31	3.01	1.20	2.88	-4%	0	0	0	2.86	-5%	0	0	0	2.86	-5%	0	0	0
November	30	1.04	0.88	1.01	-3%	0	0	0	0.98	-5%	0	0	0	0.98	-5%	0	0	0
December	31	0.56	0.56	0.55	-1%	0	0	0	0.53	-6%	0	0	0	0.53	-6%	0	0	0

D.2.6.2 CLIMATE CHANGE

Table D.2.12 West Buskegau River Flows – WB14 (1:1 Flow Control Regime)

		Baseline		Operations Phase 1 and 2 (Mine Years 4 to 18: Year 17)					Passive Closure Phase (Mine Year 46 onward: Year 47)					Pit Filled				
		Mean Monthly Flows	Environmental Flows	Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows			Mean Monthly Flows		Daily Flows		
Month	Days in Month	Flows (m^3/s)	Flows (m^3/s)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)	Flows (m^3/s)	Average Percent Difference with Baseline (%)	Instances of -10% Change from Baseline (No.)	Instances of +10% Change from Baseline (No.)	Number of Days With -10% Change from Baseline and Below Environmental Flow (No.)
January	31	0.70	0.70	0.71	1%	0	0	0	0.68	-2%	0	0	0	0.68	-3%	0	0	0
February	28	5.22	2.09	5.09	-3%	0	0	0	5.06	-3%	0	0	0	5.06	-3%	0	0	0
March	31	2.80	1.12	2.77	-1%	0	0	0	2.74	-2%	0	0	0	2.74	-2%	0	0	0
April	30	0.55	0.55	0.56	2%	0	0	0	0.53	-2%	0	0	0	0.53	-3%	0	0	0
May	31	1.35	0.71	1.33	-1%	0	0	0	1.31	-3%	0	0	0	1.31	-3%	0	0	0
June	30	1.78	0.71	1.76	-1%	0	0	0	1.73	-3%	0	0	0	1.73	-3%	0	0	0
July	31	1.16	0.71	1.16	0%	0	0	0	1.14	-2%	0	0	0	1.13	-2%	0	0	0
August	31	2.61	1.04	2.57	-2%	0	0	0	2.55	-2%	0	0	0	2.54	-2%	0	0	0
September	30	1.26	0.71	1.25	-1%	0	0	0	1.23	-3%	0	0	0	1.22	-3%	0	0	0
October	31	2.93	1.17	2.88	-2%	0	0	0	2.85	-3%	0	0	0	2.85	-3%	0	0	0
November	30	0.76	0.71	0.76	1%	0	**2**	0	0.74	-2%	0	0	0	0.74	-3%	0	0	0
December	31	0.29	0.29	0.31	6%	0	**12**	0	0.29	-1%	0	0	0	0.29	-2%	0	0	0

Attachment SW Quan-02 Ausenco Memorandum: Clarification to water balance comments on the Impact Statement for the Crawford Nickel Project

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Memorandum

Attention	Mathieu Boucher – Canada Nickel Company
CC	Andrew Sinclair - Stantec
	Sheldon Smith – Stantec
	Grahame Sterling – Ausenco
	Tariq Aziz - Ausenco
From	Jonathan Cooper - Ausenco
Subject	Clarification to water balance comments on the Impact Statement for the Crawford Nickel Project
Date	December 19, 2025
Page	Page 1 of 4
Document Ref:	104945-EW-00000-11101-501, revision C

This memo provides additional clarifications to comments raised on the Impact Statement for the Crawford Nickel Project (May 30, 2025), related to the water balance modelling completed by Ausenco in support of the original Impact Statement filing in 2024. A summary of the questions being addressed are noted below, along with the response clarification. The complete questions can be found in Enclosure 1 – Comments on the Impact Statement for the Crawford Nickel Project (May 30, 2025).

1 SW Quan -02a: Site-wide water balance model – runoff coefficients

IAAC Question: *There are questions about the runoff coefficients used in the site-wide water balance model and regional hydrological model, which directly translates into compounding uncertainty in flow predictions within the PA and the LSA. Specifically, the use of 0.5 rather than a lower runoff coefficient, as derived from the regional assessment for natural ground, has been noted as requiring further explanation and justification.*

1.1 Confirm IAAC's assumption that the runoff coefficient for baseline is synonymous with natural ground.

The water balance represents the management and movement of water during mining operations (from construction through to post-closure) and is aligned with the proposed water management strategy for the project. All runoff estimated in the water balance ultimately reports to a component of site's water management system, such as a pond. The water balance simulates water and flow paths that will be altered due to mining and does not simulate water that is unaffected. For instance, catchments are not added to the simulation until those specific catchments are impacted by the mining footprint.

With respect to the use of natural ground, in the water balance these represent areas where the land itself is not occupied by a mining footprint (i.e. WRSF, Pond, Pit, etc.) but whose ultimate discharge location has been modified. As noted, these catchments report to either a Pond or Pit and not directly to the environment. In the water balance there are several instances where these types of catchments exist:

- Perimeter/buffer area surrounding ponds, where the surrounding runoff would report to the ponds.
- Buffer areas around the stockpiles not fully covered by the facility but where runoff would be captured in the collection channels and routed to ponds.

While the water balance report notes these areas are "natural ground," a more accurate representation would be areas with minimal anticipated disturbance. As such, a runoff coefficient of 0.5 was used, taking the higher end of the natural ground runoff coefficients from the regional analysis of stations. The water balance natural catchments and where they report to are shown in Table 1-1.

Table 1-1 Water Balance Natural Catchments Discharge Locations

"Natural Ground" Catchment	Description of Catchment	Flow Directed to	Year Active	"Natural Ground" Catchment Area	Total Catchment reporting to Pond
Perimeter around Pond 1	Area around the pond not covered by the pond itself or adjacent storage facility	Pond 1	-1 to Closure	283 Ha	2,301 Ha
Perimeter around Pond 2		Pond 2	4 to Closure	21 Ha	1,878 Ha
East Stockpile	Buffer areas around the stockpiles not fully covered by the facility but where runoff would be captured in the collection channels and routed to Ponds	Pond 3	-3 to Closure	23 Ha	334 Ha
West Stockpile		Pond 2	4 to Closure	72 Ha	1,878 Ha
TOTAL				399 Ha	6,391 Ha

It should be noted that the natural catchments (399 Ha) make up approximately 2% of the overall catchment areas within the water balance model (total area is 24,400 Ha; when considering the entire disturbed area, including pit areas and TMF area) and the incremental difference between a runoff coefficient of 0.5 and 0.38 would be minimal.

1.2 Provide clarification for the selected runoff coefficient used for baseline in Appendix I (i.e. confirmation of what value was used and why).

All runoff from these natural ground areas fall within the mine boundary and will be managed as part of the water management strategy. While a lower coefficient may be more representative of natural/undisturbed areas, the natural ground within the water balance area will likely have some minor disturbances such as partial vegetation removal or vehicle disturbance from construction activities. As the water falls within the management of the site, a nominally higher runoff

coefficient and thus more runoff to be managed, provided some conservatism to the simulations and allowed for operational flexibility, such as perimeter roads or slightly modified pond footprints.

1.3 Demonstrate that the selected baseline runoff coefficient is adequate for application to the PA by comparing flow estimates from the baseline site-wide water balance model with flow measured at the local hydrometric stations.

As noted, the runoff coefficients were selected to best represent real world conditions anticipated for the Project. The water balance model simulated the changes in flows resulting from mining operations, including natural ground that will report to ponds. The natural catchments in the model are likely to be quasi disturbed, their discharge locations modified and derived flows are being attenuated in Ponds, so, a comparison to baseline flows measured at the local hydrometric stations is not a true comparison.

1.4 Provide a sensitivity analysis to the baseline runoff coefficient to decrease the level of uncertainty in the predicted changes to flows presented in Appendix C.5 of the Impact Statement (Section 6.3.6).

The areas considered natural ground within the water balance are significantly smaller than those areas considered disturbed and the resulting runoff has a minimal impact on the overall PA runoff. A comparison of runoff coefficients for the water balance's natural ground elements is shown in Appendix 1.

The analysis shows the early operational phase is more sensitive to the varied runoff coefficient; however, the incremental decrease in overall yearly runoff by reducing the runoff coefficient from 0.5 to 0.4 would be under 12,000 m^3, (as shown in Appendix 1, Column T). This represents an approximately 0.03% change in the overall water reporting to the receiving environment. This difference becomes smaller as the mine is developed and areas reporting to the ponds are reclaimed and removed from the overall active water balance.

As noted in the comments, the regional analysis of stations estimated natural ground runoff coefficients varying from 0.38 to 0.51. 0.4 was selected for the sensitivity analysis as a starting point to identify the potential impact. Based on the sensitivity analysis, the difference between 0.38 and 0.4 would be negligible and not change the overall conclusions of the assessment.

2 SW Quan-02b: Site-wide water balance model – inconsistent facility footprints

IAAC Question: *There is uncertainty in the site-wide water balance model, and associated water quality model, due to inconsistencies in the facility footprints during the transition from operations to reclamation.*

During the period when facilities transition from operations to reclamation, the total area of some of the rock impoundment, stockpiles, and Tailings Management Facility (TMF) does not appear to be maintained. For example, Appendix B (of Appendix I) suggests a deficit in the total rock impoundment (operational or reclaimed) in year 33, relative to year 29 and 34, which both have a higher total). It is unclear how the areas unaccounted for are considered in the site-wide water balance model and how this may influence changes to water quantity during this period.

2.1 Provide the rationale for not accounting for the footprint areas for some mine facilities where the total area does not appear to be maintained through time. Describe the potential influence of the excluded areas on the site-wide water balance and water quality models.

There was a transcription error between the Goldsim model look-up tables and the report table: Appendix B (of Appendix I). The WB does not exclude areas that would potentially impact the water quality model. The incorrect table was issued in the water balance report; however, the modelling was based on the correct table and therefore the model results remain unaffected. Again, there are no discrepancies in modelled drainage area totals between different WB life of mine scenarios. The correct table is attached (Appendix 2).

2.2 Explain the assumptions with respect to the transition (timeframe) from operational to reclaimed conditions and the impact on predicted changes to water quantity.

The ultimate areas of each facility will be reclaimed as they are no longer required for mining operations. The overall combined footprint of each facility remains the same throughout the model (i.e. ultimate disturbed footprint = combined reclaimed footprint + unclaimed/operation footprint). As noted in the report, there is assumed to be a five-year reclamation window for each facility (the model assumes this is a linear relationship where 1/5th of the facility is reclaimed each year until fully reclaimed).

APPENDIX 1

Comparison of Natural Ground Runoff Coefficients

	Mine Life Year	Natural Ground (Perimeter around POND 1)			Natural Ground (Perimeter around POND 2)			Natural Ground (East Stockpile; Pond 3)			Natural Ground (East Stockpile; Pond 3 -Sump)			Natural Ground (West Stockpile; Pond 2)			Yearly Comparison of Runoff			
		Catchment Area (m^2)	Runoff (m^3) [RoC 0.5]	Runoff (m^3) [RoC 0.4]	Catchment Area (m^2)	Runoff (m^3) [RoC 0.5]	Runoff (m^3) [RoC 0.4]	Catchment Area (m^2)	Runoff (m^3) [RoC 0.5]	Runoff (m^3) [RoC 0.4]	Catchment Area (m^2)	Runoff (m^3) [RoC 0.5]	Runoff (m^3) [RoC 0.4]	Catchment Area (m^2)	Runoff (m^3) [RoC 0.5]	Runoff (m^3) [RoC 0.4]	Runoff (m^3) [RoC 0.5]	Runoff (m^3) [RoC 0.4]	Difference in Runoff (m^3)	Change in Overall Flow reporting to the receiving environment
	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[J]	[J]	[K]	[L]	[M]	[N]	[P]	[Q]	[R]	[S]	[T]	[U]
Construction	-3	2,830,000	41,847	33,477	0	0	0	60,000	887	710	168,000	2,484	1,987	0	0	0	45,218	36,174	9,044	0.03%
	-2	2,830,000	41,847	33,477	0	0	0	60,000	887	710	168,000	2,484	1,987	0	0	0	45,218	36,174	9,044	0.03%
	-1	2,830,000	41,847	33,477	0	0	0	60,000	887	710	168,000	2,484	1,987	0	0	0	45,218	36,174	9,044	0.03%
Operation Phase	1	2,830,000	41,847	33,477	0	0	0	60,000	887	710	168,000	2,484	1,987	0	0	0	45,218	36,174	9,044	0.03%
	2	2,830,000	41,847	33,477	0	0	0	60,000	887	710	168,000	2,484	1,987	0	0	0	45,218	36,174	9,044	0.03%
	3	2,830,000	41,847	33,477	0	0	0	60,000	887	710	168,000	2,484	1,987	0	0	0	45,218	36,174	9,044	0.03%
	4	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	5	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	6	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	7	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	8	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	9	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	10	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	11	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	12	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	13	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	14	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	15	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	16	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	17	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	18	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	19	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	20	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	21	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	22	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	23	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	24	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	25	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	26	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	27	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	28	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	29	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	30	2,830,000	41,847	33,477	208,684	3,086	2,469	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	58,880	47,104	11,776	0.03%
	31	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	32	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	33	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	34	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	35	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	36	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	37	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	38	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	39	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	40	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	41	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
	42	0	0	0	0	0	0	60,000	887	710	168,000	2,484	1,987	715,228	10,576	8,461	13,947	11,158	2,789	0.01%
Active Closure	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Post Closure	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
	+60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%

Appendix 2
Overview of Mine Facility Footprint

Mine Life	Year	Clay Impounfdmen - Pond 1 Catchment	Clay Impounfdment	Reclaimed portion of Clay Impoundment	Rock Impounfdment - Pond 2 Catchment	Rock Impounfdment	Reclaimed portion of Rock Impoundment	Pond 3 Catchment - East Stockpile North	East Stockpile North	Reclaimed portion of East Stockpile North	Sump Catchment - East Stockpile South	East Stockpile South	Reclaimed portion of East Stockpile South	Pond 2 Catchment - West Stockpile	West Stockpile	Reclaimed portion of West Stockpile	Process Plant	TMF	Reclaimed portion of TMF
Construction	-3	0	0	0	0	0	0	60,000	1,277	0	168,000	519	0	0	0	0	926,125	9,239,715	0
	-2	0	0	0	0	0	0	60,000	272,324	0	168,000	110,606	0	0	0	0	926,125	9,239,715	0
	-1	2,830,009	15,164,377	0	0	0	0	60,000	1,043,844	0	168,000	423,961	0	0	0	0	926,125	9,239,715	0
Operation Phase	1	2,830,009	15,164,377	0	0	0	0	60,000	1,495,623	0	168,000	607,452	0	715,228	1,163,454	0	926,125	17,161,837	0
	2	2,830,009	19,687,862	0	0	0	0	60,000	2,415,169	0	168,000	695,094	0	715,228	1,150,866	0	926,125	17,161,837	0
	3	2,830,009	19,687,862	0	0	0	0	60,000	2,415,169	0	168,000	695,094	0	715,228	1,150,866	0	926,125	17,161,837	0
	4	2,830,009	20,176,488	0	208,684	2,821,982	0	60,000	2,415,169	0	168,000	695,094	0	715,228	1,150,866	0	926,125	17,161,837	0
	5	2,830,009	20,176,488	0	208,684	11,718,271	0	60,000	2,415,169	0	168,000	695,094	0	715,228	1,150,866	0	926,125	17,161,837	0
	6	2,830,009	20,176,488	0	208,684	11,718,271	0	60,000	2,415,169	0	168,000	695,094	0	715,228	1,150,866	0	926,125	17,161,837	0
	7	2,830,009	20,176,488	0	208,684	11,717,571	0	60,000	2,415,169	0	168,000	695,094	0	715,228	1,150,866	0	926,125	17,161,837	0
	8	2,830,009	20,176,488	0	208,684	11,717,571	0	60,000	2,415,169	0	168,000	695,094	0	715,228	1,733,956	0	926,125	17,161,837	0
	9	2,830,009	20,176,488	0	208,684	11,717,571	0	60,000	2,415,169	0	168,000	695,094	0	715,228	1,369,812	0	926,125	17,161,837	0
	10	2,830,009	20,176,488	0	208,684	11,716,871	0	60,000	2,415,169	0	168,000	695,094	0	715,228	2,570,466	0	926,125	17,161,837	0
	11	2,830,009	20,176,488	0	208,684	11,716,871	0	60,000	2,415,169	0	168,000	695,094	0	715,228	3,184,696	0	926,125	17,161,837	0
	12	2,830,009	20,176,488	0	208,684	11,716,171	0	60,000	2,415,169	0	168,000	695,094	0	715,228	3,951,164	0	926,125	17,161,837	0
	13	2,830,009	20,176,488	0	208,684	11,716,171	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	17,161,837	0
	14	2,830,009	20,176,488	0	208,684	11,716,171	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	17,161,837	0
	15	2,830,009	20,176,488	0	208,684	11,715,471	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	17,161,837	0
	16	2,830,009	20,176,488	0	208,684	11,715,471	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	17,161,837	0
	17	2,830,009	20,176,488	0	208,684	11,714,771	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	17,161,837	0
	18	2,830,009	20,176,488	0	208,684	11,714,771	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	13,729,470	3,432,367
	19	2,830,009	20,176,488	0	208,684	11,714,771	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	10,297,102	6,864,735
	20	2,830,009	20,176,488	0	208,684	11,714,071	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	6,864,735	10,297,102
	21	2,830,009	20,176,488	0	208,684	11,711,271	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	3,432,367	13,729,470
	22	2,830,009	20,176,488	0	208,684	11,709,271	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	23	2,830,009	20,176,488	0	208,684	11,709,271	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	24	2,830,009	20,176,488	0	208,684	11,708,571	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	25	2,830,009	20,176,488	0	208,684	11,708,571	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	26	2,830,009	20,176,488	0	208,684	11,707,871	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	27	2,830,009	20,176,488	0	208,684	11,707,871	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	28	2,830,009	20,176,488	0	208,684	11,707,871	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	29	2,830,009	20,176,488	0	208,684	11,707,871	0	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	30	0	16,141,190	4,035,298 [1],[2]	0	9,366,297	2,341,574 [2]	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	31	0	12,105,893	8,070,595	0	7,024,723	4,683,148	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	32	0	8,070,595	12,105,893	0	4,683,148	7,024,723	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	33	0	4,035,298	16,141,190	0	2,341,574	9,366,297	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	34	0	0	20,176,488	0	0	11,707,871	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	35	0	0	20,176,488	0	0	11,707,871	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	36	0	0	20,176,488	0	0	11,707,871	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	37	0	0	20,176,488	0	0	11,707,871	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	38	0	0	20,176,488	0	0	11,707,871	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	39	0	0	20,176,488	0	0	11,707,871	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	40	0	0	20,176,488	0	0	11,707,871	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	41	0	0	20,176,488	0	0	11,707,871	60,000	2,415,169	0	168,000	695,094	0	715,228	5,210,000	0	926,125	0	17,161,837
	42	0	0	20,176,488	0	0	11,707,871	60,000	1,932,136	483,034	168,000	556,075	139,019	715,228	4,168,000	1,042,000	926,125	0	17,161,837
Active Closure	43	0	0	20,176,488	0	0	11,707,871	0	1,449,102	966,068	0	417,056	278,037	0	3,126,000	2,084,000	0	0	17,161,837
	44	0	0	20,176,488	0	0	11,707,871	0	966,068	1,449,102	0	278,037	417,056	0	2,084,000	3,126,000	0	0	17,161,837
	45	0	0	20,176,488	0	0	11,707,871	0	483,034	1,932,136	0	139,019	556,075	0	1,042,000	4,168,000	0	0	17,161,837
	46	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
Post Closure	47	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	48	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	49	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	50	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	51	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	52	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	53	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	54	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	55	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	56	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	57	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	58	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	59	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837
	+60	0	0	20,176,488	0	0	11,707,871	0	0	2,415,169	0	0	695,094	0	0	5,210,000	0	0	17,161,837

Notes

(1) Each facility has been allocated a 5-year reclamation period.

(2) Both Rock Impoundment East and West will be fully reclamaid by year 34

(3) East and West Stockpile will undergo reclamation, with completion by year 47

(4) TMF will be fully reclaimed by year 22

Crawford Nickel Project ("the Project")

CNC's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project (Received May 30, 2025)

Species of Importance to Indigenous Peoples Where Habitat is Lost Due to Changes in Groundwater and Surface Water

December 24, 2025

CANADA NICKEL COMPANY

Stantec

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Abbreviations

BFI	Baseflow Index
GW	Groundwater
LSA	Local Study Area
MECP	Ministry of the Environment, Conservation and Parks
ND	North Driftwood
NDR	North Driftwood River
PA	Project Area
RSA	Regional Study Area
SW	Surface Water
TMF	Tailings Management Facility
WB	West Buskegau
WBR	West Buskegau River

Species of Importance to Indigenous Peoples Where Habitat is Lost Due to Changes in Groundwater and Surface Water

IP-01 Habitat Loss – Changes to Groundwater and Surface Water Levels

Comment Description (Context and Rationale):

IAAC's assessment will characterize the approximate changes to habitat for species of importance to Indigenous peoples (e.g. moose, waterfowl, otter, beaver), including magnitude, durations, irreversibility, etc. Given the abundance of terrestrial and wetland habitat types in the PA and the LSA that are used by species of importance to Indigenous peoples, these habitats may be affected by changes in groundwater and surface water levels, including drawdowns, mounding and flooding.

The IS acknowledges that during the operations phase, as the pit is excavated, shifts in the water balance of nearby lakes, rivers, wetlands, vegetation, and riparian environments (as discussed in Chapter 16 and 19) could directly affect these habitats.

While the IS emphasizes that changes to habitats may extend further into the LSA, the result of changes from surface water and groundwater have not been fully incorporated into the assessment and the extent of changes to the habitat of species of importance to Indigenous peoples. For example, Figure 16.7 in Chapter 16 identifies wetlands with the potential to be affected by groundwater drawdown, based on where 1 m of groundwater drawdown may occur in Year 31. However, equivalent figures for terrestrial or riparian habitats are absent. Further, while the Section 19.4.2 acknowledges the potential for indirect effects to wildlife habitats, there is no specific assessment of groundwater drawdown or mounding on wetlands that are moose aquatic feeding areas or on coniferous forests required by moose as a late overwinter habitat, despite moose being a dietary staple of Indigenous peoples.

Though the IS uses conservative assumptions to predict the extent of the water table drawdown, IAAC has identified fixes for substantial uncertainties in the groundwater and surface water modeling through previous outstanding requirements (GW-01(a-e), SW Quan-01(a-d), SW Quan(a-b)) needed to understand impacts to habitat types used by species of importance to Indigenous peoples. Predictions about impacts to habitat for species of importance to Indigenous peoples should be verified and, if appropriate, updated based on the improved model outputs.

This information is necessary to characterize residual changes to resources available for traditional purposes, which will inform the extent of significance of impacts to the current use of lands and resources for traditional purposes by Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.7.2, Section 8.9.2, Section 8.10.2

IS: Chapter 16, Chapter 18, Chapter 19

Required Information to Resolve Comment:

1) *After addressing uncertainties in the surface water and groundwater models (GW-01(a-e), SW Quan-01(a-d), SW Quan(a-b)), verify and, if appropriate, update the reported extent of habitat loss for species of importance to Indigenous peoples (including all relevant birds, terrestrial species, etc).*

2) *Provide updated maps that indicate:*

   - *geographic extent of groundwater changes (drawdown and mounding)*
   - *habitat that is used by species of importance to Indigenous peoples that is likely to be impacted by changes to groundwater and surface water levels*

CNC Response:

1) *After addressing uncertainties in the surface water and groundwater models (GW-01(a-e), SW Quan-01(a-d), SW Quan(a-b)), verify and, if appropriate, update the reported extent of habitat loss for species of importance to Indigenous peoples (including all relevant birds, terrestrial species, etc).*

Changes in Groundwater GW-01(a-e)

The Groundwater Baseline Report (Impact Statement Appendix B.5) cited a regional hydrology assessment that suggested that there may be groundwater discharge in the Local Study Area (LSA)/ Regional Study Area (RSA) based on a regional BFI of 0.3. The data collected in the Project Area (PA) as part of the baseline assessment and the data collected since, suggests there is limited interaction between groundwater and surface water systems across the PA. This is interpreted to be due to the thick glaciolacustrine unit that separates the glaciofluvial and bedrock aquifer systems from the surface water features across most of the PA.

As detailed in Groundwater Response GW-01d, the review of available data supports the conceptual understanding that the wetlands and surface water features present across the LSA/RSA are interpreted to be a function of a poorly drained landscape characterized by the dominant presence of the glaciolacustrine unit, and not the result of a strong groundwater surface water connection.

Due to the weak connection between the groundwater and surface water systems, groundwater drawdown due to pit dewatering is not expected to affect surface water features, such as watercourses, wetlands, and riparian areas that support vegetation and wildlife species habitat. As a result, groundwater drawdown is expected to have a negligible impact on habitats of wildlife species of interest to Indigenous Nations.

Changes in Surface Water

Changes in volumes and patterns of surface water flow have the potential to change habitat in riparian areas. Increases in flooding duration and extent, especially during the growing season, could cause shifts to moister terrestrial and wetland communities. Similarly, reductions in surface water flow and extent could cause decreases in wetland moisture conditions, causing shifts towards drier habitat types such as treed wetlands, or upland communities. Upland communities are unlikely to be affected by reductions in streamflow as these areas are above any water table connected to the streams.

While some changes in wetland and terrestrial communities are possible due to moderate to large changes in streamflow amounts and patterns, small changes in surface water flow and patterns are not expected to affect terrestrial habitats where surface inundation from streamflow does not occur. For the purposes of this assessment, a flow change greater than 10% was used as the criterion for assessing potential affects to terrestrial habitat.

The majority of wetlands in the LSA discharge into surface water streams and are not dependent on surface water flows to maintain hydrological balance. As a result, impacts to wetlands (if any) would be expected to be limited to areas directly connected to surface water (e.g., marshes), particularly riparian areas along the North Driftwood River (NDR) and West Buskegau River (WBR), which will be used to manage discharge from the PA. Ultimately, the ability to reduce adverse effects to wetland habitat along the NDR and WBR due to flow alterations will be constrained by the maximum sizes of the water quality "mixing zones" allowed by the MECP in the NDR and WBR and the simultaneous requirement to meet Canadian and/or Ontario water quality guidelines for the protection of freshwater aquatic biota at the downstream ends of each "mixing zone"; there will be a constant trade-off between water quantity and water quality in the NDR and WBR because the Project is located in the headwaters of both watersheds. In short, competing interests including mixing zone lengths and maintaining water quality for the protection of freshwater aquatic biota, limit our ability to manage flow in such a way as to prevent any changes in riparian habitat within the NDR and WBR where flow changes greater than 10% may occur.

A review of the proposed water management plan and water balance has been completed, along with corresponding updates to the Surface Water Quantity modeling, to reduce the downstream extent of the predicted water quality mixing zone in the North Driftwood River (NDR), as requested by the Ontario Ministry of the Environment, Conservation, and Parks (MECP). The results of this work are presented in response to SW Qual-02 Surface Water Quality – Effluent Mixing and SW Quan-01d. Two new flow scenarios were modeled to address MECP's request:

- Pre-&post- flow control - whereby the volume of effluent discharged to the NDR at each final discharge point (FDP) to match baseline flows in subwatershed ND5, the first sub-watershed downstream of the PA and diversion channel. In this scenario, excess effluent is discharged to the West Buskegau River (WBR).
- 1-to-1 flow control - where effluent discharge at each FDP is managed to be below or equal to the estimated upstream receiver flow rate considering drainage area changes due to the Project. In this scenario, excess effluent is discharged to the WBR.

Only the predicted flow changes for the 1-to-1 flow control scenario in Year 17 of mine operations in the NDR are discussed here as the 1-to-1 flow control scenario represents a more conservative scenario (i.e., greater frequency of reductions in flow greater than 10% from baseline flows) than the pre-&post- flow control scenario (based solely on hydrologic changes). Year 17 of mine operations is when Project effects on flows in the NDR are assessed as the Project area has the maximum controlled drainage area for water management infrastructure. With the flow control scenarios the flow changes are not predicted to change the extents of the local study area at the hydrologic model outlets (subwatershed ND1 in the NDR and subwatershed WB1 in the WBR) (for additional details see the SW Quan-01d response).

Surface water outflows into the NDR and WBR will be balanced to the extent feasible to maintain watercourse flows. For the 1-to-1 flow control scenario the frequency of days with flow reductions greater than 10% from baseline is predicted to be up to 204 days per year for subwatershed ND8 on the NDR for the existing climate condition (climate normal year – 1999), while subwatershed WB6 on the WBR is predicted to have 12 days per year of flow reductions greater than 10% from baseline occurring during high flow events for the existing climate condition (SW Quan-01d).

Although wetlands and terrestrial habitats are generally discharging into surface waters in the LSA, reductions in stream flow have potential to reduce moisture availability in areas adjacent to streams (e.g., riparian areas). Given the small number of days with flow reductions greater than 10% in the WBR (12 days), any effects of reduced water flow in the WBR on riparian habitat are likely to be minor to undetectable. In the NDR, where 204 days of water flows reductions greater than 10% are predicted, potential changes to riparian habitats are possible, especially for wetlands directly dependent on water levels in rivers for water balance, such as shore marshes and fens.

Both the NDR and WBR are predicted to have days with flow increases greater than 10% from baseline with the frequency more within the WBR subwatersheds compared to the NDR subwatersheds downstream of the Project area. The predicted Project development highest flow events in the NDR and WBR are estimated to be less than baseline conditions for the flow control scenarios, typically due to the storage lag time with the site-wide water management infrastructure prior to release. Flows are predominantly predicted to increase during lower flow periods and high flow events that at or below bankfull flows along the reach. As a result, the flow increase changes within the NDR and WBR are not expected to substantially change flood frequency and flood extents within the two receivers. The predicted changes in flow increases in the NDR and WBR would not be expected to increase the baseline 100-year return period flood flows adjacent to and downstream of the Project Area and there would be no increase to scour and erosion potential in the channel. As a result, changes to terrestrial and wetland habitats from flooding are not expected to occur.

Changes to Wildlife Habitat

Wetland habitat functions are predicted to be maintained within the natural range of variation based on the groundwater and surface water modelling.

Wetlands in the LSA are primarily surface-water fed (i.e., rainfall-driven) and are not expected to experience sustained changes in water levels or hydroperiod beyond natural variability, either through groundwater drawdown or the predicted surface water changes in flow conditions. Based on topography

and physiography in the LSA, there is no interaction between groundwater and surface water feeding the wetlands. Therefore, drawdown is not expected to influence wetland conditions or functions.

Under the predicted flow conditions for NDR and WBR, the duration and timing of changes are not expected to affect habitat suitability. Vegetation communities are expected to remain largely unchanged, and even if minor shifts in community structure occur, overall habitat function is anticipated to be maintained. Riparian communities are naturally dynamic and well-adapted to natural fluctuations in water levels. Similarly, wildlife that use these areas are adapted to these changing conditions and are tolerant to the hydrologic variability. In general, wildlife use in these areas is seasonally dependent for breeding, foraging, or movement, and is expected to continue under the predicted flow conditions.

For waterfowl and semi-aquatic species, such as beaver and otter, wetland conditions will continue to support ponded and slow-moving water, as well as aquatic vegetation for foraging, denning, nesting, staging and movement. These conditions will also continue to support specialized habitats, including moose aquatic feeding areas. Suitable conditions for forage species, such as emergent and submergent vegetation, will continue to thrive under low and high-flow conditions and are not anticipated to be adversely affected by the predicted changes.

Based on findings from the modelling, wetlands in the LSA are expected to continue functioning as wildlife habitat by providing foraging opportunities, cover and movement corridors for wetland-dependent species. Any potential changes to riparian communities are not expected to result in a net loss of habitat in the LSA but merely changes in types of habitats within a diverse habitat mosaic within the LSA. As a result, changes to wildlife habitat and use is not anticipated under the predicted conditions for groundwater and surface water.

Information on baseline conditions and habitat use are presented across multiple chapters in the Impact Statement and supporting appendices. The initial baseline studies for terrestrial ecology are provided in Appendix B.7.4 with supplemental baseline studies completed for each of the following:

- Vegetation, Riparian, and Wetland Environments are addressed in Chapter 16 of the Impact Statement, with the supplemental baseline report provided in Appendix B.7.1.
- Birds and Bird Habitat are addressed in Chapter 18, with the supplemental baseline report provided in Appendix B.7.2.
- Wildlife and Wildlife Habitat are addressed in Chapter 19, with the supplemental baseline report provided in Appendix B.7.3

2) *Provide updated maps that indicate:*

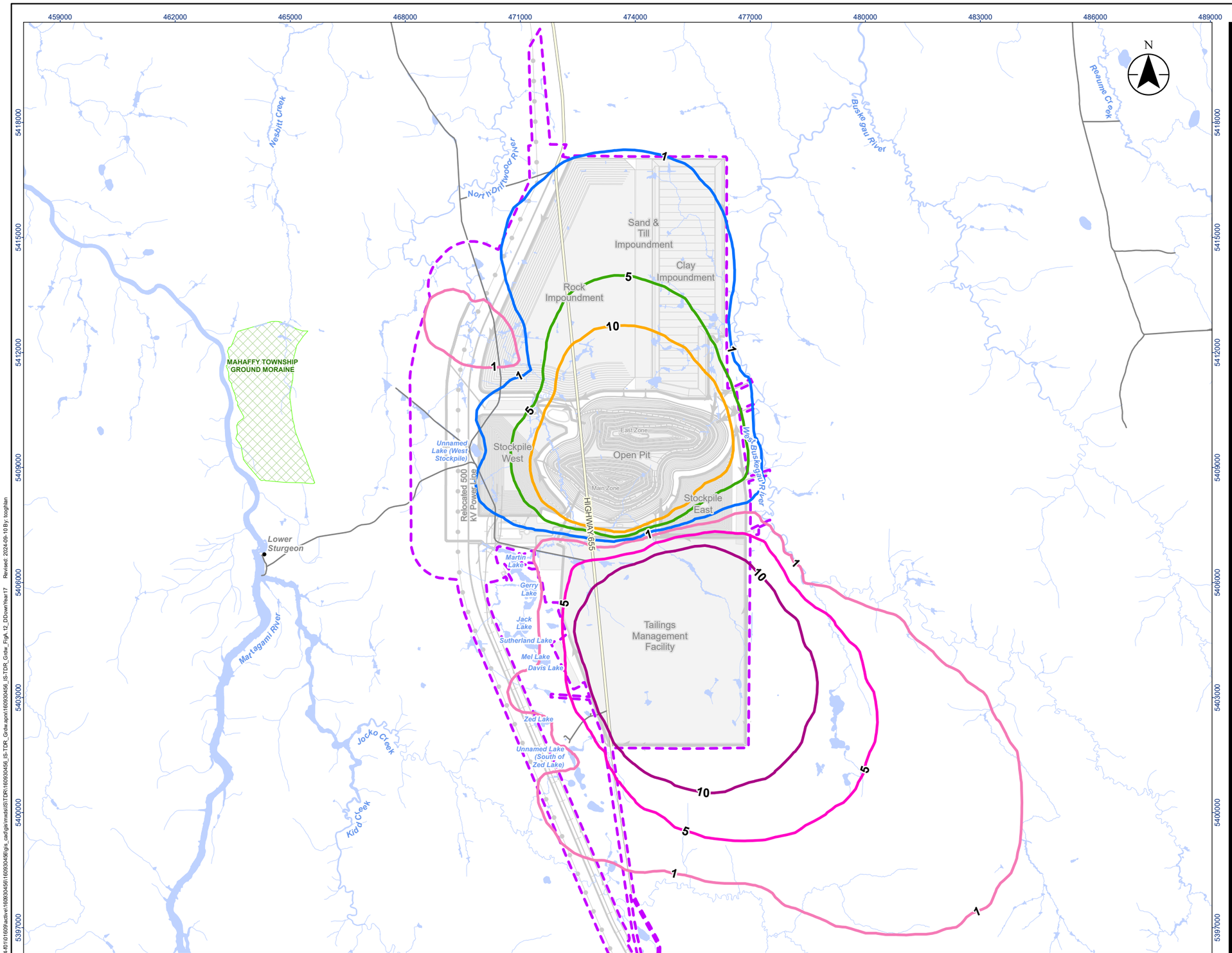
- *geographic extent of groundwater changes (drawdown and mounding)*
- *habitat that is used by species of importance to Indigenous peoples that is likely to be impacted by changes to groundwater and surface water levels*

Figure IP-01.1 depicts the geographic extent of simulated groundwater changes (drawdown and mounding), which was presented as Figure A.12 in Groundwater Assessment (Appendix C.4 of the Impact Statement). The predicted 1 m drawdown contour as a result of Open Pit dewatering extends

beyond the extents of the Open Pit as shown on Figure IP-01.1. The predicted extent of drawdown to the south of the Open Pit is limited due to increased infiltration in the Tailings Management Facility (TMF) footprint which results in mounding below the TMF. The area of mounding northwest of the Main Zone is due to the diversion of a portion of the NDR in Year 4. While changes in groundwater levels are anticipated as a result of operational activities including dewatering, the glaciolacustrine unit that hydraulically separates the groundwater and surface water systems is anticipated to minimize the impacts to habitats of wildlife species of interest to Indigenous Nations.

Wetland habitat within the 1 m groundwater drawdown contour for Year 31 is shown on Figure IP-01.2, previously presented on Figure 16.7 in Chapter 16 of the Impact Statement. These wetlands, including approximately 473 ha of swamp (representing 2% of swamps in the LSA), provide habitat for a variety of species, including species of interest to Indigenous Nations. However, as noted in response to 1) above, even though habitats exist within this potential groundwater drawdown area, the features are not expected to experience sustained changes in water levels or hydroperiod beyond natural variability. As such, any existing habitat functions of these wetlands and their function as habitat for species of interest to Indigenous Nations are expected to remain. There are no updates to the habitat figures as reflected in the Impact Statement and supporting baseline line studies for Birds and Bird Habitat (Figures A.5.1 through A.5.8, Appendix B.7.2 and Wildlife and Wildlife Habitat (Figures A6 through A13, Appendix B.7.3).

Figure IP-01.3 presents the main watercourse of the NDR and the subwatersheds where flow changes are predicted to be greater than 10% from baseline flows in Year 17 of Project operations. The map does not necessarily reflect the amount of riparian wetland habitat along these reaches of the NDR that may be adversely affected by the Project. It only reflects that some amount of habitat is predicted to experience a 10% increase or decrease in flow from baseline at some point during the life of the Project. The predicted flow increases are not expected to substantially change flood flow conditions.



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CANADA NICKEL COMPANY

Legend

- Project Area

Base Features

- Major Road
- Minor Road
- Watercourse
- Waterbody
- Conservation Reserve (Regulated)

Drawdown Contours

- 1 m Drawdown
- 5 m Drawdown
- 10 m Drawdown

Mounding Contours

- 1 m Mounding
- 5 m Mounding
- 10m Mounding

0 1 2 km

1:100,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location
Timmins, Ontario

160930456 REVA
Prepared by tcoghlan on 2024-09-10

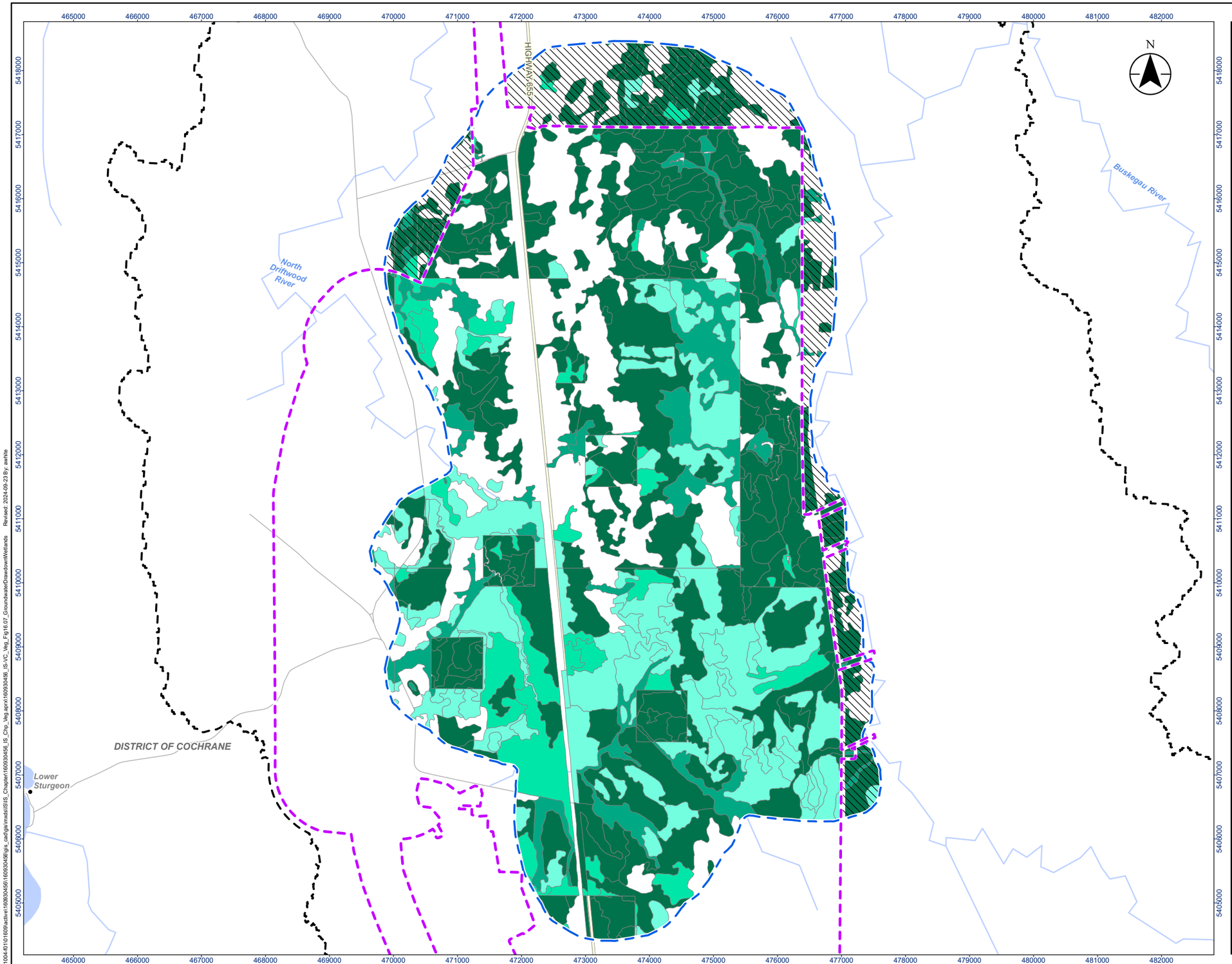
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
IP- 01.1

Title
Geographic Extent of Groundwater Changes (Drawdown and Mounding)

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Legend

- Project Area
- Local Study Area
- Year 31 1 m Groundwater
- Drawdown Contour Bog
- Fen
- Meadow Marsh
- Swamp
- Wetlands outside of the Project Area

Base Features

- Major Road
- Minor Road
- Watercourse
- Waterbody

0 1 2 km

1:60,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location
Timmins, Ontario

160930456 REVA
Prepared by awhite on 2024-09-23

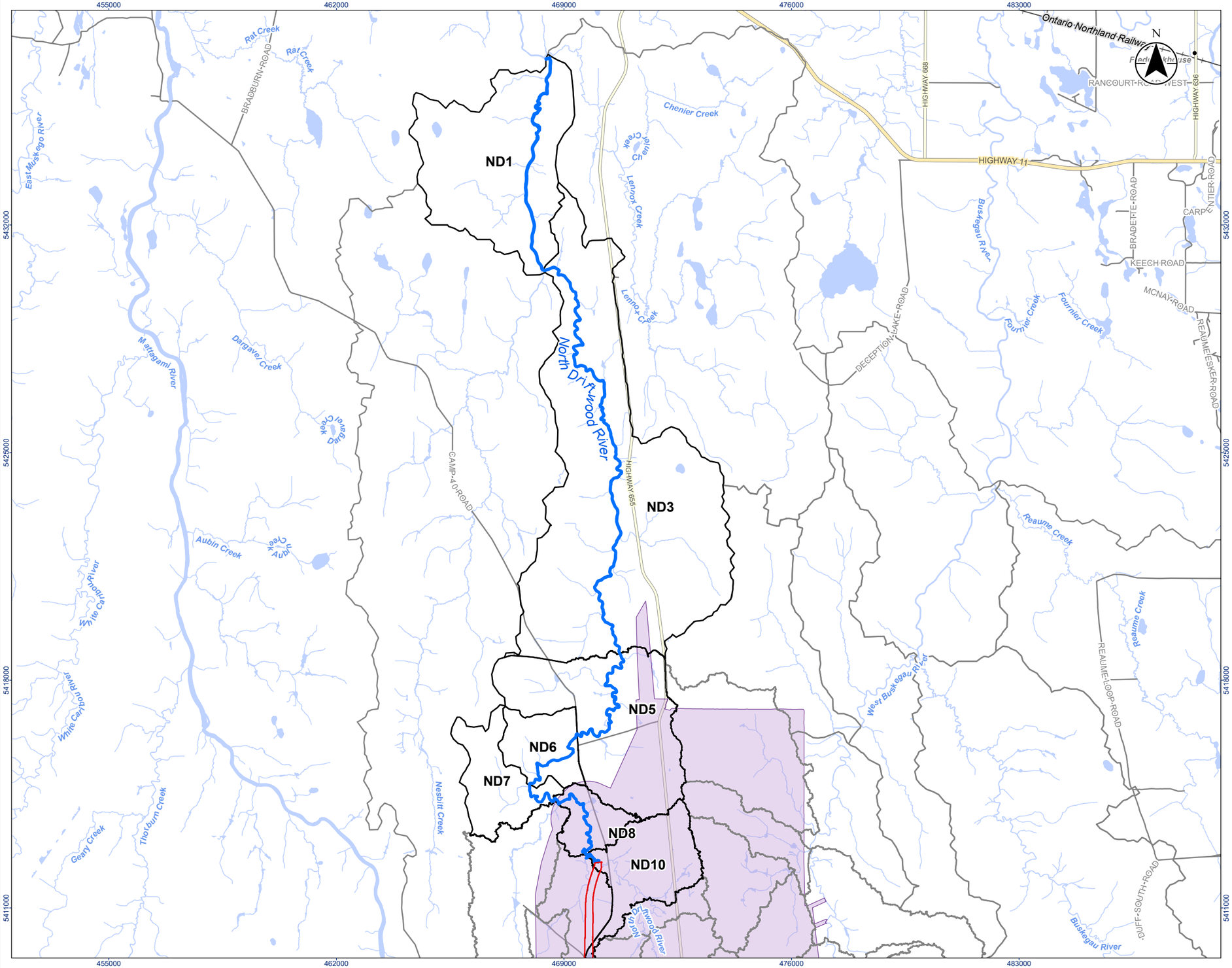
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
IP-01.2

Title
Wetland Habitat within the 1 m Groundwater Drawdown Contour for Year 31

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Stantec

Legend

- Diversion Channel Footprint
- North Driftwood River
- Project Area
- Watershed Boundary

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Watercourse
- Waterbody

0 2.5 5 km

1:120,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.



Project Location
Timmins, Ontario

160901195 REVA
Prepared by stomic on 2025-12-17

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
IP.01.3

Title
Sub-watersheds of the North Driftwood River Predicted to Experience Flow Changes >10% of Baseline Flows in Year 17 of Project Operations

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Crawford Nickel Project ("the Project")

Canada Nickel's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project
(Received May 30, 2025)

Surface Water Quality, where Changes May Affect Fish or Indigenous Peoples

December 24, 2025

CANADA NICKEL COMPANY

Stantec

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Attachment SW Qual-03 Surface Water Quality – Methylmercury Production
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Attachment SW Qual-05 Summary of Surface Water Analytical Data (2021 to 2024)

Abbreviations

Abbrevation	Full Term
CCME	Canadian Council of Ministers of the Environment
COPCs	contaminants of potential concern
CSQG-FAL	Canadian Sediment Quality Guidelines for the Protection of Freshwater Aquatic Life
CWQG-FAL	Canadian Water Quality Guidelines for Protection of Aquatic Life
FDP(s)	final discharge point(s)
ISQG	interim sediment quality guideline
Kidd Met	Kidd Metallurgical Site
LEL	lowest effect level
MAF	mean annual flow
MDMER	Metal and Diamond Mining Effluent Regulations
NEL	no effect level
PA	Project Area
PEL	probable effect level
PoPCs	Parameters of Potential Concern
PSQG	Ontario Provincial Sediment Quality Guidelines

Abbrevation	Full Term
PWQO	Provincial Water Quality Objectives
RDL	reportable detection limit
SEL	severe effect level
TSS	total suspended solids
U.S. DoT	United States Department of Transportation

Surface Water Quality, where Changes May Affect Fish or Indigenous Peoples

SW Qual-01 Surface Water Quality – Seepage

Comment Description (Context and Rationale):

The IS is predicting that a substantial daily volume of seepage (Table B.1.1.1 in Appendix B of Appendix C.5) will bypass the collection ditch system in the operations phase and be deposited directly to the surface waters of the West Buskegau River, North Driftwood River, Jocko Creek, and eight lakes. The eight lakes are currently used by Indigenous communities. In the Impact Assessment Report, IAAC will characterize residual adverse effects to fish and fish habitat and Indigenous peoples, including from potential changes to surface water quality. Greater confidence in the predicted quantity and quality of seepage to be released is necessary to understand changes to surface water quality and associated effects to fish and fish habitat and Indigenous peoples.

The locations selected for predicting surface water quality in the surface water quality model do not assess the potential effects of seepage at the seepage face, but instead assess effects of seepage downstream at the point of full mixing (in some cases the assessment nodes are kilometers away from the TMF, Impoundment Facility, ore stockpiles, and open pit). This is especially important given the close proximity of project facilities and the predicted volumes of seepage. For example, untreated seepage from the TMF is predicted to account for flow increases greater than 10% in the Jocko Creek watershed during low flow (7Q20) conditions in phase 2 operations.

IAAC notes that the IS uses Brownfield O.Reg. 153/04 Aquatic Protection Values (APVs) as the established water quality criteria for the assessment of water quality effects due to seepage. Brownfield's APVs are not appropriate for the assessment of groundwater discharges to surface water for this project (a greenfield site).

Comparison of seepage quality to appropriate guidelines is needed to understand potential effects to fish health, growth and survival, and to identify appropriate mitigation to manage effects to fish.

A Hazard Quotient (HQ) risk analysis completed by ECCC identified that, for the following elements and substances, the concentration at the seepage face (taken from seepage predictions in Table B.1.2.1 in Appendix B of Appendix C.5) would be higher than the water quality guidelines and that toxicity effects on aquatic life are likely:

- *Arsenic (As)*
- *Chloride (Cl)*
- *Chromium VI (Cr VI)*
- *Cobalt (Co)*

- *Copper (Cu)*
- *Nitrate-N (NO4)*
- *Nitrite-N (NO3)*
- *Selenium (Se)*
- *Uranium (U)*
- *Vanadium (V)*
- *Zinc (Zn)*

The IS states that seepage (and runoff) interception ditching will be in place, but no other mitigation measures are being proposed to limit seepage. IAAC and Federal Authorities are of the view that interception ditching alone will not be sufficient to manage seepage, and that opportunities to apply adaptive management in response to future monitoring results will be limited after construction. IAAC understands that the Ontario Ministry of Environment, Conservation and Parks will provide oversight to seepage monitoring through applicable provincial frameworks.

The Fisheries Act prohibits the deposit of all deleterious substances into waters frequented by fish unless authorized pursuant to, and in a manner consistent with, a Fisheries Act regulation or by a regulation under other federal legislation. The Fisheries Act makes no allowance for a mixing zone.

Reference to TISG and IS:

TISG: Section 8.6.2

IS: Chapter 3 – Section 3.3.5.2, Appendix C.5 – Appendix B: Table B.1.4, Table B.1.1.1, & Table B.1.2.1, Appendix C.5 – Appendix C: Appendix B, Appendix B.5 – Section 2.3.2,

Appendix C.4 – Sections 3.2.2, 3.3.2, 3.3.5 & 7.1

Required Information to Resolve Comment:

1) *After addressing the outstanding information requirements related to groundwater-surface water interactions, surface water flows, and geochemistry (GW-01(a-e), SW Quan- 01(a-d), SW Quan(a-b), GCH-01(a-e), GCH-02(a-d)), revise the assessment of changes to surface water quality from seepage from the TMF, Impoundment Facility, ore stockpiles, and open pit after its been filled with tailings at the seepage face (i.e., not when it is fully mixed with surface water) in the West Buskegau River, North Driftwood River, Jocko Creek, and eight lakes. To complete this assessment, directly compare seepage quality at the seepage face to Provincial Water Quality Objectives and Canadian Water Quality Guidelines for the Protection of Aquatic Life.*

2) *Provide updated maps showing the geographic extent of predicted seepage from the TMF, Impoundment Facility, ore stockpiles, and open pit after it has been filled with tailings over the life of the project.*

3) *Provide an assessment of potential effects to fish health, growth and survival as a result of the revised assessment.*

4) *Provide additional mitigation measures to prevent or reduce the effects of seepage from project components to the eight lakes listed in Table B.1.1.1 (Seepage Quantity at the Subwatershed Scale), Jocko Creek, the West Buskegau River, and the North Driftwood River. If adaptive water management measures are plausible to ensure changes to surface water quality from seepage are controlled within suitable limits, outline those measures at a conceptual level. If they are also expected to be incorporated into permitting regimes, describe how.*

Canada Nickel's Response:

1) *After addressing the outstanding information requirements related to groundwater-surface water interactions, surface water flows, and geochemistry (GW-01(a-e), SW Quan- 01(a-d), SW Quan(a-b), GCH-01(a-e), GCH-02(a-d)), revise the assessment of changes to surface water quality from seepage from the TMF, Impoundment Facility, ore stockpiles, and open pit after its been filled with tailings at the seepage face (i.e., not when it is fully mixed with surface water) in the West Buskegau River, North Driftwood River, Jocko Creek, and eight lakes. To complete this assessment, directly compare seepage quality at the seepage face to Provincial Water Quality Objectives and Canadian Water Quality Guidelines for the Protection of Aquatic Life.*

The comment requests a comparison of predicted seepage quality from the Project Area (PA) against Provincial Water Quality Objectives (PWQO) and Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG-FAL). We note that seepage is considered an effluent, as defined in the Metal and Diamond Mining Effluent Regulations (MDMER), Part 1, 1(1):

"*effluent means any of the following:*

(a) *hydrometallurgical facility effluent, milling facility effluent, mine water effluent, tailings impoundment area effluent, treatment pond effluent or treatment facility effluent other than effluent from a sewage treatment facility; or*

(b) *any seepage or surface runoff containing any deleterious substance that flows over, through or out of the site of a mine. (effluent)*"

Therefore, seepage quality should also be evaluated against the authorized concentrations for deleterious substances listed in Table 1 of Schedule 4 of the MDMER for new mines. This approach is consistent with the regulatory practice for effluent management and compliance assessment.

This requested seepage quality assessment, predicted seepage quality based on water quality model results (Impact Statement Appendix K; GCH-2d information request response) and existing groundwater quality assessment results (Impact Statement Appendix B.5 and C.4) has been evaluated against MDMER Schedule 4 Table 1 limits for applicable constituents, proposed effluent objectives developed in the supporting assimilative capacity assessment (Impact Statement Appendix C.5, Appendix C), PWQOs,

CCME CWQG-FAL and British Columbia Aquatic Life Guidelines for Sulphate using the following approach:

- Project Component Seepage mixed with Background Groundwater: Seepage flows were combined with background groundwater (Impact Statement Appendix B.5 and C.4) along the groundwater flowpaths within each sub-watershed presented in Table SW Qual-01.1 to derive flow-weighted concentrations at the seepage face. The seepage "face" is the seepage quality at the point of discharge to surface waters, but does not account for mixing or assimilation with surface waters. This approach presents a more accurate prediction of the seepage quality at the point of discharge to surface waters then the maximum concentrations presented in the Impact Statement in Table B.1.2.1. The following is a summary of the information sources for the
    - Project Seepage Quality: Average seepage concentrations were calculated for mine infrastructure seepage sources based on the upper-case (90^{th} percentile) water quality model predictions (Attachment SW-Qual-01) (Response to GCH-2d).
        - TMF seepage –90^{th} percentile value seepage quality (single water quality model output for the life of the mine).
        - Waste rock (impoundment facility) – Average 90^{th} percentile values from mine years 23 to 41 when the impoundment facility reaches its full size and capacity.
        - Pit lake – Average 90^{th} percentile value of pit lake for mine years 167 to 175 after feature is full. Prior to this time, when pit lake is forming groundwater will flow towards the pit complex and not be a source of groundwater seepage to local receivers.
        - Ore stockpiles – seepage from the ore stockpiles was not evaluated as a seepage source as piles are located within the predicted open pit drawdown cone and the pile locations will be removed and rehabilitated (Appendix B.5 in the Impacted Statement). Following ore removal and rehabilitation groundwater recharge from the stockpile areas would be transported to local receivers.
    - Project Seepage Flow Rate: The groundwater model outputs from the Groundwater technical data report (Appendix C.4 of the Impact Statement) for the Passive Closure scenario with a pit lake when seepage is expected from the TMF, tailings impounded in the pit lake and impoundment facility to local receivers with no draw down from the open pit complex.
    - Background Groundwater Quality: 75^{th} percentile baseline values (Appendix C.4 of the Impact Statement).
    - Background Groundwater Flow: Predicted total groundwater discharge to surface water features for individual subwatersheds (Appendix B.5 of the Impact Statement). Seepage flows were subtracted from total groundwater flow predicted for a receiver to estimate groundwater flow.

- The following equation was the used to estimate the seepage quality at the point of discharge to a local surface water receiver (i.e., watercourse reach within a subwatershed, waterbody).

$$Seepage\ Quality\ \left(\frac{mg}{L}\right) = Seepage\ Quality\ \left(\frac{mg}{L}\right) * \frac{Seepage\ Flow\ Rate\ \left(\frac{m^3}{d}\right)}{Total\ Groundwater\ Flow\ Rate\ \left(\frac{m^3}{d}\right)} +$$

$$Background\ Quality\ \left(\frac{mg}{L}\right) * \frac{Background\ Groundwater\ Flow\ Rate\left(\frac{m^3}{d}\right)}{Total\ Groundwater\ Flow\ Rate\ \left(\frac{m^3}{d}\right)}$$

where

Background Groundwater Flow Rate (m^3/d) = Total Groundwater Flow Rate (m^3/d) - Seepage Flow Rate (m3/d)

- Comparison with MDMER Schedule 4 Table 1 limits, Proposed Effluent Criteria, PWQO, CCME-CWQG-FAL and BC Aquatic Life Criteria for Sulphate: The resulting flow-weighted concentrations were compared against the respective regulations, criteria, objectives and guidelines.
- Spatial Coverage: This analysis was performed for subwatersheds adjacent to the PA that received PA seepage.

The prediction of the flow paths and discharge rate of seepage in groundwater from the TMF, Impoundment Facility, ore stockpiles, and open pit after it has been filled with tailings to surface water receptors is unchanged from that presented in Impact Statement Appendix C.4. Table 7.4 of Appendix C.4 presents the predicted fate of seepage from project infrastructure to surface water receivers when the open pit has been passively filled with groundwater in closure. Table 6.4 of Appendix C.4 presents the predicted total groundwater discharge to surface water for the same time period. A combination of the information from the two tables is presented in Table SW Qual-01.1 to provide a break down of the source of the discharge to each receiver. Unlike the tables in Appendix C.4, the information has been provided for each subwatershed that makes up the assessed portions of Jocko Creek, the North Driftwood River, and the West Buskegau River.

Table SW Qual-01.1 Source of Discharge to Surface Water Receivers After Filling of Open Pit

Surface Water Feature	Discharge to Receiver from Groundwater (% of Total)			
	From TMF	From Impoundment	From Tailings in Pit	From Background Groundwater
Jocko Creek JC2	0%	0%	0%	100%
Jocko Creek JC1	0%	0%	0%	100%
Jocko Creek JC_DS	0%	0%	0%	100%
North Driftwood River ND18	Feature recharges groundwater			

Surface Water Feature	Discharge to Receiver from Groundwater (% of Total)			
	From TMF	From Impoundment	From Tailings in Pit	From Background Groundwater
North Driftwood River ND20	Feature recharges groundwater			
North Driftwood River ND15	0%	0%	0%	100%
North Driftwood River ND11	0%	14%	0%	86%
North Driftwood River ND8	0%	29%	0%	71%
North Driftwood River ND7	0%	0%e	0%	100%
North Driftwood River ND6	0%	7%	0%	93%
North Driftwood River ND5	0%	34%	0%	66%
North Driftwood River ND3	0%	0%	0%	100%
West Buskegau River WB21	Feature recharges groundwater			
West Buskegau River WB19	0%	0%	0%	100%
West Buskegau River WB16	0%	0%	0%	100%
West Buskegau River WB14	0%	0%	0%	100%
West Buskegau River WB12	0%	0%	0%	100%
West Buskegau River WB9	0%	16%	0%	84%
West Buskegau River WB6	0%	46%	0%	54%
West Buskegau River WB5	0%	44%	0%	56%
West Buskegau River WB3	0%	3%	0%	97%
Unnamed Lake (South of Zed Lake)	18%	0%	0%	82%
Zed Lake	Feature recharges groundwater			
Mel Lake	5%	0%	0%	95%
Sutherland Lake	Feature recharges groundwater			
Jack Lake	0%	0%	0%	100%
Gerry Lake	8%	0%	0%	92%
Martin Lake	1%	0%	0%	99%
Unnamed Lake (West Stockpile)	4%	2%	7%	87%

Given seepage and groundwater discharge rates presented earlier, and using the step-by-step approach described at the beginning of this response, constituents' concentrations were identified at the seepage face when seepage from project components combined with background groundwater discharges to surface water features. The results of this assessment are summarized in Table SW Qual-01.2, which presents the calculated concentrations alongside the regulation limits, proposed effluent criteria and objectives and guidelines indicated above.

All seepage combined with groundwater discharge to local surface water receivers is lower than MDMER limits as per MDMER Schedule 4 Table 1 (Table SW Qual-01.2). Parameters predicted at point of discharge from groundwater to surface water (the seepage face) to exceed proposed effluent criteria include iron, phosphorus, chromium VI, uranium and nitrate (as nitrogen (N)).

Among these parameters, iron and phosphorus had concentrations at the seepage face (point of groundwater discharge to surface water) lower than the background groundwater concentration (as indicated by the 75th percentile concentrations). This implies that seepage quality has an improvement effect on groundwater discharge quality over existing background conditions.

Chromium VI concentrations at the seepage face ranged from below background existing groundwater discharge conditions to moderately above. Uranium concentrations at the seepage face were higher than the proposed effluent criteria of 15 µg/L only in sub-watershed WB6 with a concentration of 16 ug/L, which is 7% higher than the limit.

Regarding nitrate (as N) with concentrations higher than the proposed effluent criteria of 12 mg/L as N in sub-watersheds ND8 (14.1 mg/L as N), ND5 (16.7 mg/L as N), WB6 (22.2 mg/L as N) and WB5 (21.6 mg/L as N), it should be noted that values presented in the assessment results do not account for natural attenuation of nitrate along the flow path as seepage combined with groundwater moves along the groundwater flow path. Reductions in nitrate concentrations are expected due to dispersion, and biogeochemical processes such as denitrification, which convert nitrate to nitrogen gas under reducing conditions. The extent of concentration reduction depends on factors such as travel time, redox conditions, and organic carbon availability in the subsurface. Note that nitrate concentrations in groundwater, as indicated by baseline data, were below detection limits that ranged between 0.03 mg/L to 0.1 mg/L as N.

Table SW Qual-01.2 Seepage Concentrations at the Seepage Face in Different Sub-Watersheds (Based on 90th Percentile Seepage Quality)

Water Quality Parameter	Unit	MDMER	Proposed Effluent Criteria (Max. Daily Treatment Limit)	Guidelines		Background Groundwater Quality (75th)#	Surface Water Feature Seepage Face Quality in the North Driftwood River (ND11, ND8, ND7, ND6, ND5, ND3), in the West Buskegau River (WB9, WB6, WB5, WB3), and in Lakes													
		Grab Sample Max. conc.					ND11	ND8	ND7	ND6	ND5	ND3	WB9	WB6	WB5	WB3	Unnamed Lake (South of Zed Lake)	Mel Lake	Gerry Lake	Martin Lake	Unnamed Lake (West Stockpile)
Sulfate	mg/L	-	-	BC-MECCS	309[2]	5.3	46.9	92.2	6.5	27.0	107.8	6.4	51.8	141.7	137.7	14.0	55.1	17.9	26.9	17.9	29.0
Chloride	mg/L	-	-	CCME CWQG-FAL	120	3.8	26.9	52.0	4.5	15.9	60.7	4.4	29.6	79.5	77.3	8.7	53.9	16.5	25.6	16.5	21.1
Bromine	mg/L	-	-	-	N/A	0.1	1.5	3.1	0.2	0.9	3.6	0.2	1.7	4.7	4.6	0.4	0.4	0.2	0.3	0.2	0.6
Nitrite (as N)	mg/L	-	1	CCME CWQG-FAL	0.06	0.0	**0.1**	**0.1**	0.0	**0.1**	**0.1**	0.0	**0.1**	**0.2**	**0.2**	0.0	**0.1**	0.0	**0.1**	0.0	**0.1**
Nitrate-N	mg/L	-	12	CCME CWQG-FAL	3	0 (Assumed)	**6.8**	**14.1**	0.2	**3.5**	**16.7**	0.2	**7.6**	**22.2**	**21.6**	1.4	0.9	0.2	0.4	0.2	1.5
Ammonia, Un-ionized (Calculated)	mg/L	1	-	PWQO	0.02[3]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fluoride	mg/L	-	0.36	CCME CWQG-FAL	0.12	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.2**	**0.3**	**0.3**	**0.3**	**0.3**
Chromium III	µg/L	-	27	PWQO	8.9	0 (Assumed)	0.1	0.3	0.0	0.1	0.3	0.0	0.1	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.1
Chromium VI	µg/L	-	3	PWQO	1	**5.0**	**5**	**6**	**5**	**5**	**6**	**5**	**5**	**6**	**6**	**5**	**5**	**5**	**5**	**5**	**5**
Mercury	µg/L	-	-	CCME CWQG-FAL	0.026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aluminum, dissolved	µg/L	-	34	PWQO	75[4,~]	7.3	13.4	20.0	7.5	10.5	22.2	7.5	14.1	27.2	26.6	8.6	7.4	7.3	7.4	7.3	25.8
Silver	µg/L	-	-	PWQO	0.1	**0.21**	**0.18**	**0.15**	**0.20**	**0.19**	**0.13**	**0.20**	**0.17**	**0.11**	**0.11**	**0.20**	**0.17**	**0.20**	**0.19**	**0.20**	**0.22**
Arsenic	µg/L	200	15	Interim PWQO	5	**5.1**	4.8	4.4	**5.1**	4.9	4.3	**5.1**	4.7	4.0	4.1	5.0	4.4	4.9	4.8	4.9	4.8
Barium	µg/L	-	-	-	N/A	99.7	89.1	77.5	99.4	94.1	73.5	99.4	87.8	64.8	65.8	97.5	83.3	95.5	92.6	95.5	87.5
Beryllium	mg/L	-	-	PWQO	1.1 [5]	Not Available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boron	µg/L	-	600	PWQO	200	38.5	171.1	**315.4**	42.5	107.7	**365.1**	42.1	186.7	**473.2**	**460.6**	66.4	82.3	49.6	57.6	49.6	64.7
Bismuth	mg/L	-	-	-	N/A	Not Available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Calcium	µg/L	-	-	-	N/A	88,600	86163	83510	88527	87327	82595	88535	85876	80610	80841	88087	72930	84616	81780	84616	84533
Cadmium	µg/L	-	-	Interim PWQO	0.5[6]	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Cobalt	µg/L	-	3.6	Interim PWQO	0.9	0.6	0.7	0.9	0.6	0.6	0.9	0.6	0.7	**1.1**	**1.1**	0.6	0.6	0.6	0.6	0.6	0.6
Copper	µg/L	200	15	Interim PWQO	5[7]	2.1	**5.7**	**9.6**	2.2	4.0	**11.0**	2.2	**6.1**	**13.9**	**13.6**	2.9	1.9	2.1	2.0	2.1	2.6
Iron	µg/L	-	900	PWQO	300[~]	**4,450**	**3834**	**3163**	**4432**	**4128**	**2932**	**4433**	**3761**	**2430**	**2489**	**4320**	**3650**	**4247**	**4102**	**4247**	**3873**
Potassium	µg/L	-	-	-	N/A	3,680	6206	8955	3755	4999	9902	3748	6503	11960	11720	4212	3545	3646	3621	3646	4424
Lithium	µg/L	-	-	-	N/A	7.4	9.9	12.6	7.4	8.7	13.6	7.4	10.2	15.7	15.4	7.9	13.0	8.8	9.8	8.8	8.7
Magnesium	µg/L	-	-	-	N/A	27,500	38432	50333	27827	33210	54433	27793	39720	63340	62304	29802	55220	34547	39565	34547	38337
Manganese, dissolved	µg/L	-	-	-	N/A	165.0	165.6	166.4	165.0	165.3	166.6	165.0	165.7	167.1	167.1	165.1	147.8	160.6	157.5	160.6	149.5
Molybdenum	µg/L	-	-	Interim PWQO	40	11.2	18.4	26.3	11.4	15.0	29.0	11.4	19.3	34.9	34.2	12.7	14.3	12.0	12.5	12.0	12.6
Silicon	µg/L	-	-	-	N/A	10,200	8992	7678	10164	9569	7225	10168	8850	6241	6355	9946	8366	9734	9402	9734	8889
Sodium	µg/L	-	-	-	N/A	44,700	43032	41216	44650	43829	40590	44655	42835	39231	39389	44349	41424	43867	43274	43867	40721
Nickel	µg/L	500	75	PWQO	25	3.0	5.3	7.8	3.1	4.2	8.7	3.1	5.6	10.6	10.4	3.5	5.6	3.6	4.1	3.6	3.9
Lead	µg/L	160	-	Interim PWQO	5[8]	0.1	0.4	0.8	0.1	0.3	0.9	0.1	0.5	1.1	1.1	0.2	0.1	0.1	0.1	0.1	0.2
Antimony	µg/L	-	-	Interim PWQO	20	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1.0	0.6	0.7	0.6	1.2
Selenium	µg/L	-	3	CCME CWQG-FAL	1	0.4	0.8	**1.3**	0.4	0.6	**1.5**	0.4	0.9	**1.8**	**1.8**	0.5	0.8	0.5	0.6	0.5	0.5
Tin	µg/L	-	-	-	N/A	0.6	1.6	2.8	0.6	1.1	3.2	0.6	1.7	4.0	3.9	0.8	0.7	0.6	0.6	0.6	1.0
Strontium	µg/L	-	-	-	N/A	452	429	404	451	440	395	451	426	377	379	447	372	432	417	432	400

Water Quality Parameter	Unit	MDMER	Proposed Effluent Criteria (Max. Daily Treatment Limit)	Guidelines		Background Groundwater Quality (75th)#	Surface Water Feature Seepage Face Quality in the North Driftwood River (ND11, ND8, ND7, ND6, ND5, ND3), in the West Buskegau River (WB9, WB6, WB5, WB3), and in Lakes													
		Grab Sample Max. conc.					ND11	ND8	ND7	ND6	ND5	ND3	WB9	WB6	WB5	WB3	Unnamed Lake (South of Zed Lake)	Mel Lake	Gerry Lake	Martin Lake	Unnamed Lake (West Stockpile)
Titanium	µg/L	-	-	-	N/A	3.4	4.5	5.7	3.4	4.0	6.1	3.4	4.6	7.0	6.9	3.6	2.8	3.2	3.1	3.2	3.2
Thallium	mg/L	-	-	Interim PWQO	0.0003	Not Available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Uranium	µg/L	-	15	Interim PWQO	5	1.2	**5.6**	**10.3**	1.3	3.5	**12.0**	1.3	**6.1**	**15.6**	**15.2**	2.1	1.0	1.1	1.1	1.1	2.0
Vanadium	µg/L	-	18	Interim PWQO	6	2.2	**6.8**	**11.8**	2.3	4.6	**13.5**	2.3	**7.3**	**17.2**	**16.8**	3.2	1.9	2.1	2.1	2.1	2.7
Tungsten	µg/L	-	-	PWQO	30	0.9	2.7	4.6	0.9	1.8	5.3	0.9	2.9	6.8	6.6	1.3	2.1	1.2	1.4	1.2	1.3
Yttrium	mg/L	-	-	-	N/A	Not Available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zinc	µg/L	800	60	Interim PWQO	20	**26.3**	**29.6**	**33.2**	**26.4**	**28.0**	**34.5**	**26.4**	**30.0**	**37.2**	**36.9**	**27.0**	**21.9**	**25.2**	**24.4**	**25.2**	**25.3**
Phosphorus	µg/L	-	90	PWQO	30[9,~]	**142**	**123**	**101**	**141**	**132**	**94**	**141**	**120**	**78**	**80**	**138**	**120**	**136**	**132**	**136**	**124**

Notes:

Bold	Concentration is higher than applicable guidelines
CCME CWQG-FAL	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Long Term
PWQO	Provincial Water Quality Objective
BC-MECCS	British Columbia Ministry of Environment and Climate Change Strategy for the protection of aquatic life
(1)	PWQO, BC-MECCS or CCME CWQG-FAL
(2)	128 mg/L if hardness is less than 30 mg/L, 218 mg/L if hardness is between 31 and 75 mg/L, 309 mg/L if hardness is between 76 and 180 mg/L, and 429 mg/L if hardness is larger than 181 mg/L
(3)	Un-ionized ammonia was estimated based on total ammonia and assumed pH of 7.5 and temperature of 17 oC
(4)	PWQO (clay-free samples): 15 ug/L for 4.5<pH<5.5 and 75 ug/L for 6.5<pH<9
(5)	PWQO: 11 ug/L if hardness is less than 75 mg/L, and 1,100 ug/L if hardness is larger than 75 mg/L
(6)	PWQO Interim: 0.1 ug/L if hardness is less than 100 mg/L, and 0.5 ug/L if hardness is larger than 100 mg/L
(7)	PWQO Interim: 1 ug/L if hardness is between 0 and 20 mg/L, and 5 ug/L if hardness is larger than 20 mg/L
(8)	PWQO Interim: 1 ug/L if hardness is less than 30 mg/L, 3 ug/L if hardness is between 30 and 80 mg/L, and 5 ug/L if hardness is larger than 80 mg/L
(9)	PWQO: value of 30 ug/L when FDP drains into streams
N/A	Not-applicable
~	75th percentile receiver concentration is above PWQO value
#	75th percentile concentration was used to represent groundwater quality. Below RDL concentrations were replaced with half RDL
Not Available	Value not available
-	Not recorded

2) *Provide updated maps showing the geographic extent of predicted seepage from the TMF, Impoundment Facility, ore stockpiles, and open pit after it has been filled with tailings over the life of the project.*

The requested figure showing the geographic extent of predicted seepage was previously provided in Chapter 14 of the Impact Statement (Figure 14.8). Based on the responses to the GW-01 information requests, there are no predicted changes to the geographic extents of seepage presented in the Impact Statement. For completeness, this figure is attached to the response document (Attachment SW Qual-02). The figure illustrates the extent of seepage during the post-closure phase, when the open pits will be filled with tailings and water. This representation is consistent with the response provided in Section 1, which assumes the pit is filled with water as part of the closure strategy.

3) *Provide an assessment of potential effects to fish health, growth and survival as a result of the revised assessment.*

Table SW Qual-01.2 provides a comparison of seepage face water quality (the average concentration from the 90th percentile of modeled data from years 23 to 41 of the Project) at locations in the North Driftwood River, the West Buskegau River, and evaluated lakes to various benchmarks, including the MDMER, surface water quality guidelines (PWQOs, CCME-CWQG-FAL, and BC Aquatic Life Criteria), and background groundwater quality. As summarized below, a review of the data in Table SW Qual-01.2 determined that effects to fish health, growth and survival from exposure to seepage at the seepage face are not expected.

1. For parameters with a proposed MDMER limit (i.e., un-ionized ammonia, arsenic, copper, nickel, lead, zinc), predicted seepage concentrations meet these regulations.
2. The background (existing) concentrations of arsenic, fluoride, chromium VI, silver, iron, and zinc as reported in Table SW Qual-01.2 are greater than applied surface water quality guidelines (PWQOs or CCME-CWQG-FAL). The addition of seepage to groundwater does not substantively change the concentrations of these parameters in groundwater from their background (existing) concentrations. For example:
    - Fluoride: CCME-CWQG-FAL = 0.12 mg/L; existing groundwater (75th percentile) = 0.3 mg/L; highest predicted concentration at the 15 modeled seepage faces in the LAA = 0.3 mg/L.
    - Chromium VI: PWQO = 1.0 µg/L; existing groundwater (75th percentile) = 5.0 µg/L; highest predicted concentration at the 15 modeled seepage faces in the LAA = 5.8 µg/L.

    Therefore, for these parameters (including arsenic and zinc which also do not exceed the MDMER), seepage is expected to have a negligible effect on groundwater quality compared to pre-existing background conditions. As such changes to fish health, growth and survival

relative to background are not expected as a result of seepage of arsenic, fluoride, chromium VI, silver, iron, and zinc from the Project.

3. For nitrite (as N), nitrate-N, boron, cobalt, selenium, uranium, vanadium, and phosphorus, the addition of seepage to groundwater is predicted to result in concentrations greater than applied surface water quality guidelines (PWQOs or CCME-CWQG-FAL). The maximum modeled concentrations of these parameters in seepage ranged from 1.1 to 7.4 times the applied surface water quality guidelines. However, with the exception of phosphorus, these guideline exceedances were not consistently predicted for all 15 of the modeled seepage faces. For example, exceedances of PWQOs or CCME-CWQG-FAL other than for phosphorus are not predicted at: North Driftwood River ND11, ND3, West Buskegau River WB3, Mel Lake, Gerry Lake or Martin Lake.

   Furthermore, PWQOs and CCME-CWQG-FAL are designed to protect aquatic life during indefinite exposure to chemicals in surface water. Indefinite exposure to groundwater at the seepage face by fish is not likely because the seepage face does not constitute habitat for fish. Therefore, exposure of fish to maximum modelled seepage concentrations will be limited both spatially and temporally. As such, effects to fish health, growth and survival at the community level are not expected as a result of seepage of nitrite (as N), nitrate-N, boron, cobalt, selenium, uranium, vanadium, and phosphorus from the Project.

4. For the remaining parameters (sulfate, chloride, bromine, chromium III, mercury, barium, beryllium, bismuth, calcium, cadmium, potassium, lithium, magnesium, manganese, molybdenum, silicon, sodium, antimony, tin, strontium, titanium, thallium, tungsten, and yttrium), adding seepage to groundwater does not result in predicted concentrations to exceed the applied surface water quality guidelines (PWQOs, CCME-CWQG-FAL, and BC Aquatic Life Criteria) or these parameters do not have applicable guidelines for comparison. As such, effects to fish health, growth and survival are not expected as a result of seepage of sulfate, chloride, bromine, chromium III, mercury, barium, beryllium, bismuth, calcium, cadmium, potassium, lithium, magnesium, manganese, molybdenum, silicon, sodium, antimony, tin, strontium, titanium, thallium, tungsten, and yttrium from the Project.

As noted in Chapter 21 of the Impact Statement (Health), Canada Nickel will monitor surface water quality at key Project locations during construction, operations, decommissioning and closure, and fish tissue samples will be monitored in comparison to the provincial and federal guidelines for arsenic, mercury, and methylmercury for the protection of human health and wildlife consumers of aquatic biota.

4) *Provide additional mitigation measures to prevent or reduce the effects of seepage from project components to the eight lakes listed in Table B.1.1.1 (Seepage Quantity at the Subwatershed Scale), Jocko Creek, the West Buskegau River, and the North Driftwood River. If adaptive water management measures are plausible to ensure changes to surface water quality from seepage are controlled within suitable limits, outline those measures at a conceptual level. If they are also expected to be incorporated into permitting regimes, describe how.*

In alignment with the response to the information request GW-01, the following adaptive management measures are proposed. A groundwater monitoring and management plan for the Crawford Nickel Project will be developed prior to construction and will include an adaptive management component with trigger thresholds to alert to changing conditions prior to a significant environmental effect. Trigger thresholds will be staged to allow an early indicator system so that changes in data could be appropriately followed, monitored, and acted upon, as necessary. Groundwater monitoring wells will be placed around the open pit, impoundment facility, ore piles, TMF and other mine infrastructure to validate the seepage pathways from Project infrastructure and expected changes in groundwater quality concentrations. If the change in groundwater flow pathway or change to groundwater quality is trending differently or larger than predicted at a trigger monitoring location then a subsequent investigation will be completed to understand the cause. A similar surface water monitoring and management plan will be developed to include stream flow and lake level monitoring, and water quality monitoring with associated trigger thresholds, including to identify if a water quality change to a local receiver is potentially due to groundwater seepage. If the change in surface water quality is predicted to be larger than predicted, then as per the groundwater monitoring program an investigation would be triggered. Monitoring programs with adaptive management will be incorporated into permit requirements for the Mine (i.e., Ontario Ministry of Environment, Conservation and Parks (MECP), permits to take water (PTTWS), industrial sewage works (ISW) environmental compliance approvals (ECAs)).

Canada Nickel is committed to implementing technically and economically feasible mitigation measures if monitoring indicates that specified levels of environmental change have been reached or exceeded as a result of Mine development or operation. As noted in Chapter 14 of the Impact Statement, the following measures are proposed to limit groundwater inflow into the Open Pit and other site infrastructure to reduce the Project's effect on groundwater seepage and thus on groundwater-surface water interactions:

- Where trenches extend below the water table and there are risks to the surrounding environment (draining effect), Canada Nickel will limit the seepage by lining trenches with a low permeability soil layer (silt and clay) and apply best management practices to reduce water infiltration, if needed.
- Canada Nickel will design the seepage collection ditches to intercept shallow groundwater seepage from the Tailings Management Facility, ore Stockpiles and Impoundment Facility.
- Canada Nickel will develop and implement a Metal Leaching and Acid Rock Drainage Management Plan (Appendix L of the Impact Statement; Updated version developed to support the GHC-01e-2 response) to reduce and limit the known and potential risks of ML/ARD associated with the Project, thereby reducing potential effects to water quality.

Additional mitigation measures that may be implemented during construction or operation of the Mine, if deemed appropriate, to mitigate effects on seepage quality may also include:

- Installation of a groundwater cutoff walls or interceptor well systems to capture impacted groundwater and recycle it to water management infrastructure for treatment, alternatively installation of permeable reactive barrier systems to improve seepage quality prior to discharge to receivers

During closure, if deemed appropriate, measures to mitigate effects on seepage quality may include:

- Conversion of mine infrastructure (e.g., TMF, impoundment facility) perimeter seepage collection ditches into permeable reactive barriers or other passive treatment system.
- Conversion of mine infrastructure (e.g., TMF, impoundment facility) perimeter seepage collection ditches perimeter seepage collection ditches into French drains with a permeable reactive barrier or other passive treatment conveyance system to passively intercept and convey site water to a passive treatment system constructed within existing sedimentation pond footprints.

SW Qual-02 Surface Water Quality – Effluent Mixing

Comment Description (Context and Rationale):

In the IA Report, IAAC will characterize the geographic extent of effects on fish and fish habitat and Indigenous peoples, and the extent of significance of effects, including from changes to surface water quality in the rivers downstream of planned effluent discharge points. In the analysis, IAAC will rely on oversight by the Province of Ontario to manage effluent mixing and will report on predicted residual federal effects using available information. Ideally, advice to the federal impact assessment decision-makers will be based on coarse project designs that are conceptually feasible and unlikely to change drastically through the permitting process.

The IS presents potential effluent mixing zones of up to 87 km in the North Driftwood River and 40 km in the West Buskegau River (under the regulatory scenario). It also presents conceptual plans for effluent treatment and reasons the larger Mattagami River was not selected for effluent discharge.

Based on the information in the IS and comments received, IAAC is not clear that the project effluent, as designed and presented, is consistent with provincial policies that would enable the issuance of a provincial Environmental Compliance Approval for Industrial Sewage. However, IAAC anticipates that with improvements to the effluent modelling (without additional data collection), and potential adaptations in effluent treatment plans, predictions can be refined to support a more likely effects scenario and build confidence with current conceptual project design.

The following observations were made about the approach to determining the influence of planned effluent discharge on surface water quality in rivers (Appendix C of Appendix C.5), which IAAC understands may influence predictions of the downstream extent of water quality changes (either by over-estimating or under-estimating):

- *When mixing zones extended past the 200 m limit of the selected effluent mixing model, mass balance assessment was implemented. The use of the mass balance/pourpoints to estimate the length of the mixing zone does not necessarily represent the actual distance downstream of the final discharge points (FDPs) required for most Parameters of Potential Concern (PoPC) to meet the applicable regulatory criteria or background concentrations.*
- *Each final discharge point (FDP) effluent discharge flow is compared to the corresponding receiver flow at that specific pourpoint; whereas, at the downstream FDP in each river, the total effluent flow from both FDPs should be compared to the receiver flow at that specific pourpoint. In addition, the receiver flow calculations include seepage flows. The downstream changes due to parameter of potential concern (POPC) loading are not discussed.*
- *Effluent flow is greater than receiver flow for the following models: West Buskegau River 7Q20 downstream, North Driftwood 7Q20 upstream, North Driftwood 7Q20 downstream, and North Driftwood Normal upstream. IAAC understands that for provincial permitting a minimum receiver flow requirement would need to be established which would influence predicted changes to surface water quality in rivers, but may also influence mine operations in a way that needs to be considered in planning and conceptual design.*

- *CORMIX mixing zone model inputs were not clearly identified, including background water quality in the West Buskegau and North Driftwood Rivers and the proposed effluent criteria at all discharge points (including if they differ).*
- *The IS indicates that Mine Water Effluent Treated Daily Maximum Concentration in Table 5.3 (Appendix C in Appendix C.5) were used to determine the extent of the mixing zone under the regulatory scenario. However, the proposed extent of the mixing zone (for certain PoPCs) does not seem to reflect the proposed maximum concentrations used in the Assimilative Capacity Study.*
- *Climate change adjusted climate normal discharge from the FDPs were used to determine potential effects ofnormal conditions on mixing zone extent, but not for the worst-case regulatory scenario.*

MECP has advised IAAC that, based on the information provided in the IS, the potential geographic extent of the effluent mixing zones is unclear. At the provincial permitting stage, receiver-based effluent limits that are protective of the environment will need to be developed in accordance with provincial policies, before approvals are issued. Mine effluent mixing zones usually range from near instantaneous mixing to several hundred meters downstream of the FDP. Based on the estimated mixing zone lengths provided in the IS, the treatment and proposed effluent discharge limits may need to be re-evaluated.

Reference to TISG and IS:

TISG: Section 8.6.2

IS: Appendix C.5 – Appendix C

Required Information to Resolve Comment:

1) *Re-evaluate, in consultation with MECP, the geographic extent of the conceptual effluent mixing under the regulatory scenario.*

2) *Discuss the level of confidence that the current project design will result in an effluent mixing scenario that can feasibly align with provincial policies that support issuance of an Environmental Compliance Approval for Industrial Sewage. The assessment should consider, where appropriate, updated modelling, additional effluent treatments, updated discharge parameters, or any other means necessary to improve predictions.*

3) *Provide a map of the updated conceptual predicted geographic extent of surface water quality changes caused by effluent mixing under the worse-case regulatory scenario.*

4) *If adaptive water management measures are plausible to ensure changes to surface water quality from planned effluent are controlled within suitable limits, outline those measures at a conceptual level. If they are also expected to be incorporated into permitting regimes, describe how.*

Canada Nickel's Response:

1) *Re-evaluate, in consultation with MECP, the geographic extent of the conceptual effluent mixing under the regulatory scenario.*

See Attachment SW Qual-02.1, which provides a comprehensive response to this comment.

2) *Discuss the level of confidence that the current project design will result in an effluent mixing scenario that can feasibly align with provincial policies that support issuance of an Environmental Compliance Approval for Industrial Sewage. The assessment should consider, where appropriate, updated modelling, additional effluent treatments, updated discharge parameters, or any other means necessary to improve predictions.*

See Attachment SW Qual-02.1, which provides a comprehensive response to this comment.

3) *Provide a map of the updated conceptual predicted geographic extent of surface water quality changes caused by effluent mixing under the worse-case regulatory scenario.*

See Attachment SW Qual-02.1, which presents the updates geographic extent of mixing zones identified through mass balance analysis under the worst-case regulatory scenario, including map figures.

4) *If adaptive water management measures are plausible to ensure changes to surface water quality from planned effluent are controlled within suitable limits, outline those measures at a conceptual level. If they are also expected to be incorporated into permitting regimes, describe how.*

See Attachment SW Qual-02.1, which provides a comprehensive response to this comment.

SW Qual-03 Methylmercury Production

Comment Description (Context and Rationale):

During a technical working group meeting an Indigenous community raised concerns about the potential for effluent- induced methylmercury production in downstream rivers. Canada Nickel advised it would be addressed in the IS. The IS discusses methylmercury production that can arise from flooding organic soil, but not from effluent, and proposed a follow-up program to monitor methylmercury in fish tissue. Under anoxic conditions, sulphate from effluent can be used by sulphate-reducing bacteria to enhance methyl mercury production. Methylmercury can bioaccumulate in country foods consumed by Indigenous peoples.

In the IA Report, IAAC will characterize potential effects on the health of Indigenous peoples and their traditional practices. In the analysis, IAAC will take into account oversight by the Province of Ontario to manage effluent. IAAC is aware that mine proponents typically work with the Province of Ontario to establish effluent limits where appropriate, during the permitting phase. MECP made several comments regarding effluent-induced methylmercury production in downstream rivers in its submissions to IAAC.

The following observations were made in the IS:

- *The IS states that mercury is not anticipated to increase as a result of mining operations. Although there will be an increase in mercury concentrations in the receivers after full mixing, the concentration of total mercury in the North Driftwood River and the West Buskegau River would be below Canadian Water Quality Guidelines for the Protection of Aquatic Life.*
- *Chapter 15 states that the maximum average FDP total phosphorus discharge concentration and maximum average total phosphorus concentration at the point of complete mixing in the receiver in both the West Buskegau River and North Driftwood River are predicted to be below the Provincial Water Quality Objectives (PWQO) value. However, this is not true for the predicted results under regulatory conditions shown in Appendix C.5 Table 7.2 and Table 7.3, where phosphorus levels exceeding the PWQO extend downstream of the confluence with the Frederick House River and Abitibi River. It is unclear if phosphorus concentrations under regulatory conditions were considered in predictions of eutrophication. Eutrophication can lead to anoxic conditions that support methylation.*
- *The IS acknowledges that the average total inorganic nitrogen discharge via FDPs into the North Driftwood River would be expected to increase the potential for eutrophication in the watercourse segment from FDP-TMF-SP to up to 3.6km downstream of FDP-SP-02. It is unclear what mitigation measures will be considered to manage this.*
- *The proposed mine effluent limits in Table 6.16 of Appendix C.5 do not include sulphate. The high predicted sulphate concentrations in the treated mine effluent reveal that even after full mixing, the concentration of sulphate in receivers will be 4 to 15 times higher than baseline.*

Reference to TISG and IS:

TISG: Section 8.6.2

IS: Appendix C.5 – Table 6.16, Table 5.4, Table 7.2 & Table 7.3, Chapter 15 – Section 15.4.3.3.1 & Table 15.7

Required Information to Resolve Comment:

1) *Provide an assessment of the potential for methylmercury production in the North Driftwood River and West Buskegau River. The assessment should include the potential for anoxic conditions from the discharge of phosphorus and total inorganic nitrogen and increased concentrations of sulphates from both seepage and treated effluent under normal and regulatory conditions.*

2) *Confirm intentions to discuss appropriate effluent targets with MECP during permitting, as necessary, to manage the potential for methylmercury production, taking into account input from Indigenous communities.*

Canada Nickel's Response:

1) *Provide an assessment of the potential for methylmercury production in the North Driftwood River and West Buskegau River. The assessment should include the potential for anoxic conditions from the discharge of phosphorus and total inorganic nitrogen and increased concentrations of sulphates from both seepage and treated effluent under normal and regulatory conditions.*

NTD – The SW Qual-03: Surface Water Quality – Methlymercury Production will be provided under separate cover.

5) *Confirm intentions to discuss appropriate effluent targets with MECP during permitting, as necessary, to manage the potential for methylmercury production, taking into account input from Indigenous communities.*

NTD – The SW Qual-03: Surface Water Quality – Methlymercury Production will be provided under separate cover.

SW Qual-04 Sediment Contamination

Comment Description (Context and Rationale):

Information remains outstanding about sediment-bound contaminants of potential concern (COPCs), which could act as ongoing sources of contamination for fish. Understanding what partition coefficients were used in the water quality modelling, and why, will support refined predictions about how COPCs will behave (how they will separate, settle, and move) in the on-site collection ponds and in the receiving environment's water and sediment downstream of effluent. Some of these COPCs such as Cr(VI) also have the potential to bioaccumulate in fish consumed as country foods. This will help refine predictions of any effects to fish and impacts to Indigenous health.

Section 3.3 of Appendix K (Water Quality Assessment) includes data on metal sorption to total suspended solids (TSS), but the text and table legends in the Impact Statement lack clarity on how this information is incorporated into the water quality model. According to the IS, "The difference in total and dissolved concentration generated by this range of assumed TSS values (10 mg/L, 15 mg/L, and 30 mg/L) are shown in Table 3-6. These values are added to dissolved concentrations predicted for collection pond discharge to produce the total metal concentrations." However, in Section 4, the predicted concentrations presented in Tables 4-1 to 4-8 (water quality results in collection ponds and pit, compared against criteria) and associated figures appear to reflect dissolved concentrations, raising uncertainty about whether these predictions account for total concentrations. While Section 4 of Appendix K notes that water quality model predictions are "presented as" dissolved concentrations it also says that the influence of TSS is incorporated into water quality model results.

Additionally, the text does not specify the partition coefficients used to calculate the particulate fraction for metals, nor does it provide information on suspended solids and settling rates for particles used to predict sediment accumulation of COPCs. Without this information, it is difficult to evaluate whether the model conservatively predicts metal partitioning, sediment accumulation, and settling dynamics in mine site water ponds. The exclusion of Cr(VI) from Table 3-6 is also unexplained, leaving a gap in the understanding of how significant contaminants are accounted for in the surface water model.

Predictions of sediment contamination in the receiving environment and downstream areas during construction, operation, closure, and post-closure are absent.

Reference to TISG and IS:

TISG: Section 8.3.2

IS: Appendix K – Section 3 & Section 4

Required Information to Resolve Comment:

1) *Provide the partition coefficients used for each element presented in Table 3.6 (the Suspended Solid Composition and Contributions to Total Concentrations) and justify their conservativeness. Explain why Cr(VI) is not included in Table 3.6 or provide the information for Cr(VI).*

2) *Clarify water quality predictions by confirming whether the predictions presented in the tables and figures of Section 4 represent total concentrations or dissolved concentrations. If the predictions are dissolved concentrations, explain how the consideration of particulate metal settling ensures a conservative approach. If they are not conservative estimates, update the water quality predictions using total concentration and the comparison against the criteria.*

3) *Provide the following details on sediment accumulation predictions:*

    - *information on suspended solids;*
    - *the partitioning coefficients of COPCs; and*
    - *settling rates for particles used to predict sediment accumulation of COPCs.*

4) *Provide an assessment of predicted sediment contamination in the receiving environment of the project and downstream during construction, operation, closure, and post-closure. Based on the predictions, verify the selection of mitigation measures for:*

    - *effluent (e.g., stand-by modular treatment);*
    - *tailings; and*
    - *potentially acid-generating waste rock.*

Canada Nickel's Response:

1) *Provide the partition coefficients used for each element presented in Table 3.6 (the Suspended Solid Composition and Contributions to Total Concentrations) and justify their conservativeness. Explain why Cr(VI) is not included in Table 3.6 or provide the information for Cr(VI).*

See Attachment SW Qual-04, which provides a comprehensive response to this comment.

2) *Clarify water quality predictions by confirming whether the predictions presented in the tables and figures of Section 4 represent total concentrations or dissolved concentrations. If the predictions are dissolved concentrations, explain how the consideration of particulate metal settling ensures a conservative approach. If they are not conservative estimates, update the water quality predictions using total concentration and the comparison against the criteria.*

See Attachment SW Qual-04, which provides a comprehensive response to this comment.

3) Provide the following details on sediment accumulation predictions:

- *information on suspended solids;*
- *the partitioning coefficients of COPCs; and*
- *settling rates for particles used to predict sediment accumulation of COPCs.*

To address questions regarding sediment-bound contaminants of potential concern (COPCs) in receiving streams, an analysis was conducted focused on predicting sediment accumulation and associated COPC concentrations under different effluent discharge management scenarios. This assessment evaluates the accumulation thickness of sediment deposition in the receiving streams (i.e., the West Buskegau River and the North Driftwood River) and estimates COPC concentrations based on partitioning behavior determined through geochemical analysis described in the response to SW Qual-04.1. The approach integrates suspended solids loading, contaminant partitioning coefficients, and particle settling dynamics to characterize potential sources of contamination for aquatic biota, including fish.

The assessment proceeds in two stages. First, sediment accumulation depth is estimated in the receiving environment by applying particle settling rates in conjunction with predicted suspended solids loading due to effluent discharge. This step establishes the physical basis for potential contaminant retention within depositional zones. Second, the sediment accumulation predictions are combined with COPC concentrations derived from partitioning coefficients obtained through geochemical analysis. This integrated approach allows us to identify parameters that may exceed applicable sediment quality guidelines.

Sediment Accumulation

The distance sediment particles discharged from the final discharge points (FDPs) could travel downstream within the receiver watercourse was estimated based on the settling velocity of discharge particles using Stoke's Law, depth of the receiver channel at each FDP and water velocity within the receiver. The Stoke's Law settling velocity equation

$$V_s = \frac{g}{18\mu}(S.G.-1) * D^2$$

where Vs is spherical particle terminal settling velocity (cm/s), g is gravity acceleration constant (981 cm/s^2), μ is kinematic viscosity of water (0.0179 cm^2/s, assumed 0°C, [Hwang & Houghtalen 1996]), S.G. is specific gravity set at 2.7 as per the assumption in Stokes' equation (BC MELP 1996), and D is diameter (0.0005 cm as 20-30% of soil samples had clay with particle size of 0.0005 cm (Ausenco 2024)). The smaller clay particle size was assumed for this assessment as they have lower velocities and will take longer to settle within the receiver. It is expected during operation that the sedimentation ponds with their design retention times in combination with the abundance of clay at the site that the particle size distribution of the sediment that leaves the ponds to the modular treatment plants and is eventually discharged is small with larger particles more consistently treated and removed. This relationship assumes particles are spherical, small enough for laminar flow, and that turbulence and flocculation effects are minimal. Given values for inputs of the equation, the Vs was calculated at 0.0013 cm/s.

The depth of the receiving watercourses at each FDP was estimated using channel geometry measurements (Stantec 2024a) and fish habitat surveys (Stantec 2024b), focusing on shallower riffle features that represent critical habitat zones. Water velocities were derived from mean annual flow (MAF) estimates for each receiver (Stantec 2024a) and the average FDP discharge rate from the water balance model (Ausenco 2024). An average receiver flow and discharge condition was used for this assessment to align with normal operating conditions assessed in the Human Health and Ecological Risk Assessment and Fish and Fish Habitat assessments for discharges from the Project to provide representative and protective receiver concentrations. Annual average accumulation/loads were determined for this normal condition scenario. Analyses were conducted for two effluent discharge scenarios including 1-to-1 (monthly average receiver to effluent flow rates are equal to each other) and pre-&-post (monthly average discharge rate is established so that when combined with the post-development flow the total flow in the receiver matches the receiver pre-development flow rate downstream of the Project Area) to capture potential changes in sediment deposition under potential discharge options. See response to SW Qual-02 for additional details on the discharge flow control rates for the two scenarios.

The average travel distance for particles were estimated using the following equation:

$$Travel\ distance\ (km) = \frac{Settling\ Time\ (hr) * Channel\ velocity\ \left(\frac{m}{s}\right) * 3600\,\frac{s}{hr}}{1000\,\frac{m}{km}}$$

where

$$Settling\ Time\ (hr)\ = \frac{Water\ depth\ in\ channel\ (m)}{V_s\ (\frac{m}{s})} * 60\,\frac{min}{hr} * 60\ \frac{s}{min}$$

The sedimentation area was estimated based on the average bottom width of the West Buskegau River and the North Driftwood River for the MAF using monitoring station rating curve results (Appendix C.5 in the Impact Statement) in the vicinity of the FDPs (8 m and 3.5 m, respectively), and the predicted length of the sedimentation zone. Sediment loads for the FDPs were calculated using average FDP flows and the target objective 10 mg/L total suspended solids (TSS) concentration for the FDPs. The target objective of 10 mg/L was used as it is expected on an annual basis the sedimentation ponds and modular treatment systems will meet or perform better than this discharge concentration and this represents the normal/average condition. For receivers, sediment loads were calculated based on MAFs and the average baseline TSS concentrations for the receivers to represent the normal condition.

To estimate the annual thickness of sediment deposited within each sedimentation area the following equation was used:

$$Annual\ Sedimentation\ Depth\ (m) = \frac{\frac{Annual\ TSS\ Load\ \left(\frac{kg}{year}\right)}{Density\ (\frac{kg}{m^3})}}{(Sedimentation\ Area\ (m^2)}$$

Densities for sediments from each pond to estimate were estimated based on literature and work conducted for the Impact Statement (Table SW Qual-04.1). The discharge from SP-01 includes transferred treated water from TMF-SP for both flow control scenarios and the sediment accumulation rates have been adjusted according to weighting based on average annual volume discharge from each source. This assessment was conducted for the construction and operations periods when the corresponding FDPs will be discharging. Table SW Qual-04.1 presents sedimentation extents and sediment accumulation for discharge scenarios presented in the mixing zone assessment response (1-to-1 and pre-&-post).

Table SW Qual-04.1 Construction and Operations FDP Sediment Plume Extents, Thickness and Mass Loads

			Discharge Management Scenario							
			1-to-1				Pre-&-Post			
Effluent	FDP ID		SP-03	SP-01 *	TMF-SP	SP-02	SP-03	SP-01 *	TMF-SP	SP-02
	Average Discharge (L/s)		97	713	155	155	90	666	181	181
	TSS Concentration (mg/L)		10	10	10	10	10	10	10	10
	Sediment Density (t/m^3) *		1.58	1.43	1.26	1.92	1.58	1.43	1.26	1.92
	Annual TSS Load (kg/yr)		30,590	224,852	48,881	48,881	28,382	210,030	57,080	57,080
Receiver	Receiver Name		West Buskegau River		North Driftwood River		West Buskegau River		North Driftwood River	
	MAF (L/s)		2,021	2,126	288	451	2,021	2,126	288	451
	Channel	Bottom Width (m)	8	8	3.5	3.5	8	8	3.5	3.5
		Side Slope (xH:1V)	4	4	3	3	4	4	3	3
		Depth (m)	1.08	1.08	0.35	0.35	1.08	1.08	0.35	0.35
		Annual TSS Load (kg/yr)	364,560	383,500	47,501	74,385	364,560	383,500	47,501	74,385
Sedimentation Analysis	Total Flow (L/s)		2,118	2,839	443	606	2,111	2,792	469	632
	Velocity (m/s)		0.185	0.229	0.111	0.158	0.184	0.225	0.117	0.164
	Settling Time (hr)		23	23	8	8	23	23	8	8
	Travel Distance (km)		15	19	3	4	15	19	3	4
	Receiver: Effluent Annual TSS Load Ratio (-)		11.9	1.7	1.0	1.5	12.8	1.8	0.8	1.3
	Surface Area in Receivers of Depositional TSS (m^2)		123,565	152,740	10,492	14,927	123,157	150,212	11,107	15,567
	Sedimentation Depth (mm)		0.16	1.08	3.70	1.71	0.15	0.98	4.08	1.91

Notes
* As part of flow control, TMF-SP treated effluent is transferred and discharged to the final discharge point for SP-01. For the two flow scenarios 38% of flow is from SP-01 and the remainder from TMF-SP
** Bulk density assumptions: SP-03 - ore stockpile (Ausenco 2023); SP-01 – weighted flow average for clay area of impoundment facility (Swan 2023) and TMF-SP transferred tailings source discharge; TMF-SP - tailings (WSP 2023); SP-02 - waste rock and sand/till area of impoundment facility (Clarke 2017)

The predicted settling time for discharged sediment particles in the two discharge scenarios ranged from 8 to 23 hours with the West Buskegau River FDPs having the longer settling times due to higher receiver flow rates and deeper minimum channel depths. The extents of the sedimentation zones ranged from 3 km for FDP-TMF-SP in the North Driftwood River to 19 km for FDP-SP-01 in the West Buskegau River (Table SW Qual-04.1). The distance between the two FDPs in the North Driftwood River is 5.8 km, which is greater than the predicted length of the sedimentation zone for the upstream FDP (i.e., FDP-TMF-SP). Therefore, it is not anticipated that the predicted sedimentation areas of the two FDP in the North Driftwood River will overlap. The distance between FDP-SP-03 and FDP-SP-01 is 1.1 km, which indicates that the two sedimentation areas for FDP-SP-03 and FDP-SP-01 will overlap.

The predicted average annual sedimentation depths for the operating lifespan of each pond (construction, operations, active decommissioning and closure phase) vary from 0.15 mm/year in the West Buskegau River downstream of FDP-SP-03 for the Pre-&Post flow control scenario to 4.08 mm/year in the North Driftwood River downstream of FDP-TMF-SP for the Pre-&Post- flow control scenario (Table 1). The North Driftwood River and West Buskegau River were identified via sediment sampling to be predominantly silt, clay and fine sand (Appendix B.8.2 of the Impact Statement). With the fine particle size of the discharge (0.0005 cm diameter) it is expected that the deposited sediment from the Project will be mix with native suspended and bed sediments to become part of an active bed layer. This active bed layer would be subject to sediment transport within the watercourse, and given the small particle size of the native bed material and deposited sediments discharged from the Project it would be expected that these fine particles would be resuspended during high flow events (i.e., bankfull flow [dominant high flow] or higher, spring freshet) and then re-deposited farther downstream from the initial deposition area. This re-suspension and subsequent deposition farther downstream from the Project Area would be expected to continue to occur during each high flow event transporting sediment discharged from the FDPs to the ultimate receivers (Abitibi and Frederick House Rivers). Based on this active and regularly occurring sediment transport causing continuous redistribution of deposited sediments discharged by the FDPs, the Project associated sediments in the North Driftwood River and West Buskegau River would not be expected to accumulate to be thicker than the annual sedimentation depths at a single location.

Sediment Quality

Baseline sediment quality was used as the baseline against which changes in sediment quality during Project phases were assessed. Baseline sediment quality was assessed using local sediment quality assessments conducted to describe sediment quality in the PA from 2021 to 2023 (Appendix B.8.2 of the Impact Statement). The quality of sediment was estimated during construction and operation phases. Contaminants of Potential Concern (CoPCs) were parameters in receiving water sediment and mine effluent that exceeded the Ontario Provincial Sediment Quality Guidelines (PSQG; MOE 2008) or the Canadian Sediment Quality Guidelines for the Protection of Freshwater Aquatic Life (CSQG-FAL) (CCME 2024).

The PSQG have three categories of guidelines, no effect level (NEL) below which there is no biological effect with many parameters not having a NEL value, lowest effect level (LEL) which represent a concentration that can be tolerated by the majority of sediment-dwelling organisms and severe effect level (SEL), which represents a concentration that has a severe biological effect. Two categories are presented in CSQG-FAL, including the interim sediment quality guideline (ISQG) values and the probable effect

level (PEL). The interim values represent concentrations below which adverse biological effects have a rare rate of occurrence. PEL represents the concentrations that, if exceeded, creates conditions where adverse effects are more likely to occur.

To evaluate sediment quality in relation to PSQG and CSQG-FAL, depth-averaged concentrations were calculated considering both effluent-associated and baseline conditions. Sediment sampling guidelines recommend a depth of 10–15 cm (ECCC 2012; Cavanagh et al. 1994); therefore, a depth of 10 cm was adopted for this assessment as a conservative value for consistency with regulatory guidance. Note that, in the analyses presented below, whenever there are differences between the 1-to-1 and Pre-&-Post FDP flow discharge scenarios, the more conservative values were used in assessments. In addition, sediment quality at the location of FDP-SP-01 was considered to be the average of the qualities of water discharged from Pond 1 and water transferred from the TMF ponds to the West Buskegau River.

For the effluent contribution, sediment-bound ratios were estimated by subtracting dissolved concentrations from total concentrations and dividing the difference by the mean monthly TSS objective of 10 mg/L. Total and dissolved concentrations were based on the water quality model results for the average TSS concentration of 10 mg/L (Lorax 2024). These ratios were then multiplied by proposed treatment target objective concentrations for the PoPCs, and by simulated average concentrations for non-PoPCs to determine sediment-bound concentrations. This approach assumes that the particulate fraction of the effluent is fully associated with suspended solids, providing a conservative estimate of sediment-bound contaminants.

With the fine particle size of the FDP discharged sediments and native channel bed material and frequent resuspension and deposition during high flow conditions, the active sediment bed layer was estimated to be mixed evenly up to a depth of 10 cm downstream of the FDPs. No constant sediment accretion is expected to occur downstream of the FDPs with frequent resuspension and deposition farther downstream during high flow events as part of active bed transport. The annual FDP sediment deposition thickness (up to 4.08 mm) and native bed material up to a total depth of 10 cm was used to develop a Project effected depth-average sediment concentration in the receiver for this active bed layer.

The Project effected depth-averaged sediment concentrations were then computed by combining effluent-associated concentrations with baseline concentrations, weighted according to their respective total sediment depths in the active bed layer. These calculated values were subsequently compared against applicable sediment quality guidelines (Ontario and CCME) to assess compliance and potential ecological risk. Table SW Qual-04.2 presents baseline and depth-averaged sediment-associated concentrations (in mg/kg) in receivers (West Buskegau River and North Driftwood River), as well as results of comparisons against guidelines. Note that only parameters with a partitioning coefficient larger than zero (i.e., with a sediment-bound concentration) are presented in Table SW Qual-04.2.

Table SW Qual-04.2 Particle-associated Concentrations (mg/kg) in Baseline Receivers, at Different FDPs and Provincial and CCME Guideline Values

Pond	Pond 3 & Pond 1	TMF Pond	Pond 2	Baseline (2021)		Guidelines			
FDP	SP-03 & SP-01 *	TMF-SP	SP-02	West Buskegau	North Driftwood	PSQG		CSQG	
Receiver	West Buskegau River	North Driftwood River		Mean	Mean	LEL	SEL	ISQG	PEL
Mercury	0.070	0.048	0.048	0.07	0.05	0.2	2	0.17	0.486
Aluminum	8,947	8,253	8,182	8,922	8,120	-	-	-	-
Silver	1	3	2	<0.1	<0.1	-	-	-	-
Arsenic	2.37	2.92	2.80	2.30	2.74	6	33	5.9	17
Barium	59	68	54	56.51	52.53	-	-	-	-
Beryllium	0.26	0.28	0.27	0.26	0.27	-	-	-	-
Boron	10	7	20	5.90	6.17	-	-	-	-
Bismuth	0.10	0.10	0.10	<0.2	<0.2	-	-	-	-
Calcium	9,230	15,588	12,357	6,917	11,338	-	-	-	-
Cadmium	0.54	0.53	0.54	0.54	0.54	0.6	10	0.6	3.5
Cobalt	7.85	10.52	9.01	7.14	7.64	-	-	-	-
Chromium III	35	58	39	27	23	-	-	-	-
Copper	8.5	13.5	10.3	7.6	8.8	16	110	35.7	197
Iron	11,165	13,037	12,321	10,811	11,660	20,000	40,000	-	-
Potassium	1,235	1,482	1,159	952	1,079	-	-	-	-
Lithium	11.97	11.68	11.66	11.94	11.63	-	-	-	-
Magnesium	5,147	10,470	7,814	3,748	5,063	-	-	-	-
Manganese	854	897	877	844	864	460	1,100	-	-
Molybdenum	0.59	0.51	0.51	0.59	0.51	-	-	-	-
Sodium	833	787	309	111	114	-	-	-	-
Nickel	25	59	34	14	13	16	75	-	-
Lead	8.35	10.59	10.77	8.41	10.95	31	250	35	91.3
Antimony	0.12	0.16	0.14	0.12	0.12	-	-	-	-
Selenium	0.41	0.56	0.56	0.41	0.55	-	-	-	-

Pond	Pond 3 & Pond 1	TMF Pond	Pond 2	Baseline (2021)		Guidelines			
FDP	SP-03 & SP-01 *	TMF-SP	SP-02	West Buskegau	North Driftwood	PSQG		CSQG	
Receiver	West Buskegau River	North Driftwood River		Mean	Mean	LEL	SEL	ISQG	PEL
Tin	1.29	1.64	1.45	1.20	1.30	-	-	-	-
Strontium	21.4	26.2	22.7	20.1	20.7	-	-	-	-
Titanium	439	459	432	427	410	-	-	-	-
Thallium	0.11	0.12	0.12	0.11	0.12	-	-	-	-
Uranium	0.77	0.55	0.55	0.77	0.56	-	-	-	-
Vanadium	22	27	24	20.27	21.49	-	-	-	-
Tungsten	0.25	0.50	0.50	<0.5	0.50	-	-	-	-
Yttrium	-	-	-	-	-	-	-	-	-
Zinc	69.9	68.0	67.4	69.9	67.4	120	820	123	315
Phosphorus	575	505	515	574	519	-	-	-	-

Notes
Shaded cells (blue/yellow/pink/orange) – indicate exceedance of a guideline value for that parameter and source
* SP-01 sediment discharge quality estimated based on SP-01 treated discharge quality and associated source partition coefficients, and portion of directed treated TMF-SP flow and associated partitioning coefficients

The North Driftwood River and West Buskegau River baseline average sediment quality identified manganese as a PoPC, that exceeded the PSQG LEL value and are between 1.8x and 1.9x greater than the PSQG LEL value (Table SW Qual-4.2).

The average Project effected depth-averaged sediment concentrations presented in Table SW Qual -4.2 indicate that manganese exceeds the PSQG LEL value and are between 1.8x and 1.95x greater than the PSQG LEL value. Nickel is identified also as a PoPC with concentrations that exceeded the PSQG LEL value and are up to 3.7x greater than the PSQG LEL value.

References:

BC Ministry of Environment, Lands, and Parks. (BC MELP) (1996). Guidelines for Assessing the Design, Size and Operation of Sedimentation Ponds Used in Mining. November 1996.

Cavanagh, N., Swain, L. G., Nordin, R. N., & Pommen, L. W. 1994. Lake and stream bottom: sediment sampling manual. BC Ministry of Environment, Lands and Parks, Water Quality Branch.

Clarke, B.G. 2017. Engineering of Glacial Deposits. CRC Press, London, UK.

Environment and Climate Change Canada (ECCC). 2012. Metal mining technical guidance for environmental effects monitoring.

Hwang, N.H.C. and Houghtalen, R.J. 1996. Fundamentals of Hydraulic Engineering Systems. 3rd Ed.

Lorax. (Lorax Environmental Services Ltd). 2024. Crawford Nickel Project Water Quality Model Report.

MOE (Ministry of the Environment). 2008. Guidelines for Identifying, Assessing, and Managing Contaminated Sediments in Ontario.

Stantec. 2024a. Crawford Nickel Project: Assimilative Capacity Study.

Stantec. 2024b. Internal Communications.

Swan, W. 2023. Time-since-land-use-conversion differently affected soil properties in Northern Ontario's Great Clay Belt. PhD Thesis. University of Guelph.

WSP 2023. Crawford Project. Tailings Management Feasibility Study.

4) *Provide an assessment of predicted sediment contamination in the receiving environment of the project and downstream during construction, operation, closure, and post-closure. Based on the predictions, verify the selection of mitigation measures for:*

- *effluent (e.g., stand-by modular treatment);*
- *tailings; and*
- *potentially acid-generating waste rock.*

The response to SW Qual-04.3 includes comparison of predicted changes to the active sediment bed layer quality, which identify exceedances of the PSQG LEL values for manganese and nickel. The manganese values were slightly elevated above what was observed in baseline sediments in the North Driftwood River and West Buskegau River. The estimated concentration in the active bed layer for nickel is predicted to be up to 3.7x the applicable PSQG LEL value. For fish, indefinite exposure to the maximum estimated sediment concentration will be limited spatially and temporarily due to the transport of the active bed layer. During high flows including spring freshet the active bed layer where sediments discharged from the Project will be mixed, transported downstream and not expected to accumulate appreciably near the site. As such, effects to fish health, growth and survival at the community level are not expected as a result of sediment quality changes for manganese and nickel from the Project.

Chapter 15 of the Impact Statement outlined the following surface water quality mitigation measures, including sediment loading (via treated discharge from modular treatment systems and sedimentation ponds that include tailings and potentially acid-generating waste rock as sediment sources), to control potential changes within suitable limits:

- Canada Nickel will routinely monitor construction areas to identify areas of potential erosion and apply appropriate erosion and sedimentation control measures in accordance with the Erosion and Sediment Control Plan.
- Canada Nickel will maintain haul roads, site roads, and access roads in good condition to reduce erosion, improve water flow and manage vegetation growth within the ditches.
- Canada Nickel will collect runoff and groundwater inflows from the Open Pit and pump water to sedimentation ponds prior to being discharged to the receiving environment.
- Canada Nickel will design contact water collection and sedimentation ponds (Collection Pond 1, Collection Pond 2, Collection Pond 3, Tailings Management Facility Northwest Collection Pond, and Tailings Management Facility Northeast Collection Pond) to provide onsite storage of local runoff with the size and residence times necessary to promote sediment removal. The ponds will be sized to store up to the 10-year return period, 24-hour duration storm event with freeboard.
- Canada Nickel will treat water effluents prior to discharge to the receiving environment, as required, to meet regulatory criteria including an Environmental Compliance Approval issued by the Ministry of the Environment, Conservation and Parks (MECP) as well as criteria developed through the receiving watercourse Assimilative Capacity Study (Appendix G of the Surface Water Resources Assessment [Appendix C.5 of the Impact Statement]), in addition to the Metal and Diamond Mining Effluent Regulations (MDMER).
- Canada Nickel will implement water treatment through use of a water treatment plant to receive discharge from the TMF, collection ponds and will use proven processes to treat the water to meet regulatory effluent criteria prior to discharge to the environment.
- Canada Nickel will develop and implement a Metal Leaching and Acid Rock Drainage Management Plan (Appendix L of the Impact Statement; Updated version developed to support

the GHC-01e-2 response) to reduce and limit the known and potential risks of ML/ARD associated with the Project, thereby reducing potential effects to water quality.

It is expected during operation that the sedimentation ponds with their design retention times, including additional retention to provide additional on-site storage to support discharge flow control scenarios (e.g., 1-to-1 receiver to effluent ratio; pre-&post- development flow ratio) will perform better than the assessed treatment value of 10 mg/L scenario assessed in SW Qual-04.1, 2 and 3. Also due to the abundance of clay at the site (20-30%) the particle size distribution of the sediment that leaves the ponds to the modular treatment plants would be expected to be relatively small and will mix and become part of the active sediment bed that is easily transported downstream during high flow events.

The modular contact water treatment plant, although no final selection of technologies has occurred will have a multi-step treatment train. As select metals and metalloids are both potential contaminants of concern it is expected that chemical precipitation will be potentially required in the treatment train, which will further remove suspended particles via flocculation, chemical precipitation and sedimentation (Appendix C.5 in the Impact Statement). These treatment train measures in combination with the redundancy and available mitigation measures within the sedimentation pond system provide adequate treatment redundancy to maintain low suspended solids concentrations (10 mg/L or less on a typical basis) with small particle sizes (approx. 5 µm or smaller) in the discharge to the North Driftwood River and West Buskegau River.

SW Qual-05 Surface Water Quality – Baseline Values for Parameters of Potential Concern (POPC)

Comment Description (Context and Rationale):

It is unclear why the baseline data for the West Buskegau River, North Driftwood River, and Jocko Creek (Table 3.2) shows no values for chromium III, chromium VI, and un-ionized ammonia. The IS states that "when more than 50% of results were below the reportable detection limit (RDL), summary statistics were not calculated, except for the maximum parameter values" however, maximum values for chromium III, chromium VI, and un-ionized ammonia do not appear to have been included.

Additionally, the information presented in Tables 7.2, 7.3, 7.4, and 7.5 appears to contradict the information provided in Table 3.2. Table 7.2 and Table 7.3 in Appendix C provide receiver 75th percentile concentration as 1.5 ug/L for chromium III, 0 ug/L for chromium VI and 0.48 ug/L for un-ionized ammonia. Table 7.4 and Table 7.5 provide receiver mean concentration as 1.3 ug/L for chromium III, 0 ug/L for chromium VI and 0.60 ug/L for un-ionized ammonia.

Ensuring accurate baseline values for PoPC, including PoPC that may bioaccumulate in country foods, are available and reflected in models is necessary to validate predicted changes to water quality and associated effects to fish and fish habitat and Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.6.1

IS: Appendix C.5 – Appendix C: Table 3.2, Table 7.2, Table 7.3, Table 7.4, & Table 7.5

Required Information to Resolve Comment:

1) *Review and explain any inconsistencies between Tables 3.2, 7.2, 7.3, 7.4, and 7.5 in Appendix C.5 or revise the values reported for chromium III, chromium VI, and un-ionized ammonia in water quality baseline data.*

2) *Ensure that model predictions reflect the appropriate baseline values.*

Canada Nickel's Response:

1) *Review and explain any inconsistencies between Tables 3.2, 7.2, 7.3, 7.4, and 7.5 in Appendix C.5 or revise the values reported for chromium III, chromium VI, and un-ionized ammonia in water quality baseline data.*

Table 3.2 of Appendix C.5 is a summary of the local water quality characterization in Appendix B.6 of the Impact Statement and presents the mean and 75th percentile concentrations of water quality parameters in the West Buskegau River, the North Driftwood River, and Jocko Creek, respectively, for the August 2021 – December 2023 monitoring period that were used to setup the baseline water quality data inputs for the mixing zone assessment. Table SW Qual-05.1 presents the Table 3.2 in Appendix C.5 results for the three parameters (chromium III, chromium VI, and un-ionized ammonia) referenced in this information request, and the Table 7.2, 7.3, 7.4 and 7.5 in Appendix C.5 values. In addition, to assist with the response, baseline data statistical values from Table 5.29 and Appendix B.6 in Appendix B.6 are presented to provide additional context for the response.

Table SW Qual-05.1 Chromium and Ammonia Baseline Data Statistical Values from Impact Statement Appendix B.6 and C.5

Info Source	Parameter	Units	Detection Limit	Jocko Creek Watershed		North Driftwood River Watershed		West Buskegau River Watershed	
				Mean	75th Percentile	Mean	75th Percentile	Mean	75th Percentile
Chromium									
Appendix B.6, Table 5.29	Total Chromium (watercourses)	µg/L	0.5/1	1.3	1.6	1.3	1.6	1.3	1.6
Appendix C.5 in Table 3.2	Chromium III (calculated)	µg/L	-	-	-	-	-	-	-
Appendix C.5 in Table 3.2	Chromium VI (calculated)	µg/L	-	-	-	-	-	-	-
Appendix C.5 in Table 7.2, 7.3, 7.4 and 7.5	Chromium III	µg/L	-	1.3	1.5	1.3	1.5	1.3	1.5
Appendix C.5 in Table 7.2, 7.3, 7.4 and 7.5	Chromium VI	µg/L	-	0	0	0	0	0	0
2024 Monitoring data	Chromium VI (watercourses)	µg/L	1	<1	<1	<1	<1	<1	<1
2024 Monitoring data	Chromium III (calculated) (watercourses)	µg/L	1.4	-	-	-	-	-	-

Info Source	Parameter	Units	Detection Limit	Jocko Creek Watershed		North Driftwood River Watershed		West Buskegau River Watershed	
				Mean	75th Percentile	Mean	75th Percentile	Mean	75th Percentile
Ammonia									
Appendix B.6 in Appendix B.9	Total Ammonia (as N)	mg/L	0.005	0.050	0.057	0.038	0.048	0.06	0.069
Appendix B.6 in Appendix B.9	pH, field	-	0	6.05	7.08	6.42	7.10	5.76	6.55
Appendix B.6 in Appendix B.9	Temperature, field	ºC	-5	10.09	17.24	9.74	17.46	8.12	14.83
-	Un-ionized Ammonia (calculated with field data) *	µg/L	-	0.01	0.22	0.02	0.20	0.01	0.07
Appendix C.5 in Table C-1, C-2, C-3, C-4, C-5 and C-6	Un-ionized Ammonia (calculated) (pH 7.5 and water temperature 17ºC)	µg/L	-	0.5	0.57	0.38	0.48	0.6	0.69

Notes:
* Calculated using Canadian Council of Ministers of the Environment. 2010. Canadian water quality guidelines for the protection of aquatic life: Ammonia. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

Chromium III and VI

The baseline surface water quality study (August 2021 to December 2023) only collected water quality samples for analysis of total chromium concentrations (Appendix B.6). The trivalent (chromium III) and hexavalent (chromium VI) forms of chromium were not included in the analysis package. Table 3.2 presents the available statistical mean and 75th percentile concentrations of chromium III and chromium VI. As chromium III and chromium VI results were not available, no statistical results were listed in Table 3.2. To support the mixing zone assessment, two surface water quality monitoring events were conducted in the summer of 2024 with analysis of chromium VI and calculated chromium III concentrations (total chromium concentration subtract chromium VI concentration) prior to submission of the Impact Statement and finalization Appendix C.5 and its attached Appendix C. The results had chromium VI concentrations in the North Driftwood River and West Buskegau River below the laboratory RDL of 1 µg/L.

Based on the chromium III and VI results, the receiving water environment assumed the total chromium concentration was presented as chromium III and the was limited to no chromium VI present in the receiver, which was applied using the 75th percentile value in Tables 7.2 and 7.3 and average value in Tables 7.4 and 7.5.

Attachment SW Qual-05 includes a summary table of Jocko Creek (6 sites), West Buskegau River (7 sites) and North Driftwood River (3 sites) water quality total chromium, chromium VI and chromium III results for up to seven events in 2024. Only one sample of the 112 samples from watercourses in the baseline study area had a detectable chromium VI concentration (WB-S-04 2 µg/L [Dec 3, 2024]) with the total chromium result for the same event being 1.5 µg/L and the other results were consistently below the 1 µg/L RDL. The remainder of the total chromium concentration for each monitoring event is calculated as the chromium III concentration. Of the 112 watercourse samples collected from Jocko Creek, West Buskegau River and North Driftwood River 38% had chromium III concentrations above the calculation method RDL (1.4 µg/L), which is too few above detection results for the application of methods to calculate statistics (mean, 75th percentile) applying the data analysis methods in Section 4.1.5.1. of Appendix B.6. These additional chromium III and chromium VI surface water quality results from local watercourses in 2024 support the assumption applied in the mixing zone assessment in Appendix C of Appendix C.5 for setting the chromium III concentration as equal to the total chromium concentration in the receiver and no chromium VI present. However, to represent the presence of chromium VI in the receiver as it typically can be between 10 and 60% of the total chromium concentration[1], a conservative 20% of the total chromium concentration was assumed to be chromium VI. The revised mean and 75th percentile chromium VI concentrations were revised to 0.3 µg/L and 0.3 µg/L, respectively. These concentrations were applied for the revised mixing zone study in response to the SW Qual-02 response, and results summarized in the SW Qual-05.2 response.

Un-ionized Ammonia

Un-ionized ammonia is calculated from total ammonia using field pH and water temperature values. The baseline study did not assess or calculate un-ionized ammonia concentrations (Appendix B.6) and as

[1] Canadian Council of Ministers of the Environment. 2010. *Canadian water quality guidelines for the protection of aquatic life: Ammonia.* In: Canadian environmental quality guidelines. 1999. Canadian Council of Ministers of the Environment, Winnipeg.

such Table 3.2 in Appendix C.5 did not present mean or 75th percentile values. A conservative estimate of the 75th percentile (regulatory condition scenario) and mean (normal condition scenario) un-ionized ammonia concentrations were calculated for the West Buskegau River and North Driftwood River using the fraction of un-ionized ammonia equation from Council of Ministers of the Environment *Canadian water quality guidelines for the protection of aquatic life: Ammonia* (2010) (Table SW Qual-05.1). The fraction of un-ionized ammonia increases with increasing pH and water temperature values, and it was assumed that the North Driftwood River and West Buskegau River had a pH value of 7.5 and water temperature of 17ºC to calculate the un-ionized ammonia concentration in each, which were presented in Tables 7.2, 7.3, 7.4 and 7.5. Table SW Qual-05.1 presents the average and 75th percentile water temperature and pH values from the baseline monitoring program (Appendix B.6) for each receiver. The field statistical pH values and water temperatures are lower than the assumed receiver values of 7.5 and 17 ºC, respectively, and therefore have substantially lower un-ionized ammonia concentrations than what was used in the assessment. The conservative 75th percentile and mean un-ionized ammonia concentrations for the receiver pH value of 7.5 and water temperature of 17ºC were then used for the mixing zone assessment for the regulatory and normal mixing zone scenarios, respectively.

2) Ensure that model predictions reflect the appropriate baseline values.

Based on the above response to SW Qual-05.1, the North Driftwood River and West Buskegau River receiver baseline mean and 75th percentile values for chromium III and un-ionized ammonia concentrations are considered adequately conservative and have not been changed for the revised mixing zone assessment developed in response to SW Qual-02. The chromium VI concentration was adjusted to indicate a concentration present in the receiver with revised mean and 75th percentile chromium VI concentrations of 0.3 µg/L and 0.3 µg/L, respectively, which was used in the SW Qual-02 mixing zone assessment modelling scenarios (see SW Qual-02 response for additional details).

The revised mixing zone assessment with a chromium VI concentration of 0.3 µg/L for the North Driftwood River regulatory flow control scenario with a receiver to effluent flow ratio of one to one (1-to-1), estimated mixing zone extents for chromium VI of 30.4 km downstream of the Pond 2 FDP (subwatershed ND3 outlet). A sensitivity analysis was conducted by comparing with length of the chromium VI mixing zone assuming a North Driftwood River receiver concentration of 0 µg/L. The revised length of mixing zone was estimated to be the ND5 outlet (14.1 km downstream of the Pond 2 FDP), which is less in length than ND3. The revised receiver 0.3 µg/L concentration has the chromium VI length of the mixing zone have the same extent as the chromium III mixing zone and aligns with the extents of other PoPC mixing zone length (e.g., copper, selenium, zinc, fluoride, nitrate).

For the pre- and post-development (pre-&post-) flow control regulatory mixing zone assessment for the North Driftwood River, which has a higher effluent flow into the North Driftwood River, when receiver chromium VI concentrations were 0 µg/L and 0.3 µg/L they were predicted to have the same length of mixing zone downstream of the Pond 2 FDP (subwatershed ND3 outlet).

For the West Buskegau River, under conditions of the North Driftwood River receiver to effluent flow ratio of 1-to-1, the West Buskegau River mixing zone extent is estimated to go to P1 (26.9 km downstream of the Pond 1 FDP) with a receiver chromium VI concentration of 0.3 µg/L. This is longer than the chromium VI receiver 0 µg/L concentration mixing zone extent scenario with the zone extending to the WB3

subwatershed outlet 14.2 km downstream of the Pond 1 FDP. The 0.3 µg/L chromium VI mixing zone extent align with vanadium and has a 5.2 km longer mixing zone than chromium III.

Additional details on the change to the mixing zone assessment results are presented in the response to SW Qual-02.

SW Qual-06 Accidents & Malfunctions – Nickel Concentrate Spill

Comment Description (Context and Rationale):

The IS includes an effects and risk assessment for various scenarios arising from plausible accidents and malfunctions related to the project. Generally, these were well documented with clear pathways and risk. The scenario of a rail accident resulting in the release of nickel concentrate still needs to be addressed.

The project includes the construction and operation of a rail spur that will cross several waterways, including Jocko Creek and Kidd Creek, both tributaries to the Mattagami River, and rail transport along an existing rail line to the Kidd Concentrator. The rail spur will accommodate up to four roundtrip trains per 24 hours for the life of the mine,

Reference to TISG and IS:

TISG: Section 13.1

IS: Chapter 3 – Section 3.4.1, Chapter 31 – Section 31.2.4

Required Information to Resolve Comment:

1) Based on the quantity of concentrate to be transported by rail:

- *report, with appropriate rationale, the risk of spill within the waterways noted;*
- *report, with appropriate rationale, in the event of a spill from train derailment, potential consequences (including the adverse effects to fish and fish habitat, migratory birds, and Indigenous peoples);*
- *in doing so, describe the plausible worst-case scenarios and the more- likely, but lower-consequence scenarios, including magnitude, geographic extent, duration and reversibility of effects, taking into account the influence of local geography and relative locations of sensitive receptors, and informed by known behaviors of nickel concentrate in the environment.*

Canada Nickel's Response:

1) Based on the quantity of concentrate to be transported by rail:

- *report, with appropriate rationale, the risk of spill within the waterways noted;*
- *report, with appropriate rationale, in the event of a spill from train derailment, potential consequences (including the adverse effects to fish and fish habitat, migratory birds, and Indigenous peoples);*
- *in doing so, describe the plausible worst-case scenarios and the more- likely, but lower-consequence scenarios, including magnitude, geographic extent, duration and reversibility of effects, taking into account the influence of local geography and relative locations of sensitive receptors, and informed by known behaviors of nickel concentrate in the environment.*

As described in Chapter 31 of the Impact Statement, risk is determined as a function of the likelihood of a hazard/adverse event occurring (frequency of occurrence) and the severity of its consequences (magnitude, duration and extent of the damage or harm). This determination is based on the evaluation of the severity of potential residual adverse effects (i.e., effects that remain after implementation of mitigation measures) and the likelihood of the event occurring.

The potential likelihood of an event occurring is defined as follows:

- Very Low: Not expected to occur during the life of the Project, with no or limited previous examples of occurrence in similar projects.
- Low: Limited potential to occur in exceptional circumstances during the life of the Project with limited but consistent occurrence in some similar projects.
- Moderate: May occur during the life of the Project, with an established trend of occurrence in most similar projects.
- High: Expected to occur during the life of the Project, with frequent occurrence in similar projects.
- Very High: Almost certain to occur during the life of the Project.

The severity of consequences of an event is defined as follows:

- Very Low: Localized effect, readily remediated, recovery within a few weeks or months.
- Low: Localized effect, predictably remediated, recovery within the life of the Project.
- Moderate: Widespread effect, predictably remediated, recovery within the life of the Project.
- High: Widespread effect, uncertain remediation, may not be recoverable within the life of the Project.
- Very High: Widespread effect, unlikely to be completely remediated, not recoverable within the life of the Project.

Once the likelihood and severity of consequence are determined, the risk matrix presented in Figures 31.1 and 31.2 of the Impact Statement is used to determine the risk associated with the plausible accident or malfunction scenario.

The following information summarizes the potential likelihood and severity of consequence of a spill of concentrate into a watercourse as a result of a derailment during the transportation of concentrate by rail.

Probability of a Derailment Causing a Spill of Concentrate into a Watercourse

The probability of a spill of concentrate into a watercourse as a result of a derailment during the transportation of concentrate by rail is expected to be Very Low (i.e., not expected to occur during the life of the Project, with no or limited previous examples of occurrence in similar projects); however, for the purposes of addressing this information request, we have identified two plausible scenarios for consideration, including:

- a minor spill caused as a result of a damaged rail car resulting in the release of small amounts of concentrate (i.e., leakage) onto the ballast while the train is in motion, or
- a plausible worst-case scenario, where the spill of concentrate occurs as a result of a derailment at one of the watercourse crossings along the existing and proposed rail spur where the contents of the rail cars are released to the environment.

In the plausible worst-case scenario, determining the risk of a spill of concentrate into a watercourse as a result of a derailment must consider several factors, including:

- the likelihood of a derailment occurring along the ~50 km rail spur;
- the likelihood of that derailment resulting in a spill of concentrate; and,
- the likelihood of that spill of concentrate occurring at a location where it could enter a watercourse.

Transport Canada defines a derailment as any instance where one or more wheels of rolling stock have come off the normal running surface of the rail. Most derailment accidents are minor, occurring during switching operations in yards or on spurs at speeds of less than 10 mph. According to the Transportation Safety Board of Canada's (TSBC) *Statistical Summary: Rail Transportation Occurrences in 2024* (TSBC, 2025), the 10-year average number of main-track derailments per million main-track (i.e., non-yard) train miles is 0.98 (Table SW-Qual -06-1) and shows a declining trend over this 10-year period (Figure SW-Qual -06-1).

Table SW-Qual-06-1 Rail Transportation Derailments in Canada (2014 to 2024)[2]

Derailment Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Main-track derailments, 1 or 2 cars	44	40	31	48	39	54	40	38	32	28	20
Main-track derailments, 3 to 5 cars	15	8	8	5	11	6	3	3	8	9	9
Main-track derailments, 6 or more cars	41	27	17	28	37	33	27	34	28	18	19
Million main-track train miles	76.5	79.6	74.7	78	82.6	83.3	74.9	74.1	75.4	79.7	82.2

[2] Transportation Safety Board of Canada. 2025. Statistical Summary: Rail Transportation Occurrences in 2024. https://www.tsb.gc.ca/sites/default/files/2025-06/sser-ssro-2024-ENG.pdf

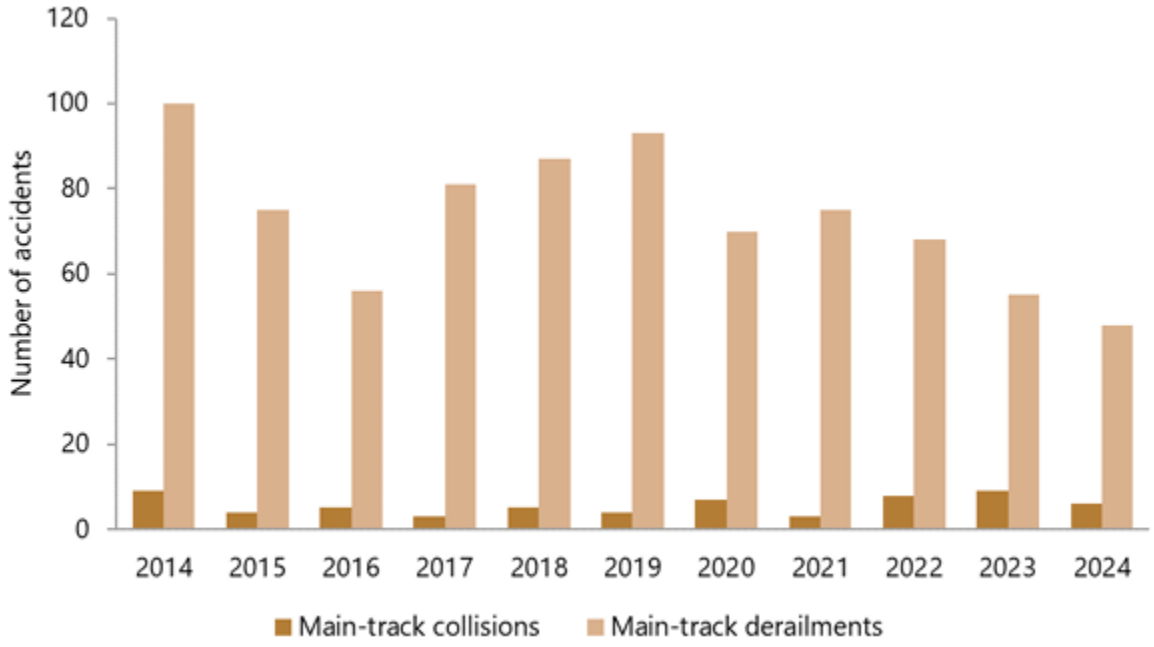


Figure SW-Qual-06-1 Main-track collision and derailment accidents in Canada (2014 to 2024)[1]

As indicated in Chapter 3 of the Impact Statement, a new rail spur line approximately 25 km long will be constructed to facilitate the transport of materials to and from the mine. The new rail spur will run from the Process Plant in a southerly direction along the eastern side of the realigned Highway 655 to the existing Ontario Northland Railway spur line, which is an existing rail spur line used by Glencore to transport ore from their existing Kidd mine site to the Kidd Metallurgical Site (Kidd Met). The length of existing Ontario Northland Railway spur line from where the new rail spur will tie-in to the Kidd Met is approximately 25 km. As such, concentrate from the Project will be transported ~50 km by rail from the process plant to Kidd Met.

Chapter 3 of the Impact Statement indicates that up to four roundtrip trains per 24-hours are anticipated to transport concentrate from the Process Plant for further processing offsite, which translates into approximately 400 km (248.5 miles) of train travel per day during mine operations. Using the average frequency of 0.98 derailments per million main-track train miles experienced over the past 10 years in Canada as an indication, the expected risk of a derailment of any kind would be approximately once every 4,105 days, or once every approximately 11.25 years.

Over the ~50 km trip from the process plant to the Kidd Met, the rail spur crosses 13 watercourses, which is equivalent to approximately 0.26 watercourse crossings per kilometre of travel or approximately one watercourse crossing every 3.85 kilometers. For the purposes of this estimate, we have assumed the area within +/- 35 m from the centre line of a watercourse (i.e., equivalent to the approximate length of a

rail car) would be the location susceptible to a spill of concentrate entering the watercourse (i.e., 70 m every 3.85 km, or approximately 1.82% of the rail spur).

As such, the likelihood that a derailment would occur at a location where a spill of concentrate would enter a watercourse is equal to the expected risk of a derailment occurring at any point along the rail spur (once every 11.25 years) divided by the likelihood of a derailment occurring within proximity of a watercourse (1.82%) Therefore, the risk of a of derailment causing a spill of concentrate into a watercourse would be 11.25 years / 1.82% = once every approximately 618 years. The operational mine life over which concentrate will be transported is proposed to be 42 years, indicating the very low likelihood that derailment causing a spill of concentrate into a watercourse would occur over the operating life of the mine.

Further, the likelihood of a spill occurring at any one watercourse along the rail spur (i.e., Jocko Creek or Kidd Creek) is even lower, whereby the likelihood that a derailment would occur at Jocko Creek, Kidd Creek, or any specific watercourse crossing is equal to the expected risk of a derailment (once every 11.25 years) divided by the likelihood of a derailment occurring at any one watercourse location (70 m of ~50 km, or approximately 0.14% of the rail spur). Therefore, the risk of a derailment causing a spill of concentrate into a specific watercourse would be 11.25 years / 0.14% = once every approximately 8,034 years. Therefore, the probability of a spill of concentrate into a specific watercourse (i.e., Kidd Creek, Jocko Creek or otherwise) as a result of a derailment during the transportation of concentrate by rail is very low (i.e., not expected to occur during the life of the Project).

Preventative Measures

During Project construction, there will be no transportation of concentrate by rail. As such, there will be no risk of a spill of concentrate as a result of a derailment into a waterway during construction.

During operations, the new spur line that will be constructed to facilitate the transportation of materials to and from the mine will be owned by Ontario Northland Railway, a Crown agency reporting to the Ministry of Transportation. The potential for a spill of concentrate during transportation will be reduced through Ontario Northland Railway's regular inspection and maintenance of the new and existing rail spur and through the safe operation of trains transporting concentrate to and from the Kidd Met (i.e., obey speed limits).

Canada Nickel will conduct regular inspection of its rail equipment for any signs of damage and will maintain its rolling stock to reduce the potential for malfunction that may lead to a spill or derailment. Canada Nickel staff will also inspect rail cars upon loading and prior to leaving the Process Plant for signs of damage or leakage.

With preventive measures in place, the likelihood of a worst-case accidental spill caused by a derailment is considered very low.

Emergency Response

An environmental incident of the magnitude of a train derailment into a watercourse would result in an immediate cessation of operations of the rail spur. Cars would be removed from the watercourse using rail-mounted equipment. Concentrate from the spill would be cleaned up using either rail-mounted excavators or hydro vacuums, or in the event that the spill occurs along the new stretch of the rail spur between the Project and the Kidd mine, improved access from Highway 655 may be reduce response times and clean-up duration.

Captured concentrate material would be transported to the Kidd Met for processing and damage to the existing rail spur or culvert crossings would be repaired. An over-excavation of the material from the bottom of the channel would be conducted to remove remaining concentrate in the channel and the channel would be restored to return the impacted watercourse to pre-accident conditions (i.e., channel restoration, revegetation of the slopes, culvert repairs). Appropriate monitoring of construction activities would occur during clean-up and restoration and longer term monitoring of the impacted channel and associated banks of the affected watercourse would occur as required by regulations.

Effects Assessment

A derailment causing the spill of concentrate into a watercourse could have adverse effects on fish and fish habitat, migratory birds, and Indigenous peoples, whereby localized vegetation, water flow, and corresponding habitat of fish and other wildlife within the immediate vicinity of the derailment will experience direct impacts and disturbance as a result of the accident and corresponding spill of concentrate. Further, short-term effects will be observed during recapture of the concentrate, site clean-up, and channel restoration. Given that the transportation of concentrate by rail is expected to occur 24 hours per day throughout the year, such effects could occur at any time (i.e., low flow / high flow, summer / winter, day / night).

Fish and Fish Habitat

Direct impacts and alteration to fish habitat would occur in the event of a spill of concentrate in a watercourse. Based on the plausible worst-case scenario, concentrate would overprint all or portions of the watercourse, including substrate material or aquatic vegetation, and may obstruct the flow of water to downstream areas. Such effects would be reduced through emergency response measures aimed at stabilizing the site, restoring flow, capturing released concentrate from the watercourse, and restoring the channel.

Concentrate material is not anticipated to move downstream. As described in the Crawford Feasibility Study, Nickel concentrate has a specific gravity of 4.69 and Magnetite concentrate has a specific gravity of 4.49. In the plausible worst-case scenario, each car is expected to contain 91 tonnes of dry concentrate and the contents of up to two cars may enter the watercourse. As both these nickel and magnetite concentrates are heavy, the estimated 182 tonnes of dry concentrate in a watercourse as a result of derailment would be expected to settle to the bottom and remain in place. As such, informed by the known behaviors of concentrate in the environment, the downstream migration of concentrate is not anticipated.

The widest watercourse crossing between the process plant and the Kidd Met is a crossing of a tributary of the Porcupine River just west of the Kidd Met site, which is approximately 23 m wide where the rail crosses. A conservative estimate of 2 cars landing in the watercourse as a result of a derailment would result in 182 tonnes of dry concentrate into the tributary of the Porcupine River. The volume of concentrate in any other watercourse along the spur line is expected to be less than this amount as they are smaller watercourses and material is more likely to be located on channel banks or surrounding areas.

In regard to water quality, when concentrates are submerged under water, the oxidation of sulfide minerals is substantially reduced compared to subaerial conditions. This is primarily due to the much slower rate of oxygen diffusion in water, which is several orders of magnitude lower than in air (MEND 2009)3. As a result, the risk of metal leaching in an underwater scenario is mainly associated with the flushing of water-soluble constituents present in the concentrates (e.g. build up of oxidation products during the metallurgical process), rather than from leaching caused by oxidative dissolution. To date, metal leaching assessments have not been completed for either Nickel concentrate or Magnetite concentrate. These assessments will be evaluated in the development of the geochemical program to support the permitting process.

In order to estimate the effects of an accidental release of approximately 182 tonnes of concentrates into a river, results from shake flask extraction tests conducted on ore materials have been utilized as possible and available analogues for mass balance calculations. This approach assumes that the water soluble properties of ore concentrates are similar to those of the ore materials. The shake flask extraction procedure involves the continuous mixing of a crushed sample (with 85% passing 6.3 mm) with deionized water, maintaining a water to rock mass ratio of 3, for a period of 24 hours. The shake flask test results for ore materials showed that boron and chromium are two primary PoPCs with boron leaching in the initial flush and chromium leaching through time in the longer-term (Baseline Geochemical Characterization Program Report; Appendix H of the Impact Statement). The maximum boron concentration in the leachate was about 8.5 times of the PWQO. In addition, the ore concentrates are products of the metallurgical process at the process plant that materials considered of having high metal leaching potential are tailings which will be deposited in the tailings impoundment. Ore concentrates would only have limited build up of oxidation products during filtration and drying processes.

Using the MAF at the Porcupine River at Hoyle (Station ID 04MD004) of 5.6 m^3/s, it would take less than five minutes to achieve a water to rock (e.g., ore concentrates) mass ratio of about 9. Under this condition, the water in contact with the concentrates is estimated to have boron concentration below the PWQO for boron. Under an accidental spill condition, the pore spaces of dry concentrate deposited in a watercourse will fill with watercourse water, but due to the slower hydraulic conductivity of water through the concentrate porous media, the flushing will be a slower than free water moving in the watercourse. Thus the flushing effect is not envisioned to be instantaneous but would occur over a period of hours to

[3] Mine Environment Neutral Drainage (MEND). 2009. Report 1.20.1. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. Available at: https://mend-nedem.org/wp-content/uploads/1.20.1_PredictionManual.pdf

days and the initially flushed constituents would assimilate with watercourse water as leachate material slowly seeping from the deposited material.

During clean-up, localized impacts to fish and fish habitat are anticipated as a result of machinery access, vegetation removal, removal of concentrate from the channel, and restoration of the channel bed and banks. In such an emergency scenario, measures to reduce fish exposure to the spill zone, erosion and the release of sediment would be employed to the extent practicable, including implementation of several in-water mitigation measures outlined in Sections 15.4.3.2 and 17.4.2.2 of the Impact Statement, such as implementing erosion control measures, maintaining downstream flows, and measures outlined in DFO guidance. Additionally, during emergency response activities it is expected that fish in the spill zone would be salvaged and fish exclusion fencing would be deployed to reduce fish exposure to spilled material.

Adverse changes to the quality of fish habitat would be expected to reverse following the site clean-up. Additional remedial measures may be required to restore the quality of fish habitat in the restored channel.

Residual adverse effects on fish and fish habitat from an unlikely worst-case derailment causing the spill of concentrate into a watercourse following mitigation and offsetting are predicted to be low in magnitude, limited to the LSA for Fish and Fish Habitat (or an equivalent distance should it occur along the existing spur line), short-term in duration, and reversible. The timing of an accident may affect the severity of any residual adverse effect due to the sensitivity of fish during critical life stages (i.e., fish spawning or migration), whereby the effects may be greater if the spill of concentrate were to occur during such critical life stages; however, the duration of any effects is still anticipated to be short-term in duration.

Migratory Birds and Bird Habitat

Habitat for migratory birds occurs along the rail spur, and in some cases adjacent to watercourses. Examples of migratory bird habitat potentially affected by a concentrate spill in a watercourse along the rail spur include waterfowl nesting areas, woodland raptor nesting habitat, and marsh breeding habitat. There is no confirmed habitat of Special Concern or rare species along the rail spur (Figure 18.2.7 of the Impact Statement).

In the event of a derailment causing a spill of concentrate into a watercourse, migratory birds are expected to be disturbed by the noise associated with a derailment and would likely fly away from the immediate area. Similar to fish habitat, any migratory bird habitats in the vicinity of the spill would be overprinted, including any vegetation or residences in the immediate vicinity of the spill.

During clean-up, localized impacts to migratory bird habitat are anticipated as a result of machinery access, vegetation removal, removal of concentrate from the channel, and restoration of the channel bed and banks. In such an emergency scenario, measures to limit the footprint of disturbance would be employed to the extent practicable, including implementation of several mitigation measures outlined in Sections 18.4.2.2 and 18.4.3.2 of the Impact Statement, such as implementing measures to restrict

clearing, reduce disturbance, control erosion and sediment, train staff, and notify ECCC-Canadian Wildlife Service of the mortality of migratory birds.

Affected vegetation and wetlands would reestablish over time through channel and site restoration and natural dispersion from unaffected portions of either the same community, or adjacent wetland communities, usually within one to two growing seasons.

Residual adverse effects on migratory birds and bird habitat from an unlikely worst-case derailment causing the spill of concentrate into a watercourse following mitigation and offsetting are predicted to be low in magnitude, limited to the LSA for Birds and Bird Habitat (or an equivalent distance should it occur along the existing spur line), short-term in duration, and reversible. The timing of an accident may affect the severity of any residual adverse effect due to the sensitivity of birds during critical life stages (i.e., breeding / nesting), whereby the effects may be greater if the spill of concentrate were to occur during such critical life stages; however, the duration of any effects are still anticipated to be short-term in duration.

Indigenous Peoples

A derailment causing the spill of concentrate into a watercourse would result in localized impacts to fish and fish habitat (habitat, water quality, and flow) and migratory bird habitat within and downstream of a spill. This would result in a temporary disturbance to fishing and navigation, which would be restored through recapturing concentrate and restoring the channel. Use would be restricted until restoration was completed.

The potential for effects on heritage resources may include disruption of sites of cultural importance and would depend upon the size and location of the failure and the proximity to these heritage resources. Should this unlikely scenario unfold, there could be localized overprinting of the watercourse and associated habitats, as well as impacts near the location of the failure.

Residual adverse effects on Indigenous interests from an unlikely worst-case derailment causing the spill of concentrate into a watercourse following mitigation and offsetting are predicted to be moderate in magnitude, limited to the LSA for Indigenous Interests, short-term in duration, and reversible.

Risk Assessment

The likelihood of a plausible worst-case derailment causing the spill of concentrate into a watercourse has been determined to be Very Low.

A potential derailment causing a spill into a watercourse would have a localized effect on surface water, fish and fish habitat, and migratory birds. Since recapturing concentrate material, site clean up, and restoration may take some time (i.e., weeks to months) to fully restore the natural channel, the extent of effects on these VCs would be short-term and would temporarily impede the use of and access to land and water resources for recreational and traditional uses during such restoration activities. Therefore, the severity of consequences is considered to be Very Low to Moderate (in the event that concentrate blocks the flow of water, increasing the extent of downstream effects and ability to navigate). As such, the risk of

a plausible worst-case derailment causing the spill of concentrate into a watercourse is determined to be Negligible to Low (see Table SW-Qual-06-2).

According to Figure 31.2 of the Impact Statement, Negligible risks require no further consideration, while Low risks are considered to be acceptable and additional controls are not likely required.

Table SW-Qual-06-2 Risk Analysis Results

Accident/Malfunction	Likelihood of Event	Severity of Consequences of Event	Risk
Derailment Causing a Concentrate Spill into a Watercourse	Very Low	Very Low to Moderate	Negligible to Low

Attachments

Attachment SW Qual-01 Lorax Environmental - Crawford Nickel Project Upper-Case Source Term Sensitivity

TECHNICAL MEMORANDUM

To:	**Mathieu Boucher (Canada Nickel Company), Grahame Sterling and Jonathan Cooper (Ausenco)**	**Date: 23 December 2025**
From:	**John Dockrey and Okan Aygun (Lorax)**	**Project #: A724-1**
Subject:	**Crawford Nickel Project Upper-Case Source Term Sensitivity**	

1. Introduction

The Crawford Nickel Project (The Project), owned by Canadian Nickel Company (CNC), proposes to develop an open pit mine located 42 km north of Timmins, Ontario. The deposit is a greenfield site with no prior history of mining activity. The Project consists of an open pit, two low grade ore stockpiles, two ore processing plants, a waste impoundment, and a tailings management facility (TMF). The current life of mine is 41 years. Mining of the pit would be complete after 30 years, with ore stockpiles milled for the final 11 years of mine life. Economic recovery of value minerals notably Ni as well as Co, Fe and Cr will occur using a combination of flotation and magnetic separation processes followed by in-process tailings carbonation to mineralize CO_2 within the tailings waste stream. Ore will initially be processed at a rate of 60,000 tpd, with a single mill expansion to increase the milling rate to 120,000 tpd in Year 4.5 of operations. The mine waste facilities will be progressively reclaimed during operations, and the pit will be allowed to passively flood with groundwater and surface runoff from the surrounding catchment following the cessation of mining operations.

Lorax Environmental Services Ltd. (Lorax) was retained by CNC to develop a mine site water quality model (WQM) supported by geochemical source terms developed for key mine site components of the Project. The model used Base-Case source terms meant to represent a best estimate of Project water quality for contact and non-contact water and was submitted as Appendix K of 2024 Crawford Nickel Project Environmental Impact Statement (Lorax, 2024).

Review comments from the Impact Assessment Agency of Canada (IACC) requested a water quality model sensitivity with Upper-Case source terms be developed using 90th or 75th percentile geochemical loading rates (Comment GCH-02d). This technical memorandum provides Upper-Case source terms and water quality results in response to this request, which incorporate the following modifications:

- Humidity cell tests used 90th percentile loading rates calculated from the most recent test results.
- Incorporation hexavalent chromium loading from ultramafic rock types in the impoundment facility using 90th percentile humidity cell loading rates.

- Overburden stored in impoundment facility is represented using shake flask extraction results reported in WSP (2024).
- Mineral solubility controls applied using the 10th percentile pH observed in HCT tests
- Nitrogen source terms using analogue mine data apply 75th percentile nitrogen loss rates from blasting residues.

An overview of the water quality model inputs, approach and data sources used in the Upper-Case and Base-Case source terms is provided in Table 1. Other source term assumptions and the overall modelling approach remain unchanged from what was described in Lorax (2024).

Table 1:
Overview of Water Quality Inputs, Approach and Data Sources

Source Term	Approach	Base-Case	Upper-Case
Waste Rock in Impoundment	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
Pit Walls	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
Ore Stockpile	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
Process Area	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
TMF Beach	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
Overburden	Base-Case – mass base loading Upper-Case- SFE concentrations	Median waste rock HCT Loadings	90th Percentile overburden SFE test results
Process Water	Upscale metallurgical process water using mill water balance	IPT Process Water	IPT Process Water (same as Base-Case)
Background groundwater	Direct application	Baseline monitoring data	Baseline monitoring data (same as Base-Case)
Background surface water	Direct application	Baseline monitoring data	Baseline monitoring data (same as Base-Case)
Nitrogen Species	Nitrogen loss estimate	Median Nitrogen loss estimate from analogue mine	75th Percentile Nitrogen loss estimate from analogue mine

2. Source Term Updates

2.1 Humidity Cell Loading Rates

Geochemical loading rates for ore, tailings and waste rock are calculated from humidity cell tests (HCT). The humidity cell testing program completed for the Crawford Project includes samples

of ore (n=3) waste rock (n=12) and tailings (n=4) (WSP, 2024). At the time of Base-Case model development, there were 19 to 91 cycles (weeks) of test data available. Many of these tests are ongoing, and there are currently 79 to 152 cycles (*i.e.*, weeks) of data are available (**Error! Reference source not found.**).

Humidity cell tests are grouped by material type and lithology, and 90th percentile loading rates are used to calculate Upper-Case loading rates for different mine rock types and tailings (Table 3). These loading rates incorporate all humidity cell test cycles that are currently available. Humidity cell leachate concentrations reported below the method detection limit (DL) are assumed to be 0.5xDL when calculating loading rates. The talc lithology composes 3.8% of the logged lithology at Crawford and has not been characterized by kinetic testing. This is an ultramafic rock type, and is assigned the same HCT loading rate as dunite (the dominant ultramafic rock type) for the purpose of source term calculations.

Table 2:
Humidity Cell Testing Program

Lithology	HCT ID	Material	Date Initiated	Cycles Available
Dunite	CR21-146 510-520	Ore	1-Sep-23	79
	CR22-193A 200-210	Ore	1-Sep-23	79
	P1-Dun-MZ-7	Ore	2-Nov-21	91
	CANA-13	Tailings	5-Apr-22	152
	CBS-003	Tailings	5-Apr-22	152
	CDS-003	Tailings	22-Jun-22	152
Gabbro	CR21-GT-04B 350-360	Waste Rock	1-Sep-23	79
	CR20-41 365-375	Waste Rock	1-Sep-23	79
	P1-Gab-EZ-1	Waste Rock	2-Nov-21	91
Basalt/Metavolcanic	CR21-GT-07 510-520	Waste Rock	1-Sep-23	79
	CR22-GT-11 300-310	Waste Rock	1-Sep-23	79
	CR21-GT-03 300-310	Waste Rock	1-Sep-23	79
	CR21-GT-09B 490-500	Waste Rock	1-Sep-23	79
	P1-MetV-MZ-4	Waste Rock	2-Nov-21	91
Peridotite	CR20-34 555-565	Waste Rock	1-Sep-23	79
	CR20-78 100-110	Waste Rock	1-Sep-23	79
	P1-Per-EZ-2	Waste Rock	2-Nov-21	91
	CBS-001	Tailings	22-Jun-22	141
Pyroxenite	P1-Pyr-MZ-1	Waste Rock	2-Nov-21	91

Table 3:
Humidity cell loading rates applied to Upper-Case source term calculations

Parameter	Dunite Ore	Pyroxenite Waste Rock	Peridotite Waste Rock	Basalt/Metavolcanic Waste Rock	Gabbro Waste Rock	Dunite Tailings	Peridotite Tailings
	mg/kg/month	mg/kg/month	mg/kg/month	mg/kg/month	mg/kg/month	mg/kg/month	mg/kg/month
Sulphate	4.72	1.0	1.62	2.22	1.0	29.2	2.53
Silver	0.0000251	0.000025	0.0000249	0.0000251	0.000025	0.0000247	0.0000228
Aluminum	0.00297	0.0094	0.0059	0.115	0.0308	0.00437	0.000915
Arsenic	0.000465	0.00394	0.000303	0.00523	0.000433	0.000231	0.0000915
Barium	0.00214	0.000672	0.000896	0.00256	0.000307	0.0011	0.0014
Beryllium	0.00000351	0.0000035	0.00000348	0.00000352	0.00000351	0.00000503	0.0000032
Calcium	2.03	3.96	0.989	3.88	1.91	0.374	1.12
Cadmium	0.00000711	0.0000082	0.00000679	0.00000789	0.00000478	0.00000302	0.00000139
Cobalt	0.0000544	0.000041	0.000126	0.000157	0.0000258	0.0000987	0.0000226
Chromium	0.00171	0.00116	0.000407	0.000105	0.000198	0.00422	0.000951
Chromium (VI)	0.00157	0.0007	0.000483	0.000153	0.000228	0.00408	0.000892
Copper	0.000545	0.00073	0.000519	0.000631	0.000533	0.000464	0.000368
Iron	0.00634	0.022	0.00636	0.00605	0.011	0.00919	0.0032
Mercury	0.00000639	0.000005	0.000005	0.00000502	0.00000501	0.00000497	0.00000456
Potassium	0.153	0.307	0.32	2.39	0.692	0.104	0.194
Lithium	0.00609	0.00022	0.000286	0.000306	0.000266	0.000118	0.0000461
Magnesium	39	2.28	11.1	1.42	0.723	37.2	6.68
Manganese	0.000754	0.00188	0.000612	0.00521	0.000807	0.00083	0.000493
Molybdenum	0.00152	0.00169	0.000904	0.0019	0.00123	0.00104	0.000423
Sodium	0.358	0.602	0.269	1.7	0.94	0.747	0.0303
Nickel	0.00118	0.00043	0.00147	0.000327	0.000273	0.00186	0.000472
Lead	0.0000452	0.000045	0.0000448	0.0000464	0.0000466	0.000045	0.0000411
Antimony	0.000451	0.00045	0.000449	0.000907	0.000451	0.000445	0.000411
Selenium	0.000142	0.00009	0.0000596	0.0000998	0.0000567	0.000451	0.0000191
Strontium	0.00648	0.00651	0.00309	0.0194	0.00481	0.00121	0.00149
Thallium	0.00000252	0.0000025	0.0000025	0.00000416	0.00000251	0.00000732	0.00000228
Uranium	0.00232	0.00129	0.00141	0.000723	0.000491	0.00173	0.0000527
Vanadium	0.000041	0.000886	0.0000768	0.00108	0.000754	0.0000298	0.00000974
Zinc	0.001	0.001	0.00133	0.0015	0.001	0.000991	0.000913

2.2 Overburden

Overburden at the project is composed of glacial till containing a heterogenous mix of clay, silt, sand gravel and boulders deposited by glacial action (Ausenco, 2021). No kinetic tests have been completed on overburden samples as part of the baseline characterization program. The metal leaching potential of overburden was assessed through shake flask extractions (SFE), which included 24 tests on non-organic clay and silt material representing overburden that will be stored within the waste impoundment (WSP, 2024).

The Upper-Case source term uses the 90th percentile SFE concentrations to represent water that contacts overburden in the impoundment facility (

Table 4). It is assumed that the amount of infiltration that interacts with overburden is equivalent to the overall proportion of overburden in the impoundment facility (approx. 16%). That is, the concentrations shown in Table 4 are added to 16% of drainage infiltrating the overburden in addition to the load generated from waste rock oxidation represented by HCT tests. In this way, the oxidation of waste rock (as represented by HCT tests) and the influence of overburden is incorporated into the overall impoundment source term.

Recent re-analysis of overburden samples has found that the tests completed in the initial baseline studies likely overestimated water soluble Al, Fe and Cr(VI) owing to the high fines content and associated analytical interference (see comment GCH-02D response). Re-analysis of these tests showed considerably lower Cr(VI) concentrations with median and 90th percentile values of 0.8 µg/L. The Upper-Case source term uses the first round of SFE tests reported in WSP (2024) which showed a much higher 90th percentile Cr(VI) of 3.6 µg/L and is therefore considered highly conservative.

2.3 Nitrogen Losses

Explosives are typically the dominant source of nitrogen (N) compounds (*i.e.,* total ammonia, nitrate and nitrite) in contact waters at mines that use ammonium nitrate (AN) explosives (Pommen, 1983). Source terms for N compounds in Impoundment Facility and Stockpile drainage, and in process water are derived from operational data obtained from an analogue surface mine site described in Lorax (2024). The N loading rate for ore and waste is calculated from median and 75th percentile quality values to be 4.2 and 6.7 g N/t, respectively, and these values are used to calculate the Base-Case and Upper-Case source terms for N species.

Table 4:
90th percentile shake flask extraction results for mineral overburden sample results from WSP (2024)

Parameter	90th Percentile (mg/L)	Parameter	90th Percentile (mg/L)
Sulphate	68	Lithium	0.00824
Silver	<0.00005	Magnesium	6.08
Aluminum	0.267	Manganese	0.00669
Arsenic	0.00586	Molybdenum	0.0161
Barium	0.0291	Sodium	26.4
Beryllium	0.0000205	Nickel	0.00188
Calcium	42.7	Lead	0.000272
Cadmium	0.0000157	Antimony	0.00117
Cobalt	0.000182	Selenium	0.00331
Chromium	0.00418	Strontium	0.331
Chromium (VI)	0.0036	Thallium	0.0000057
Copper	0.01031	Uranium	0.00311
Iron	0.234	Vanadium	0.0114
Mercury	0.000017	Zinc	0.0027
Potassium	5.1		

2.4 Solubility Limits

The Base-Case source term applies the maximum Cr(VI) concentration observed in mafic HCT tests (gabbro, basalt, metavolcanic) to the waste rock term of 0.6 µg/L. The Upper-Case source term assumes conservative upscaling of Cr(VI) loading from ultramafic rock types using 90th percentile HCT rates in the Upper-Case sensitivity. This results in a maximum Cr(VI) impoundment seepage concentration of 7.5 µg/L.

Thermodynamic solubility limits are developed using the United States Geological Survey numerical modelling program PHREEQC coupled to the minteq.v4 database (Parkhurst and Appello, 1999). The speciation pH was decreased from pH 8.3 (median of HCT tests) used in Base-Case source terms, to pH 7.8 (10th percentile of HCT tests) in the Upper-Case scenario to provide conservatism the PHREEQC speciation results.

2.5 Source Term Results

Resulting source term concentrations are presented in Appendix A. Trends for Cr(VI), As and NO_3 in surface runoff are illustrated in Figure 1, and trends for Cr(VI) and As in seepage are shown in Figure 2.

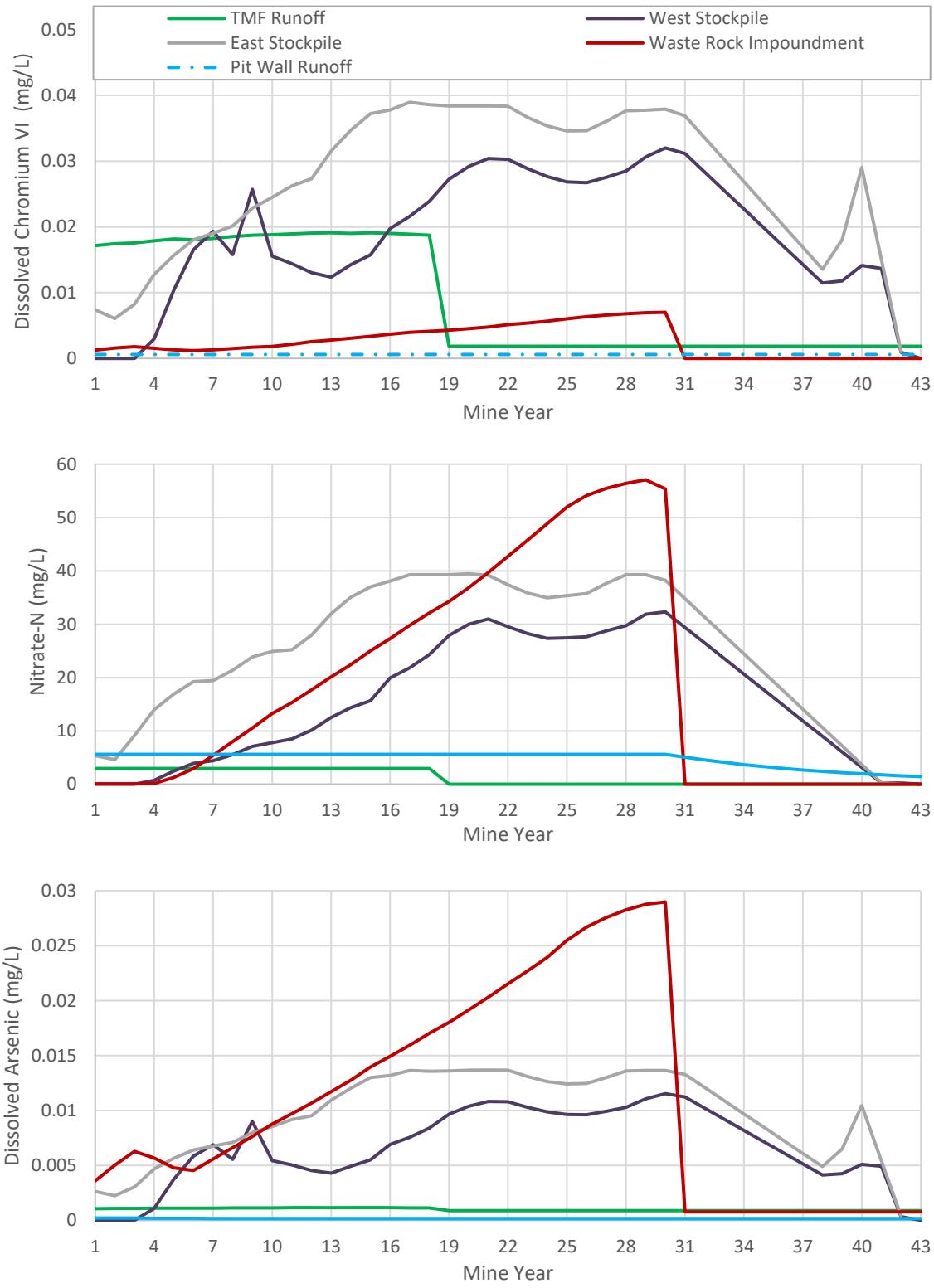


Figure 1: Source term results for dissolved chromium VI (top), nitrate (middle) and arsenic (bottom) in surface runoff from mine facilities.

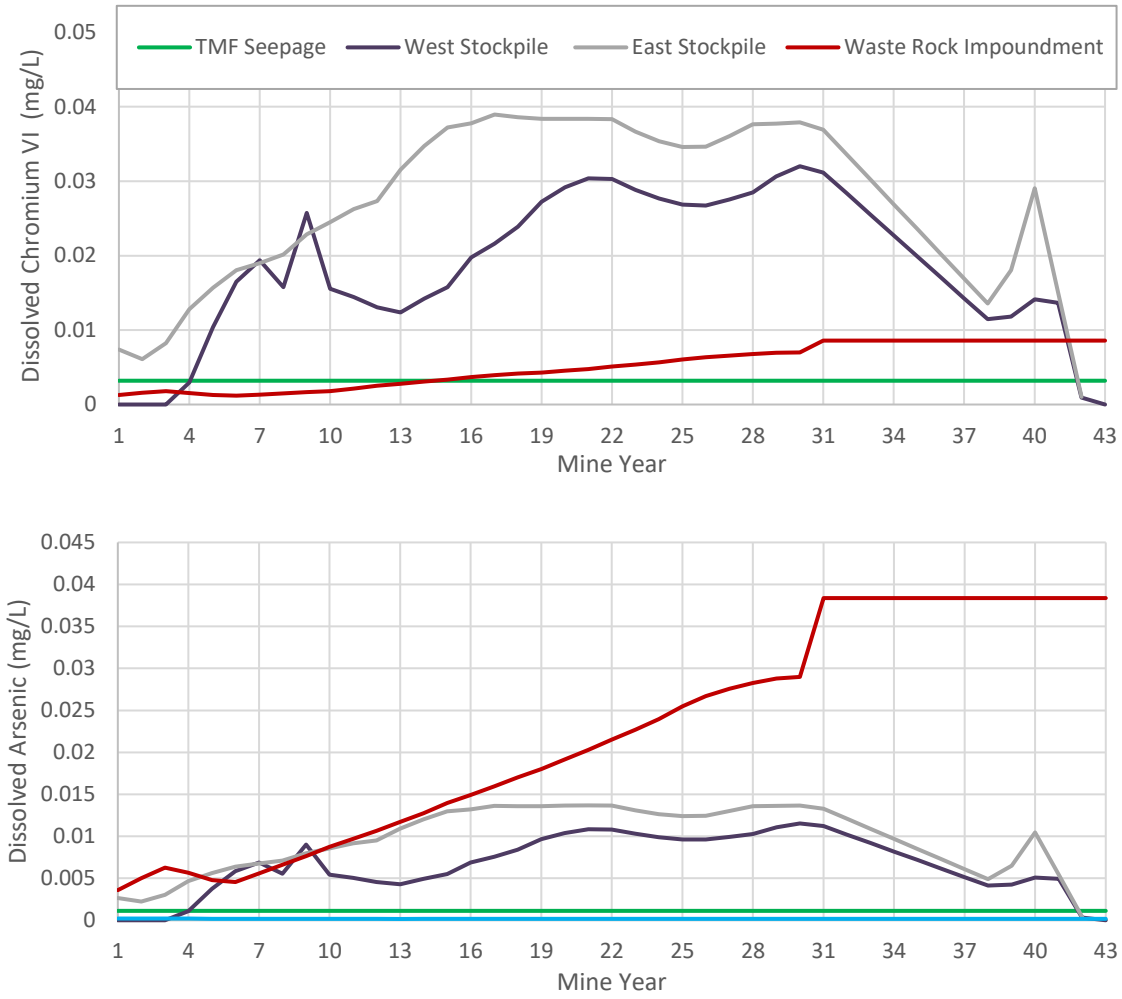


Figure 2: Source term results for dissolved chromium VI (top) and arsenic (bottom) in seepage from mine facilities.

3. Water Quality Model Results

Water quality model results for collection ponds and the mine pit are presented in this section. Model predictions represent monthly mean values, and all constituents are presented as dissolved concentrations in this section. Results for dissolved concentrations are provided in Appendix B along with statistics on total concentrations calculated using a TSS of 10 mg/L, 15 mg/L and 30 mg/L.

Collection Pond and Pit Lake predictions are screened against both end-of-pipe requirements and receiving water quality requirements in this section. The end of pipe requirements are defined by the maximum monthly mean concentrations under Schedule 4 of Metal and Diamond Mining Effluent Regulations (MDMER). The receiving environment criteria are defined using the Ontario Provincial Water Quality Objectives (PWQOs)) or Canadian Council of Ministers of the

Environment's Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (CCME CWQG-FAL) when no PWQO exists or the CCME-CWQG-FAL guideline is newer (MOEE 1994; CCME, 2024). Results are only screened against receiving environment water quality for reference, as these criteria do not apply to mine-site water or end-of-pipe discharge. Concentration trends for As, Cr(VI), and NO_3 are plotted in Figure 3 and 4.

3.1 Collection Ponds

Collection Pond water quality model results for dissolved concentrations are screened against guidelines in Table 5 to Table 10 for the Upper-Case scenario. No exceedances of maximum monthly average MDMER end-of-pipe criteria are identified. Parameters are found to exceed CCME/PWQO criteria in all collection ponds. Parameters which are predicted to be in concentrations above receiving environment criteria in Pond 1 (NO_3, NO_2, Cl, SO_4, As, Cd, Co, Cr(VI), Cu, Se, V and Zn), Pond 2 (NO_3, NO_2, Cl, SO4, As, Cd, Co, Cr(VI), Cu, Se, U, V, Zn), Pond 3 (NO_3, NO_2, Cr(VI), Cu, U, Zn), TMF NE Pond (NO_3, NO_2, As, Cd, Co, Cr(VI), Cu, Se, U, V and Zn); and the TMF NW Pond (NO_3, NO_2, As, Cd, Co, Cr(VI), Cu, Se, U, V and Zn). Parameters exceeding 5x are NO_3, NO_2, As, Cr(VI), Cu, U and V. The greatest magnitude exceedances are for NO_3 and Cr(VI), with NO_3 reaching 18x screening guidelines in Pond 1, and Cr(VI) reaching 27x screening guidelines in Pond 3.

Collection Pond water quality model results for total concentrations assuming a TSS of 30 mg/L are screened against guidelines in for the Upper-Case scenario in Table 11 to Table 16. The total concentrations associated with 10, 15 and 30 mg/L TSS are shown in Table 3-6 of Appendix K of the Project Environmental Impact Statement (Lorax, 2024). This elevated TSS level will contribute sufficient Co (0.00219 mg/L), Fe, (1.73 mg/L), Ni (0.0255 mg/L) and Cr(III) (0.026 mg/L) to exceed guidelines in all ponds for total concentrations. Elevated TSS will also meaningfully increase concentrations of Cu (0.00218 mg/L) and V (0.00251 mg/L) relative to there CCME/PWQO screening guidelines of 0.005 mg/L and 0.006 mg/L, respectively. However, this does not result in additional exceedances beyond what was identified by screening dissolved concentrations.

3.2 Pit Lake

Pit lake water quality model results during the flooding period and after the pit is fully flooded are screened against guidelines in Table 17 and Table 18 respectively. During both periods, there are no exceedances of the maximum monthly average MDMER end-of-pipe criteria. Although some parameters are found to exceed CCME/PWQO criteria during the flooding period (Table 17), no exceedances are predicted for the period after the pit is fully flooded (Table 18). The parameters that exceed the receiving environment criteria during the flooding period included NO_3, NO_2, Cl, SO_4, Co, Cr(VI) and Se. These exceedances are limited to <5x CCME/SWQO guidelines. Owing

to the low energy environment and reduced mining disturbances during the active flooding and post-closure period, the dissolved and total concentrations are assumed to be identical (e.g., low to negligible suspended solids).

3.3 Comparison of Base-Case to Upper-Case Results

Upper-Case and Base-Case results are compared in Figure 3 and Figure 4 for collection ponds and the Pit lake, respectively. In general, the water quality trends are similar between the Upper-Case and Base-Case, as both are driven by the mine schedule and water management. The largest increase between Upper-Case and Base-Case predictions is for Cr(VI), where peak concentrations increase from 0.01 to 0.027 mg/L in collection ponds. This is driven by the 90th percentile HCT rates and changes in Cr(VI) loading assumptions in the waste impoundment. A more muted response is observed for As concentrations due to the 90th percentile loading showing a more modest increase over median loading rates compared to Cr(VI) (Figure 3). A number of dissolved concentrations exceeded screening criteria in the Upper-Case but not the Base-Case in Pond 1 (Cl, SO_4, Cd, Cr(VI)), Pond 2 (Cl, SO_4), Pond 3 (Cl, SO_4, Co, As, Co, Cu, Zn), TMF NE Pond (Co, Zn), and the TMF NW Pond (Cd, Co, Cu, Zn,).

The Pit Lakes receive tailings process water at the end of operations that will form the initial pond water. Filling will be completed with groundwater seepage, surface catchment runoff, direct precipitation, and pit wall runoff. The process water source term was based on IPT tailings metallurgical testing, which was applied to both the Base-Case and Upper-Case source terms. Given that this is a dominant source of the initial load in the pit lake, the concentrations trends are generally similar in Base-Case and Upper-Case scenarios. The flooded pit lake did not exceed screening guidelines in the Base-Case and Upper-Case scenario.

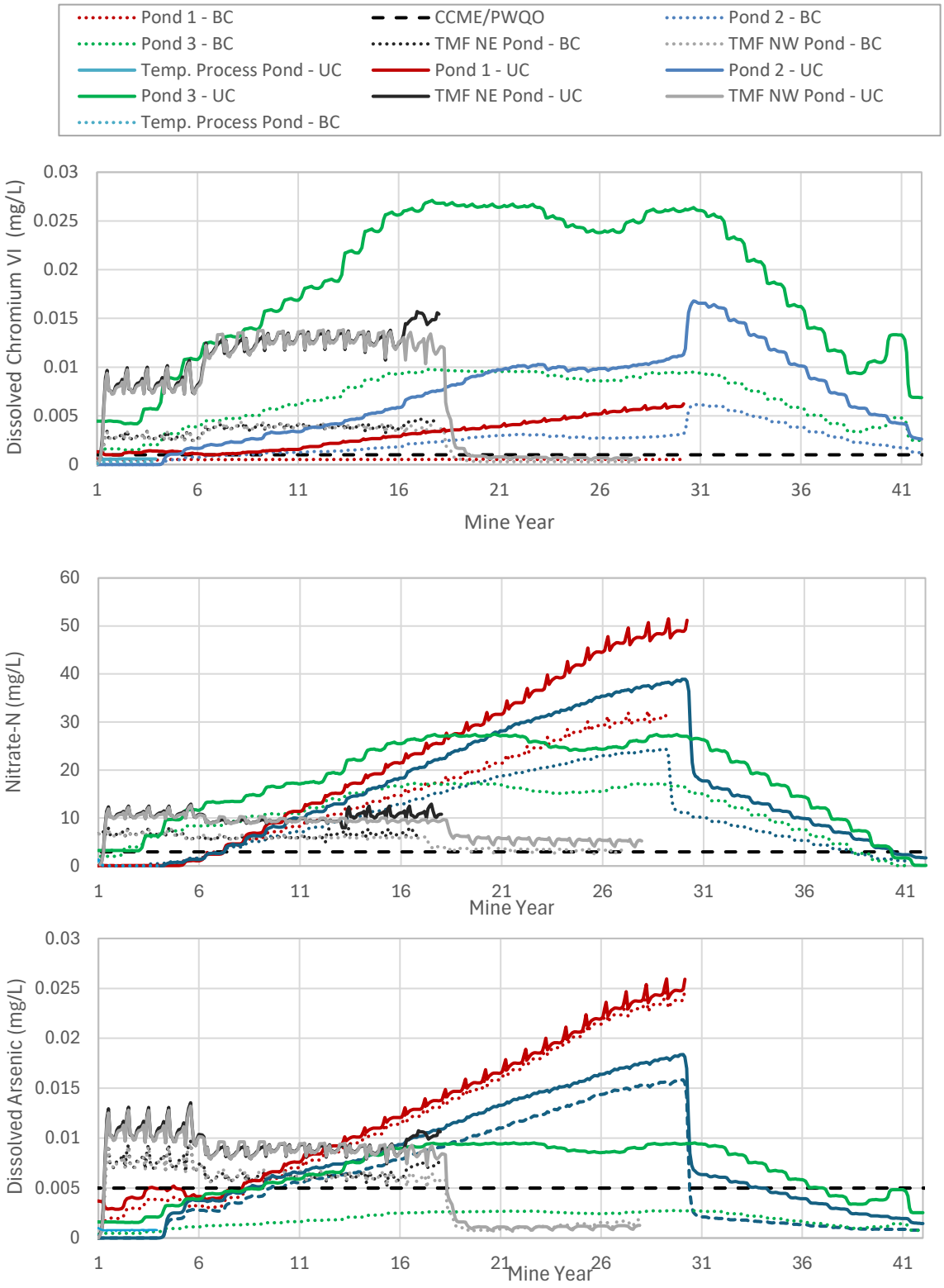


Figure 3: **Water quality model results for Upper-Case (UC) and Base-Case (BC) dissolved chromium VI (top), nitrate (middle) and dissolved arsenic (bottom) in mine water collection ponds compared against receiving environment guidelines (CCME/PWQO).**

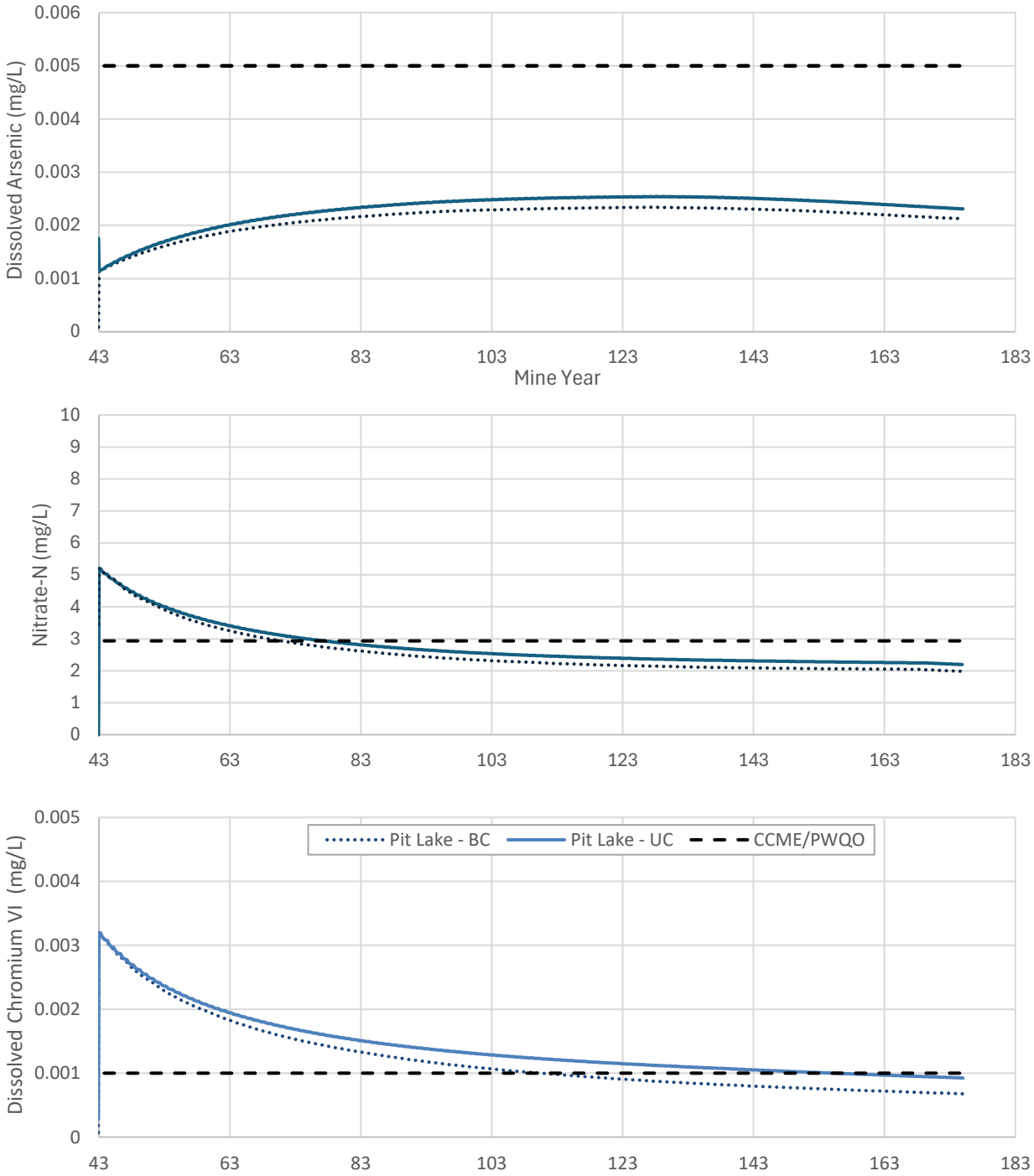


Figure 4: Water quality model results for Upper-Case (UC) and Base-Case (BC) dissolved chromium VI (top), dissolved arsenic (middle) and nitrate (bottom) in closure pit lake compared against receiving environment guidelines (CCME/PWQO).

Table 5:
Water quality results for dissolved concentrations at Collection Pond 1 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.000562	0.00803	0.157	0.338	0.371	2.7	76
Nitrate	mg/L-N	0.0592	0.0768	21.4	46.9	51.5	2.94	-
Nitrite	mg/L-N	0.000419	0.000544	0.151	0.332	0.364	0.06	-
Chloride	mg/L	39.9	52.9	149	155	159	120	-
Sulphate	mg/L	27.4	38.2	132	255	280	218	-
Aluminum	mg/L	0.0485	0.0505	0.0522	0.0543	0.0555	variable**	-
Arsenic	mg/L	0.00287	0.00404	0.0121	0.0235	0.0259	0.005	0.1
Barium	mg/L	0.00502	0.00609	0.0128	0.0206	0.0222	-	-
Calcium	mg/L	20.5	27.1	50	61.7	65.9	-	-
Cadmium	mg/L	0.0000227	0.0000323	0.000112	0.000216	0.000237	0.0001	-
Cobalt	mg/L	0.00017	0.000232	0.000752	0.00144	0.00159	0.0009	-
Chromium III	mg/L	0.000304	0.000447	0.000465	0.000486	0.000499	0.0089	-
Chromium VI	mg/L	0.000982	0.00112	0.00288	0.00558	0.00623	0.001	-
Copper	mg/L	0.00314	0.00437	0.0128	0.0237	0.0259	0.005	0.2
Iron	mg/L	0.0419	0.106	0.11	0.116	0.129	0.3	-
Potassium	mg/L	5.23	7.33	15.2	19	20.2	-	-
Magnesium	mg/L	25.9	30.6	68.5	90.7	98.3	-	-
Manganese	mg/L	0.0228	0.0263	0.0931	0.151	0.16	0.29	-
Molybdenum	mg/L	0.00597	0.00874	0.028	0.0533	0.0582	0.073	-
Sodium	mg/L	9.57	12.6	23.4	28.5	30.3	-	-
Nickel	mg/L	0.00165	0.00236	0.00841	0.0165	0.0182	0.025	0.25
Lead	mg/L	0.000227	0.000317	0.00104	0.00198	0.00217	0.003	0.08
Selenium	mg/L	0.000619	0.00078	0.00174	0.00301	0.00328	0.001	-
Uranium	mg/L	0.00255	0.00369	0.0138	0.0274	0.0301	0.005	-
Vanadium	mg/L	0.00349	0.00521	0.0159	0.0298	0.0324	0.006	-
Zinc	mg/L	0.00425	0.00628	0.0222	0.0429	0.047	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 6:
Water quality results for dissolved concentrations at Collection Pond 2 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.00245	0.194	0.386	0.521	0.742	2.7	76
Nitrate	mg/L-N	0.00685	2.46	14.6	35.7	38.9	2.94	-
Nitrite	mg/L-N	0.000229	0.0421	0.0987	0.246	0.267	0.06	-
Chloride	mg/L	0.566	56.3	125	145	148	120	-
Sulphate	mg/L	0.277	50.9	161	257	280	218	-
Aluminum	mg/L	0.000325	0.013	0.0344	0.0408	0.0432	variable**	-
Arsenic	mg/L	0.0000252	0.00242	0.00691	0.0166	0.0184	0.005	0.1
Barium	mg/L	0.0000358	0.00626	0.0107	0.0166	0.0173	-	-
Calcium	mg/L	0.169	11	35.8	43.7	44.9	-	-
Cadmium	mg/L	0.000000235	0.0000313	0.0000814	0.000168	0.000182	0.0001	-
Cobalt	mg/L	0.0000018	0.00025	0.000675	0.00123	0.00136	0.0009	-
Chromium III	mg/L	0.00000437	0.000324	0.000338	0.000363	0.000438	0.0089	-
Chromium VI	mg/L	0.0000107	0.00229	0.00793	0.013	0.0168	0.001	-
Copper	mg/L	0.0000262	0.00267	0.00764	0.0173	0.0187	0.005	0.2
Iron	mg/L	0.00111	0.0568	0.0583	0.073	0.111	0.3	-
Potassium	mg/L	0.0458	2.43	10.5	12.9	13.2	-	-
Magnesium	mg/L	0.328	36	88.3	107	115	-	-
Manganese	mg/L	0.000178	0.01	0.0515	0.1	0.102	0.29	-
Molybdenum	mg/L	0.0000528	0.0061	0.0179	0.0398	0.0429	0.073	-
Sodium	mg/L	0.0745	3.57	16.3	19.4	19.8	-	-
Nickel	mg/L	0.0000186	0.0031	0.0101	0.0163	0.018	0.025	0.25
Lead	mg/L	0.00000223	0.000235	0.000625	0.00144	0.00156	0.003	0.08
Selenium	mg/L	0.00000436	0.000514	0.00134	0.00246	0.00266	0.001	-
Uranium	mg/L	0.0000285	0.00509	0.0169	0.0274	0.0301	0.005	-
Vanadium	mg/L	0.0000278	0.000687	0.00825	0.0187	0.0199	0.006	-
Zinc	mg/L	0.0000439	0.00522	0.0141	0.0318	0.0344	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 7:
Water quality results for dissolved concentrations at Collection Pond 3 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.00413	0.0533	0.156	0.193	0.195	2.7	76
Nitrate	mg/L-N	0.117	7.37	21.8	27.1	27.5	2.94	-
Nitrite	mg/L-N	0.000826	0.0522	0.154	0.192	0.194	0.06	-
Chloride	mg/L	88.1	132	133	133	134	120	-
Sulphate	mg/L	86.5	161	338	402	412	218	-
Aluminum	mg/L	0.00701	0.0071	0.0072	0.00727	0.00866	variable**	-
Arsenic	mg/L	0.0021	0.00384	0.00788	0.00944	0.00954	0.005	0.1
Barium	mg/L	0.00686	0.00854	0.00922	0.0141	0.0156	-	-
Calcium	mg/L	3.87	5.58	8.32	9.27	9.37	-	-
Cadmium	mg/L	0.0000328	0.000059	0.00012	0.000145	0.000147	0.0001	-
Cobalt	mg/L	0.000342	0.000589	0.0012	0.00145	0.00147	0.0009	-
Chromium III	mg/L	0.000182	0.000185	0.000189	0.000191	0.000214	0.0089	-
Chromium VI	mg/L	0.00568	0.0106	0.0222	0.0265	0.0271	0.001	-
Copper	mg/L	0.00252	0.00453	0.00925	0.0112	0.0113	0.005	0.2
Iron	mg/L	0.0158	0.0158	0.0159	0.016	0.043	0.3	-
Potassium	mg/L	0.437	0.634	0.917	1.04	1.06	-	-
Magnesium	mg/L	67.5	96.5	147	163	165	-	-
Manganese	mg/L	0.00678	0.012	0.0229	0.0275	0.0278	0.29	-
Molybdenum	mg/L	0.00624	0.0114	0.0236	0.0284	0.0289	0.073	-
Sodium	mg/L	0.755	1.09	1.62	1.8	1.82	-	-
Nickel	mg/L	0.00571	0.0101	0.0209	0.0252	0.0256	0.025	0.25
Lead	mg/L	0.000215	0.000386	0.000777	0.000938	0.00095	0.003	0.08
Selenium	mg/L	0.000542	0.001	0.00209	0.0025	0.00255	0.001	-
Uranium	mg/L	0.00933	0.0171	0.0354	0.0427	0.0434	0.005	-
Vanadium	mg/L	0.000344	0.000609	0.00118	0.00145	0.00147	0.006	-
Zinc	mg/L	0.00515	0.00912	0.0185	0.0223	0.0227	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 8:
Water quality results for dissolved concentrations at TMF NE Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0203	0.646	0.902	0.991	1.09	2.7	76
Nitrate	mg/L-N	0.108	9.09	10.1	11.5	12.9	2.94	-
Nitrite	mg/L-N	0.00313	0.0913	0.113	0.126	0.138	0.06	-
Chloride	mg/L	1.71	43.5	48.5	55.3	66.3	120	-
Sulphate	mg/L	5.29	152	172	198	212	218	-
Aluminum	mg/L	0.00061	0.0177	0.0191	0.0289	0.0319	variable**	-
Arsenic	mg/L	0.00035	0.00826	0.00923	0.0111	0.0135	0.005	0.1
Barium	mg/L	0.000311	0.00924	0.0101	0.0111	0.012	-	-
Calcium	mg/L	0.987	24	25.8	32.5	38.2	-	-
Cadmium	mg/L	0.00000324	0.0000792	0.0000872	0.000106	0.000126	0.0001	-
Cobalt	mg/L	0.0000265	0.00075	0.000821	0.000922	0.00104	0.0009	-
Chromium III	mg/L	0.00000701	0.000237	0.000295	0.000522	0.000615	0.0089	-
Chromium VI	mg/L	0.000262	0.00771	0.0124	0.0142	0.0157	0.001	-
Copper	mg/L	0.000366	0.00907	0.0101	0.0117	0.0142	0.005	0.2
Iron	mg/L	0.000852	0.013	0.0396	0.132	0.169	0.3	-
Potassium	mg/L	0.305	7.04	7.82	9.68	11.8	-	-
Magnesium	mg/L	2.4	72.2	80.5	90.6	97.3	-	-
Manganese	mg/L	0.000149	0.00626	0.00773	0.0122	0.0135	0.29	-
Molybdenum	mg/L	0.000813	0.02	0.0223	0.026	0.0316	0.073	-
Sodium	mg/L	0.453	11.3	12.2	14.9	17.6	-	-
Nickel	mg/L	0.000353	0.0104	0.0116	0.0132	0.014	0.025	0.25
Lead	mg/L	0.0000313	0.000796	0.000876	0.00103	0.00121	0.003	0.08
Selenium	mg/L	0.0000663	0.00195	0.00226	0.00257	0.0028	0.001	-
Uranium	mg/L	0.000487	0.0132	0.0146	0.0168	0.0191	0.005	-
Vanadium	mg/L	0.000412	0.00937	0.0105	0.013	0.0159	0.006	-
Zinc	mg/L	0.000685	0.0174	0.0191	0.0222	0.0265	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 9:
Water quality results for dissolved concentrations at TMF NW Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0164	0.366	0.678	0.959	1	2.7	76
Nitrate	mg/L-N	0.26	5.18	9.24	10.5	12.6	2.94	-
Nitrite	mg/L-N	0.00252	0.0171	0.0975	0.12	0.125	0.06	-
Chloride	mg/L	1.38	18.1	45.5	51	64.7	120	-
Sulphate	mg/L	4.26	24.9	158	184	204	218	-
Aluminum	mg/L	0.000491	0.0134	0.0183	0.0276	0.0313	variable**	-
Arsenic	mg/L	0.000282	0.00103	0.00844	0.0103	0.0132	0.005	0.1
Barium	mg/L	0.00025	0.00505	0.00949	0.0105	0.0117	-	-
Calcium	mg/L	0.795	11	24.3	30.6	37.3	-	-
Cadmium	mg/L	0.00000261	0.0000121	0.0000806	0.0001	0.000123	0.0001	-
Cobalt	mg/L	0.0000213	0.000208	0.00078	0.00086	0.00101	0.0009	-
Chromium III	mg/L	0.00000565	0.000269	0.000392	0.000623	0.000677	0.0089	-
Chromium VI	mg/L	0.000211	0.000661	0.00841	0.0135	0.0138	0.001	-
Copper	mg/L	0.000295	0.00103	0.00926	0.0109	0.0138	0.005	0.2
Iron	mg/L	0.000686	0.0262	0.0784	0.127	0.163	0.3	-
Potassium	mg/L	0.246	1.32	7.23	8.98	11.5	-	-
Magnesium	mg/L	1.94	26.1	74.6	86	92.1	-	-
Manganese	mg/L	0.00012	0.00707	0.011	0.022	0.0254	0.29	-
Molybdenum	mg/L	0.000655	0.00378	0.0207	0.0241	0.0308	0.073	-
Sodium	mg/L	0.365	5.73	11.5	14.1	17.2	-	-
Nickel	mg/L	0.000285	0.00396	0.0108	0.0124	0.0136	0.025	0.25
Lead	mg/L	0.0000252	0.000114	0.000812	0.000973	0.00118	0.003	0.08
Selenium	mg/L	0.0000534	0.000234	0.00204	0.00243	0.00257	0.001	-
Uranium	mg/L	0.000392	0.00113	0.0135	0.0154	0.0186	0.005	-
Vanadium	mg/L	0.000332	0.0011	0.00959	0.0121	0.0156	0.006	-
Zinc	mg/L	0.000552	0.00225	0.0177	0.0209	0.0259	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 10:
Water quality results for dissolved concentrations at Temporary Process Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.000439	0.0004425	0.000451	0.003204	1.03	2.7	76
Nitrate	mg/L-N	0.0707	0.07145	0.07285	0.0778	1.96	2.94	-
Nitrite	mg/L-N	0.000438	0.0004425	0.000451	0.0005345	0.0317	0.06	-
Chloride	mg/L	3.76	3.78	3.835	5.435	22.2	120	-
Sulphate	mg/L	4.76	4.805	4.89	4.965	15.7	218	-
Aluminum	mg/L	0.00679	0.006865	0.00699	0.00709	0.0097	variable**	-
Arsenic	mg/L	0.000345	0.000776	0.0007955	0.0008055	0.00081	0.005	0.1
Barium	mg/L	0.000343	0.000347	0.0003535	0.0003585	0.00241	-	-
Calcium	mg/L	13.7	18	18.5	18.7	18.8	-	-
Cadmium	mg/L	0.00000473	0.000004775	0.000004865	0.000004965	0.000044	0.0001	-
Cobalt	mg/L	0.0000257	0.000026	0.0000265	0.00002685	0.000157	0.0009	-
Chromium III	mg/L	0.000181	0.000183	0.0001865	0.0001895	0.00133	0.0089	-
Chromium VI	mg/L	0.000042	0.0002765	0.000283	0.000287	0.000288	0.001	-
Copper	mg/L	0.000502	0.000507	0.0005165	0.000524	0.00147	0.005	0.2
Iron	mg/L	0.00289	0.00292	0.00297	0.00554	0.03	0.3	-
Potassium	mg/L	1.69	5.295	5.43	5.495	5.53	-	-
Magnesium	mg/L	12.6	12.75	13	13.2	53.4	-	-
Manganese	mg/L	0.00149	0.001505	0.00153	0.00158	0.0197	0.29	-
Molybdenum	mg/L	0.00116	0.00118	0.0012	0.001215	0.0033	0.073	-
Sodium	mg/L	7.38	7.45	7.585	7.7	9.8	-	-
Nickel	mg/L	0.000279	0.000282	0.0002875	0.000296	0.0036	0.025	0.25
Lead	mg/L	0.0000418	0.0000422	0.00004295	0.0000436	0.000151	0.003	0.08
Selenium	mg/L	0.0000558	0.0000564	0.0000574	0.0000583	0.000106	0.001	-
Uranium	mg/L	0.0000609	0.00056	0.000574	0.000581	0.000585	0.005	-
Vanadium	mg/L	0.000502	0.000682	0.0006995	0.0007085	0.000712	0.006	-
Zinc	mg/L	0.000904	0.000913	0.0009295	0.0009435	0.00322	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 11:
Water quality results assuming 30ppm total suspended solids at Collection Pond 1 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.000562	0.00803	0.157	0.338	0.371	2.7	76
Nitrate	mg/L-N	0.0592	0.0768	21.4	46.9	51.5	2.94	-
Nitrite	mg/L-N	0.000419	0.000544	0.151	0.332	0.364	0.06	-
Chloride	mg/L	39.9	52.9	149	155	159	120	-
Sulphate	mg/L	27.4	38.2	132	255	280	218	-
Aluminum	mg/L	1.42	1.42	1.42	1.42	1.43	variable**	-
Arsenic	mg/L	0.00298	0.00415	0.0122	0.0236	0.0261	0.005	0.1
Barium	mg/L	0.00807	0.00914	0.0159	0.0237	0.0252	-	-
Calcium	mg/L	21.9	28.4	51.3	63	67.2	-	-
Cadmium	mg/L	0.0000246	0.0000342	0.000114	0.000218	0.000239	0.0001	-
Cobalt	mg/L	0.00236	0.00242	0.00294	0.00363	0.00378	0.0009	-
Chromium III	mg/L	0.0264	0.0265	0.0266	0.0266	0.0266	0.0089	-
Chromium VI	mg/L	0.000982	0.00112	0.00288	0.00558	0.00623	0.001	-
Copper	mg/L	0.00532	0.00655	0.0149	0.0259	0.0281	0.005	0.2
Iron	mg/L	1.77	1.84	1.84	1.85	1.86	0.3	-
Potassium	mg/L	5.33	7.44	15.3	19.1	20.3	-	-
Magnesium	mg/L	29.4	34	71.9	94.1	102	-	-
Manganese	mg/L	0.0532	0.0567	0.124	0.181	0.19	0.29	-
Molybdenum	mg/L	0.00599	0.00876	0.0281	0.0533	0.0583	0.073	-
Sodium	mg/L	9.77	12.8	23.6	28.7	30.5	-	-
Nickel	mg/L	0.0271	0.0279	0.0339	0.042	0.0437	0.025	0.25
Lead	mg/L	0.00027	0.00036	0.00109	0.00203	0.00221	0.003	0.08
Selenium	mg/L	0.000634	0.000795	0.00176	0.00303	0.00329	0.001	-
Uranium	mg/L	0.00255	0.0037	0.0138	0.0274	0.0302	0.005	-
Vanadium	mg/L	0.006	0.00772	0.0184	0.0323	0.0349	0.006	-
Zinc	mg/L	0.00581	0.00784	0.0238	0.0444	0.0486	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 12:
Water quality results assuming 30ppm total suspended solids at for Collection Pond 2 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.00245	0.194	0.386	0.521	0.742	2.7	76
Nitrate	mg/L-N	0.00685	2.46	14.6	35.7	38.9	2.94	-
Nitrite	mg/L-N	0.000229	0.0421	0.0987	0.246	0.267	0.06	-
Chloride	mg/L	0.566	56.3	125	145	148	120	-
Sulphate	mg/L	0.277	50.9	161	257	280	218	-
Aluminum	mg/L	1.37	1.38	1.4	1.41	1.41	variable**	-
Arsenic	mg/L	0.000136	0.00253	0.00702	0.0167	0.0185	0.005	0.1
Barium	mg/L	0.00309	0.00931	0.0138	0.0196	0.0203	-	-
Calcium	mg/L	1.49	12.3	37.1	45	46.2	-	-
Cadmium	mg/L	0.00000218	0.0000332	0.0000833	0.00017	0.000184	0.0001	-
Cobalt	mg/L	0.00219	0.00244	0.00287	0.00342	0.00355	0.0009	-
Chromium III	mg/L	0.0261	0.0264	0.0264	0.0265	0.0265	0.0089	-
Chromium VI	mg/L	0.0000107	0.00229	0.00793	0.013	0.0168	0.001	-
Copper	mg/L	0.00221	0.00485	0.00982	0.0195	0.0209	0.005	0.2
Iron	mg/L	1.73	1.79	1.79	1.8	1.84	0.3	-
Potassium	mg/L	0.15	2.53	10.6	13	13.3	-	-
Magnesium	mg/L	3.74	39.4	91.7	110	119	-	-
Manganese	mg/L	0.0306	0.0404	0.0819	0.131	0.132	0.29	-
Molybdenum	mg/L	0.0000681	0.00612	0.0179	0.0398	0.0429	0.073	-
Sodium	mg/L	0.279	3.77	16.5	19.6	20	-	-
Nickel	mg/L	0.0255	0.0286	0.0356	0.0418	0.0435	0.025	0.25
Lead	mg/L	0.0000453	0.000278	0.000669	0.00149	0.0016	0.003	0.08
Selenium	mg/L	0.0000199	0.000529	0.00135	0.00248	0.00268	0.001	-
Uranium	mg/L	0.000033	0.00509	0.0169	0.0274	0.0301	0.005	-
Vanadium	mg/L	0.00254	0.0032	0.0108	0.0212	0.0224	0.006	-
Zinc	mg/L	0.0016	0.00678	0.0157	0.0334	0.036	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 13:
Water quality results assuming 30ppm total suspended solids at Pond 3 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.00413	0.0533	0.156	0.193	0.195	2.7	76
Nitrate	mg/L-N	0.117	7.37	21.8	27.1	27.5	2.94	-
Nitrite	mg/L-N	0.000826	0.0522	0.154	0.192	0.194	0.06	-
Chloride	mg/L	88.1	132	133	133	134	120	-
Sulphate	mg/L	86.5	161	338	402	412	218	-
Aluminum	mg/L	1.38	1.38	1.38	1.38	1.38	variable**	-
Arsenic	mg/L	0.00221	0.00395	0.00799	0.00955	0.00965	0.005	0.1
Barium	mg/L	0.00991	0.0116	0.0123	0.0172	0.0187	-	-
Calcium	mg/L	5.19	6.9	9.64	10.6	10.7	-	-
Cadmium	mg/L	0.0000348	0.000061	0.000122	0.000147	0.000149	0.0001	-
Cobalt	mg/L	0.00253	0.00278	0.00339	0.00364	0.00366	0.0009	-
Chromium III	mg/L	0.0263	0.0263	0.0263	0.0263	0.0263	0.0089	-
Chromium VI	mg/L	0.00568	0.0106	0.0222	0.0265	0.0271	0.001	-
Copper	mg/L	0.0047	0.00671	0.0114	0.0134	0.0135	0.005	0.2
Iron	mg/L	1.75	1.75	1.75	1.75	1.77	0.3	-
Potassium	mg/L	0.541	0.738	1.02	1.15	1.16	-	-
Magnesium	mg/L	70.9	99.9	150	166	169	-	-
Manganese	mg/L	0.0372	0.0424	0.0533	0.0579	0.0582	0.29	-
Molybdenum	mg/L	0.00625	0.0114	0.0236	0.0284	0.0289	0.073	-
Sodium	mg/L	0.96	1.3	1.82	2.01	2.03	-	-
Nickel	mg/L	0.0312	0.0356	0.0464	0.0507	0.0511	0.025	0.25
Lead	mg/L	0.000259	0.000429	0.00082	0.000981	0.000993	0.003	0.08
Selenium	mg/L	0.000557	0.00102	0.0021	0.00251	0.00256	0.001	-
Uranium	mg/L	0.00933	0.0171	0.0355	0.0427	0.0434	0.005	-
Vanadium	mg/L	0.00285	0.00312	0.00369	0.00396	0.00398	0.006	-
Zinc	mg/L	0.00671	0.0107	0.0201	0.0239	0.0242	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 14:
Water quality results for assuming 30ppm total suspended solids at for TMF NE Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0203	0.646	0.902	0.991	1.09	2.7	76
Nitrate	mg/L-N	0.108	9.09	10.1	11.5	12.9	2.94	-
Nitrite	mg/L-N	0.00313	0.0913	0.113	0.126	0.138	0.06	-
Chloride	mg/L	1.71	43.5	48.5	55.3	66.3	120	-
Sulphate	mg/L	5.29	152	172	198	212	218	-
Aluminum	mg/L	1.37	1.39	1.39	1.4	1.4	variable**	-
Arsenic	mg/L	0.000461	0.00837	0.00934	0.0112	0.0137	0.005	0.1
Barium	mg/L	0.00336	0.0123	0.0131	0.0142	0.015	-	-
Calcium	mg/L	2.31	25.3	27.1	33.8	39.5	-	-
Cadmium	mg/L	0.00000518	0.0000811	0.0000892	0.000108	0.000128	0.0001	-
Cobalt	mg/L	0.00222	0.00294	0.00301	0.00311	0.00323	0.0009	-
Chromium III	mg/L	0.0261	0.0263	0.0264	0.0266	0.0267	0.0089	-
Chromium VI	mg/L	0.000262	0.00771	0.0124	0.0142	0.0157	0.001	-
Copper	mg/L	0.00255	0.0113	0.0122	0.0139	0.0164	0.005	0.2
Iron	mg/L	1.73	1.74	1.77	1.86	1.9	0.3	-
Potassium	mg/L	0.409	7.15	7.93	9.78	11.9	-	-
Magnesium	mg/L	5.81	75.6	83.9	94	101	-	-
Manganese	mg/L	0.0305	0.0367	0.0381	0.0426	0.0439	0.29	-
Molybdenum	mg/L	0.000829	0.02	0.0223	0.026	0.0316	0.073	-
Sodium	mg/L	0.658	11.5	12.4	15.1	17.8	-	-
Nickel	mg/L	0.0259	0.0359	0.0371	0.0387	0.0395	0.025	0.25
Lead	mg/L	0.0000744	0.000839	0.000919	0.00107	0.00126	0.003	0.08
Selenium	mg/L	0.0000818	0.00196	0.00228	0.00259	0.00282	0.001	-
Uranium	mg/L	0.000491	0.0132	0.0146	0.0168	0.0191	0.005	-
Vanadium	mg/L	0.00292	0.0119	0.013	0.0156	0.0185	0.006	-
Zinc	mg/L	0.00224	0.0189	0.0207	0.0238	0.0281	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 15:
Water quality results assuming 30ppm total suspended solids at TMF NW Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0164	0.366	0.678	0.959	1	2.7	76
Nitrate	mg/L-N	0.26	5.18	9.24	10.5	12.6	2.94	-
Nitrite	mg/L-N	0.00252	0.0171	0.0975	0.12	0.125	0.06	-
Chloride	mg/L	1.38	18.1	45.5	51	64.7	120	-
Sulphate	mg/L	4.26	24.9	158	184	204	218	-
Aluminum	mg/L	1.37	1.38	1.39	1.4	1.4	variable**	-
Arsenic	mg/L	0.000393	0.00114	0.00855	0.0104	0.0133	0.005	0.1
Barium	mg/L	0.0033	0.0081	0.0125	0.0135	0.0148	-	-
Calcium	mg/L	2.11	12.3	25.6	31.9	38.6	-	-
Cadmium	mg/L	0.00000455	0.000014	0.0000825	0.000102	0.000125	0.0001	-
Cobalt	mg/L	0.00221	0.0024	0.00297	0.00305	0.0032	0.0009	-
Chromium III	mg/L	0.0261	0.0264	0.0265	0.0267	0.0268	0.0089	-
Chromium VI	mg/L	0.000211	0.000661	0.00841	0.0135	0.0138	0.001	-
Copper	mg/L	0.00247	0.00321	0.0114	0.0131	0.016	0.005	0.2
Iron	mg/L	1.73	1.76	1.81	1.86	1.89	0.3	-
Potassium	mg/L	0.35	1.42	7.33	9.09	11.6	-	-
Magnesium	mg/L	5.35	29.5	78	89.4	95.6	-	-
Manganese	mg/L	0.0305	0.0375	0.0414	0.0524	0.0558	0.29	-
Molybdenum	mg/L	0.000671	0.0038	0.0207	0.0241	0.0308	0.073	-
Sodium	mg/L	0.57	5.94	11.8	14.3	17.4	-	-
Nickel	mg/L	0.0258	0.0295	0.0363	0.0379	0.0391	0.025	0.25
Lead	mg/L	0.0000683	0.000157	0.000855	0.00102	0.00123	0.003	0.08
Selenium	mg/L	0.0000689	0.00025	0.00206	0.00244	0.00259	0.001	-
Uranium	mg/L	0.000397	0.00114	0.0135	0.0154	0.0186	0.005	-
Vanadium	mg/L	0.00284	0.00361	0.0121	0.0147	0.0181	0.006	-
Zinc	mg/L	0.00211	0.00381	0.0192	0.0224	0.0274	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 16:
Water quality results assuming 30ppm total suspended solids at Temporary Process Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.000439	0.000443	0.000451	0.0032	1.03	2.7	76
Nitrate	mg/L-N	0.0707	0.0715	0.0729	0.0778	1.96	2.94	-
Nitrite	mg/L-N	0.000438	0.000443	0.000451	0.000535	0.0317	0.06	-
Chloride	mg/L	3.76	3.78	3.84	5.44	22.2	120	-
Sulphate	mg/L	4.76	4.81	4.89	4.97	15.7	218	-
Aluminum	mg/L	1.38	1.38	1.38	1.38	1.38	variable**	-
Arsenic	mg/L	0.000456	0.000887	0.000907	0.000917	0.000921	0.005	0.1
Barium	mg/L	0.00339	0.0034	0.0034	0.00341	0.00546	-	-
Calcium	mg/L	15	19.3	19.8	20	20.1	-	-
Cadmium	mg/L	0.00000667	0.00000672	0.00000681	0.00000691	0.0000459	0.0001	-
Cobalt	mg/L	0.00222	0.00222	0.00222	0.00222	0.00235	0.0009	-
Chromium III	mg/L	0.0263	0.0263	0.0263	0.0263	0.0274	0.0089	-
Chromium VI	mg/L	0.000042	0.000277	0.000283	0.000287	0.000288	0.001	-
Copper	mg/L	0.00268	0.00269	0.0027	0.0027	0.00365	0.005	0.2
Iron	mg/L	1.73	1.73	1.73	1.74	1.76	0.3	-
Potassium	mg/L	1.79	5.4	5.53	5.6	5.63	-	-
Magnesium	mg/L	16	16.2	16.4	16.6	56.8	-	-
Manganese	mg/L	0.0319	0.0319	0.0319	0.032	0.0501	0.29	-
Molybdenum	mg/L	0.00118	0.0012	0.00122	0.00123	0.00332	0.073	-
Sodium	mg/L	7.59	7.66	7.79	7.91	10	-	-
Nickel	mg/L	0.0258	0.0258	0.0258	0.0258	0.0291	0.025	0.25
Lead	mg/L	0.0000849	0.0000853	0.0000861	0.0000867	0.000194	0.003	0.08
Selenium	mg/L	0.0000713	0.0000719	0.0000729	0.0000738	0.000122	0.001	-
Uranium	mg/L	0.0000654	0.000565	0.000579	0.000586	0.00059	0.005	-
Vanadium	mg/L	0.00301	0.00319	0.00321	0.00322	0.00322	0.006	-
Zinc	mg/L	0.00246	0.00247	0.00249	0.0025	0.00478	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 17:
Water quality results for dissolved concentrations in the Pit Lake during the flooding period (Year 43 to Year 158) screened against end of pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0824	0.176	0.594	1.54	2.28	2.7	76
Nitrate	mg/L-N	2.4	2.43	2.69	3.94	5.2	2.94	-
Nitrite	mg/L-N	0.00000568	0.000161	0.000665	0.0723	0.217	0.06	-
Chloride	mg/L	77.7	82.1	111	224	329	120	-
Sulphate	mg/L	94.8	100	133	257	374	218	-
Aluminum	mg/L	0.012	0.0123	0.014	0.0198	0.0256	variable**	-
Arsenic	mg/L	0.00188	0.00225	0.00264	0.00271	0.00272	0.005	0.1
Barium	mg/L	0.0103	0.0106	0.0111	0.0123	0.0139	-	-
Calcium	mg/L	2.93	7.21	12.3	13.2	13.3	-	-
Cadmium	mg/L	0.00000907	0.0000122	0.0000181	0.0000201	0.0000202	0.0001	-
Cobalt	mg/L	0.000705	0.000743	0.00098	0.00188	0.00273	0.0009	-
Chromium III	mg/L	0.000103	0.000304	0.000534	0.000564	0.000565	0.0089	-
Chromium VI	mg/L	0.000985	0.00103	0.0013	0.00228	0.0032	0.001	-
Copper	mg/L	0.00101	0.0012	0.00152	0.00158	0.00158	0.005	0.2
Iron	mg/L	0.00377	0.0522	0.145	0.186	0.188	0.3	-
Potassium	mg/L	2.13	2.2	2.34	2.62	2.95	-	-
Magnesium	mg/L	54	56.8	73	130	182	-	-
Manganese	mg/L	0.0307	0.0317	0.0355	0.052	0.0696	0.29	-
Molybdenum	mg/L	0.00926	0.00969	0.0119	0.0203	0.0285	0.073	-
Sodium	mg/L	11.1	11.5	13.3	19.9	26.5	-	-
Nickel	mg/L	0.00495	0.0052	0.0067	0.0121	0.0172	0.025	0.25
Lead	mg/L	0.0000906	0.000109	0.000138	0.000144	0.000144	0.003	0.08
Selenium	mg/L	0.00082	0.000861	0.00111	0.00204	0.00294	0.001	-
Uranium	mg/L	0.0000173	0.000683	0.00148	0.00162	0.00162	0.005	-
Vanadium	mg/L	0.000325	0.000836	0.00152	0.00166	0.00167	0.006	-
Zinc	mg/L	0.00201	0.00238	0.00296	0.00306	0.00306	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters. For the purpose of the present analysis, the results are screened against the P75th concentration of D-Al (0.2um) in the North Driftwood River of 0.086 mg/L.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 18:
Water quality results for dissolved concentrations in the Pit Lake after fully flooded (Year 159 to 174) screened against end of pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0000634	0.000425	0.0205	0.0706	0.0826	2.7	76
Nitrate	mg/L-N	2.32	2.33	2.37	2.39	2.4	2.94	-
Nitrite	mg/L-N	0.000144	0.000229	0.000502	0.000735	0.000791	0.06	-
Chloride	mg/L	72.5	73.1	75	77.1	77.7	120	-
Sulphate	mg/L	88.7	89.4	91.6	94.1	94.8	218	-
Aluminum	mg/L	0.0116	0.0116	0.0118	0.0119	0.012	variable**	-
Arsenic	mg/L	0.00244	0.00245	0.0025	0.00255	0.00256	0.005	0.1
Barium	mg/L	0.00877	0.00881	0.00897	0.00913	0.00918	-	-
Calcium	mg/L	12	12.1	12.3	12.5	12.6	-	-
Cadmium	mg/L	0.0000194	0.0000195	0.0000197	0.0000199	0.00002	0.0001	-
Cobalt	mg/L	0.000297	0.000299	0.000305	0.000312	0.000314	0.0009	-
Chromium III	mg/L	0.000554	0.000556	0.000564	0.000573	0.000575	0.0089	-
Chromium VI	mg/L	0.000925	0.000932	0.000954	0.000978	0.000985	0.001	-
Copper	mg/L	0.00147	0.00148	0.0015	0.00152	0.00153	0.005	0.2
Iron	mg/L	0.185	0.186	0.187	0.187	0.188	0.3	-
Potassium	mg/L	2.02	2.04	2.08	2.12	2.13	-	-
Magnesium	mg/L	50.4	50.8	52.1	53.6	54	-	-
Manganese	mg/L	0.0293	0.0295	0.03	0.0305	0.0307	0.29	-
Molybdenum	mg/L	0.00873	0.00879	0.00899	0.0092	0.00926	0.073	-
Sodium	mg/L	10.5	10.5	10.8	11	11.1	-	-
Nickel	mg/L	0.00464	0.00467	0.00479	0.00491	0.00495	0.025	0.25
Lead	mg/L	0.000136	0.000136	0.000138	0.00014	0.000141	0.003	0.08
Selenium	mg/L	0.00077	0.000775	0.000794	0.000814	0.00082	0.001	-
Uranium	mg/L	0.00151	0.00152	0.00155	0.00157	0.00158	0.005	-
Vanadium	mg/L	0.00157	0.00158	0.0016	0.00162	0.00163	0.006	-
Zinc	mg/L	0.00286	0.00287	0.00291	0.00296	0.00297	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

4. Closure

Please contact the undersigned if you require further information or clarification.

Regards,

LORAX ENVIRONMENTAL SERVICES LTD.

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Attachment SW Qual-02 Surface Water Quality - Effluent Mixing

Stantec

Attachment SW Qual-02: Surface Water Quality – Effluent Mixing

1 Introduction

This memorandum provides an update to the Assimilative Capacity Study (ACS) prepared in support of the Project's Impact Statement (IS) (Appendix C.5, Appendix C). The ACS was originally completed in early 2024 and included an assessment of effluent mixing in two receiving watercourses—the West Buskegau River (WBR) and the North Driftwood River (NDR)—using CORMIX modeling and mass balance analysis. The results of that assessment were presented in tabular format and supported by figures illustrating the location of each point where mass balance calculations were performed.

Following regulatory review of the Impact Statement, Information Request (IR) comments were received requesting a re-evaluation of the geographic extent of conceptual effluent mixing under the regulatory scenario. The following comments related to the mixing zone assessment were received and are responded to in this memo:

SW Qual-02.1: *Re-evaluate, in consultation with MECP, the geographic extent of the conceptual effluent mixing under the regulatory scenario.*

SW Qual-02.2: *Discuss the level of confidence that the current project design will result in an effluent mixing scenario that can feasibly align with provincial policies that support issuance of an Environmental Compliance Approval for Industrial Sewage. The assessment should consider, where appropriate, updated modelling, additional effluent treatments, updated discharge parameters, or any other means necessary to improve predictions.*

SW Qual-02.3: *Provide a map of the updated conceptual predicted geographic extent of surface water quality changes caused by effluent mixing under the worst-case regulatory scenario.*

SW Qual-02.4: *If adaptive water management measures are plausible to ensure changes to surface water quality from planned effluent are controlled within suitable limits, outline those measures at a conceptual level. If they are also expected to be incorporated into permitting regimes, describe how.*

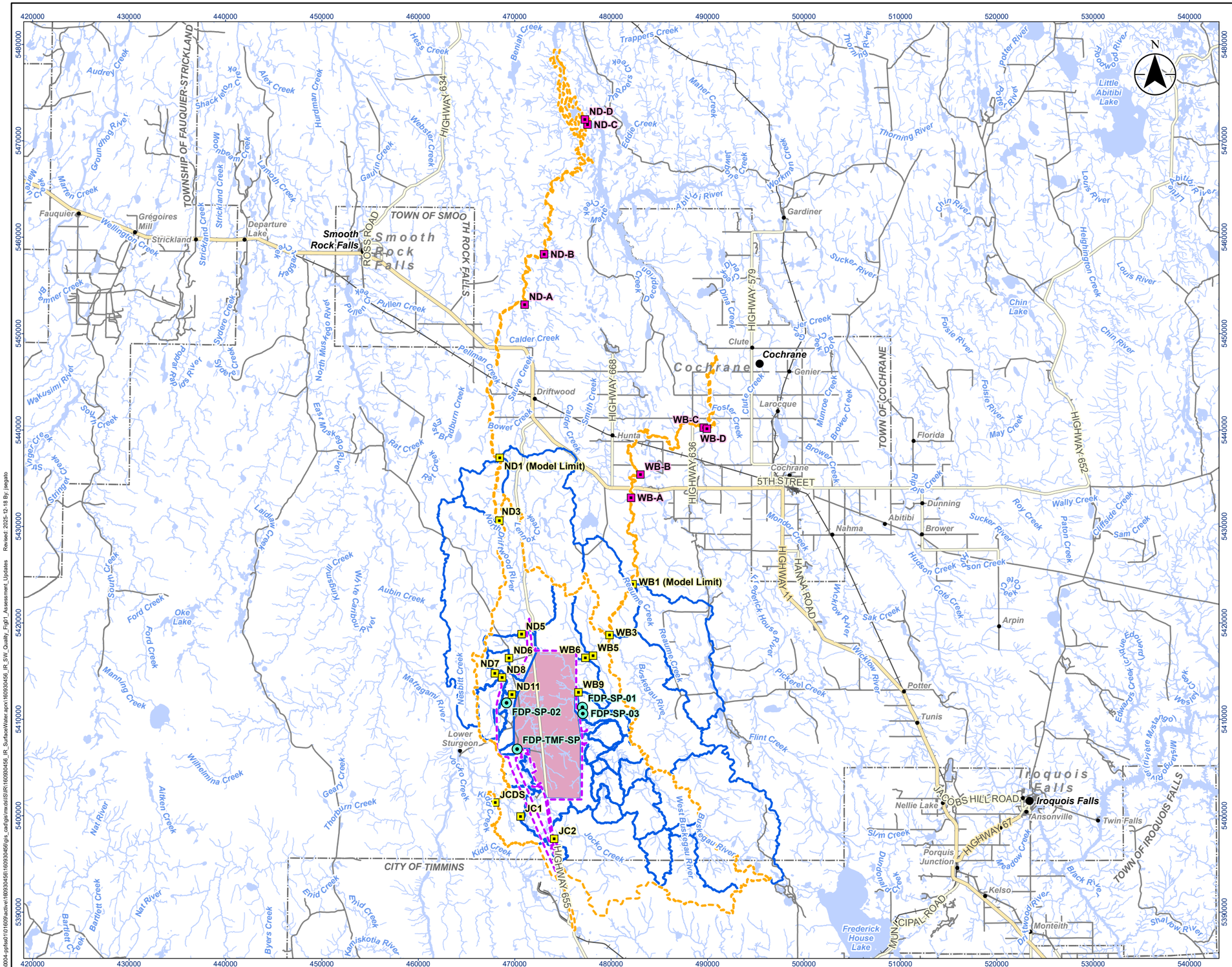
In response to these comments, the ACS was updated to incorporate the outcomes of proposed discharge management scenarios designed to reduce mixing zone lengths. The following two scenarios were evaluated:

- One-to-One (1-to-1) Scenario – Effluent discharge at each final discharge point (FDP) is managed to be equal to the estimated upstream receiver flow considering drainage area changes due to the Project (e.g., discharge is equal to 7Q20 low flow condition upstream receiver flow). This approach was applied to the North Driftwood River and West Buskegau River FDPs.
- Pre- and Post-Development (Pre-&-Post) Scenario – In the most downstream subwatershed on the North Driftwood River (e.g., ND5) that has its drainage area reduced by the Project, the baseline monthly average flow is estimated in the HEC-HMS hydrologic model. With the Project water management infrastructure in place the receiver flow in the same downstream subwatershed is estimated with no FDP discharge using the HEC-HMS hydrologic model. The difference between the baseline and Project with no FDP HEC-HMS model results in the downstream subwatershed represents the max FDP discharges that can be released into that receiver. This potentially can represent a receiver to effluent flow ratio of less than 1 (e.g., 0.8). This approach is also referred to as hydrograph matching where the pre-development hydrograph is preserved in post-development.

These discharge management scenarios were tested through numerical tests to assess their influence on mixing zone extent and their respective capacity to discharge the excess water the mine generates. The updated analysis, as detailed in this memorandum, demonstrates that adjusting effluent discharge ratios relative to receiver flows can significantly reduce mixing zone lengths, resulting in conceptual effluent mixing zones of reduced length.

The purpose of this memorandum is to present the updated ACS results, describe the methodology applied to incorporate discharge management scenarios, and summarize the implications of these changes on mixing zone extent. In addition, this memorandum also intends to provide information required to resolve IR comments.

Mass balance analyses (to demonstrate the extent of mixing zones) were conducted at the same locations as presented in the original ACS appended to the IS (Stantec 2024), which include pourpoints of sub-watersheds across the PA and four points downstream the PA to the confluence of the NDR at the Abitibi river and the confluence of the WBR at the Federick House River (Figure 1). In the rest of this memorandum, references will be made to these points and the distance from final discharge points (FDPs) to these points will be provided. Updates in the ACS aim to address SW Qual-02.1 by providing results of the re-evaluation of effluent mixing and the corresponding mixing zones extent, as well as SW Qual-02.3 by referencing mass balance points in Figure 1 in the results section.



Legend

- Project Area
- Local Study Area
- Regional Study Area

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Watercourse
- Municipal Boundary - Lower Tier
- Waterbody
- Subwatershed Outlet
- Subwatershed Outlet (Outside Model)
- Discharge Location
- Existing Condition Subwatershed
- Subwatershed Reports to Mine Water Management System

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.

Project Location
Timmins, Ontario

160930456 REVA
Prepared by jsegato on 2025-12-18

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
1

Title
Mass Balance Analysis Points in the Project Area and Downstream Areas

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\\Cdn004-pph901101609\active\160930456\160930456\gis_cad\gis\mxds\SW\160930456_IR_SurfaceWater.aprx\160930456_IR_SW_Quality_Fig01_Assessment_Updates Revised: 2025-12-18 By: jsegato

2 Discharge Management

Effluent discharge management plays a critical role in controlling the extent of mixing zones in the receiving watercourses. For this assessment, two discharge points are located along the WBR, identified as the upstream FDP, FDP-SP-03, and the downstream FDP, FDP-SP-01. Two discharge points are located along the NDR, identified as FDP-TMF-Pond (the upstream FDP) and FDP-SP-02 (the downstream FDP). These FDPs are presented in Figure 1 and represent the conceptual effluent release points during construction and operations.

2.1 Description of Discharge Management Scenarios

Two discharge management scenarios were evaluated to address IR comments and reduce the predicted extent of mixing zones:

- One-to-One (1-to-1) Scenario: Under this scenario, effluent discharge at each point was set equal to the available flow in the receiving watercourse at the location of the discharge during low-flow conditions (7Q20). This approach aims to simulate conditions where effluent contributions do not exceed the residual natural flow of the receiver under critical conditions.
- Pre- and Post-Development (Pre-&-Post) Scenario: In this scenario, effluent discharge was set equal to the difference between flows (i.e., 7Q20 in the regulatory case, and mean annual flow in the normal case) under pre-development and post-development conditions in NDR. The rationale for only applying this flow control scenario to the NDR is that a larger percentage of the headwater drainage area is located in the Project Area in comparison to the WBR. This method accounts for changes in hydrology due to project development and aims to match the hydrograph so that the combination of post-development flows and discharge will be equal to pre-development flows and reduce likelihood for flow reduction occurences. For flow calculations, the pourpoint of sub-watershed ND5 (Figure 1) were considered.

Modeling results for Year 17 were used for this analysis. Additionally, water transfer from the FDP-TMF-Pond outflow toward the WBR was incorporated into the assessment as the flow control measures do not allow the collected water to be fully released on a daily basis. This transferred water is assumed to discharge at the location of FDP-SP-01, meaning the discharge at that point represents a combination of flows from FDP-SP-01 and the transfer from TMF water management ponds.

Although the primary focus of the analyses presented in this memorandum is the regulatory scenario, where 7Q20 represents the target low-flow statistic, additional mixing zone assessments were conducted for a normal flow scenario using mean annual flow (MAF) in the receiver to estimate effluent discharge under both 1-to-1 and Pre-&-Post scenarios. These supplementary analyses provide context by illustrating the expected extent of mixing zones under average conditions, in contrast to the regulatory case, which represents a conservative worst-case situation. In addition, sensitivity analysis was also conducted to assess the effects of varying discharge to receiver flow on mixing zones extent, which is described in Section 5.

2.2 Calculation of Discharge at Specific Points

Estimated Mine Year 17 (Operations Phase II) discharge rate values for each flow control scenario and discharge point were calculated based on the assumptions described above (Table 1). Discharge parameters updates presented in this section are intended to address the requested information noted in SW Qual-02.2.

Table 1: Mine Year 17 Estimated Discharge Values at Different FDPs for Regulatory and Normal Cases

Case	Discharge Scenario	Receiver	FDP Discharge (m^3/s)				
			FDP-SP-01	FDP-SP-03	FDP-SP-02	Transfer from TMF Ponds[C]	FDP-TMF-SP
Regulatory	1-to-1	NDR	-	-	0.030	-	0.030
		WBR	0.075	0.027	-	0.122	-
	Pre-&-post	NDR	-	-	0.041	-	0.041
		WBR	n/a	n/a	-	n/a	-
	Impact Statement	[A]	0.324	0.116	0.324	0[B]	0.648
Normal	1-to-1 [D]	NDR	-	-	0.155	-	0.155
		WBR	0.271	0.097	-	0.442	-
	Pre-&-post	NDR	-	-	0.181	-	0.181
		WBR	n/a	n/a	-	n/a	-
	Impact Statement	[A]	0.316	0.036	0.191	0[B]	0.421

Notes:

(A) FDPs discharging to the WBR are FDP-SP-03 and FDP-SP-01
FDPs discharging to the NDR are FDP-TMF-SP and FDP-SP-02

(B) No water transfer from TMF ponds in the Impact Statement

(C) Discharged at the same location at FDP-SP-01

(D) 1 FDP-SP-03 1-to-1 discharge rate is higher than the Impact Statement discharge rate as the receiver 1-to-ratio allows a higher discharge rate than previously modelled.

NDR North Driftwood River

WBR West Buskegau River

n/a Not applicable as the more conservative case of 1-to-1 was considered

3 Water Quality Modelling Updates

The water quality model was updated to represent an upper-case condition, simulating worst-case scenarios for effluent discharge and receiving water quality. See GCH responses for additional details on the water quality model upper-case condition development. These updates were undertaken to reflect conservative assumptions and provide a basis for assessing compliance with applicable water quality objectives. As part of the ACS update, the median predicted concentrations for key parameters were compared against the Provincial Water Quality Objectives (PWQO) and the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG-FAL) to identify any additional Parameters of Potential Concern (PoPC) beyond those previously considered in the Impact Statement.

The updated assessment identified only chloride as exceeding the CWQG-FAL threshold of 120 mg/L at the median upper-case concentration. While chloride was already recognized as a groundwater PoPC and included in the Impact Statement, its surface water assessment was updated to reflect the revised concentration. Similar to the Impact Statement, no treatment criteria were considered for chloride in the present update, and therefore, concentrations used in mass balance calculations were set at median upper case concentrations generated by the water quality model. Similarly, un-ionized ammonia was re-evaluated at the median concentration because it did not have an established treatment criterion at the time of the Impact Statement. For other parameters, the same treatment criteria applied in the Impact Statement were retained.

Given the updated discharge parameters presented in Section 2 and the water quality updates described in this section, the ACS results—including those derived from CORMIX modeling and mass balance analyses—were revised accordingly. Detailed results for parameters are provided in Section 4, which will be used to address SW QUAL-02.1 and SW QUAL-02.2. Geographical extent of mixing zones (based on updated mass balance results) will also be presented in the results section to address SW Qual-02.3.

4 Results

4.1 CORMIX Modelling

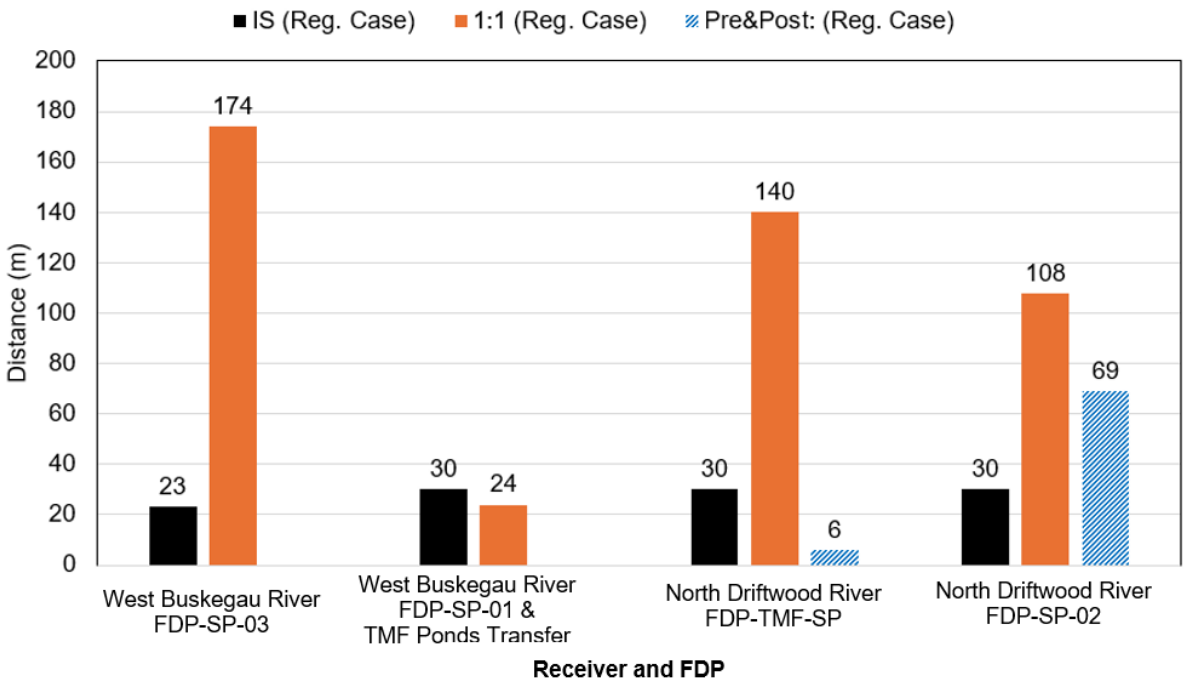
CORMIX modeling was previously presented in the original ACS in the Impact Statement. Because effluent discharges at the four FDPs were updated under the 1-to-1 and Pre-&-Post scenarios, the CORMIX models were revised to reflect these changes. Other than discharge rates, other input variables remained consistent with those presented in the Impact Statement.

Regarding CORMIX results presented in the original ACS, it was noted in the IR comment that “CORMIX mixing zone model inputs were not clearly identified, including background water quality in the West Buskegau and North Driftwood Rivers and the proposed effluent criteria at all discharge points (including if they differ).” Here efforts are focused on clear descriptions of mixing zones to address this comment. However, note that CORMIX was used solely to simulate the distance from each discharge point to the point of full mixing. CORMIX could also be used to predict water quality between discharge points and the respective point of full mixing. However, in this ACS and for water quality assessments, mass balance analyses were applied as detailed in Section 6.2 of the original ACS study, and Section 4.2 of the present memorandum. For these calculations, dilution ratios at the point of full mixing were assumed to be driven by the ratio of effluent discharge to the flow in the receiving watercourse. Concentrations between discharge points and points of full mixing were considered of a secondary importance and were not presented.

4.1.1 Distance to Full Mixing

Figure 2 compares the updated distances to the point of full mixing under the regulatory scenario for the original Impact Statement, the 1-to-1 scenario, and the Pre-&-Post scenario. The regulatory scenario represents low flow in the receiver (7-day low flow, 20-year return period) with 75th percentile of baseline concentrations for the PoPCs, and discharge quality at daily maximum concentrations and the discharge rate based on the flow scenario and receiver flow. The regulatory condition has been setup in alignment with Procedure B-1-5 of Water Management (MOEE 1994). A normal condition was also developed with the receiver flow equal to the mean annual flow (MAF) with mean concentrations of the PoPCs, and discharge quality at the target effluent objective and discharge rate based on the flow scenario and receiver flow. Note that the Pre-&-Post scenario was not considered in the WBR as the 1-to-1 was the more conservative case. Results indicate that the distance to the point of full mixing varied between 6 m in the NDR at FDP-TMF-SP to 174 m in the WBR for FDP-SP-03. In addition, except for the 1-to-1 scenario in the WBR at FDP-SP-01, which includes the combined discharge at FDP-SP-01 and water transfer from TMF ponds, the distance to the point of full mixing at other FDPs increased in comparison to the original Impact Statement due to reduced receiver flow relative to effluent discharge.

Figure 2: Distance to the Point of Full Mixing (m)



Overall, the updated modeling demonstrates that discharge management scenarios significantly influence the distance to the point of full mixing. In the NDR where both 1-to-1 and Pre-&-Post scenarios were considered, the former generally results in longer mixing distances than the latter due to lower effluent-to-receiver flow ratios. FDP-SP-03 had the largest distance to the point of full mixing (174 m) in the WBR due to the smaller magnitude of discharge in comparison to other discharge points.

4.2 Mixing Zone Updates (Regulatory Case)

4.2.1 Concentrations at Full Mixing

The first step in updating the mixing zone assessment was to confirm the treatment criteria for PoPC at the effluent discharge points. These criteria represent the concentrations in treated effluent at the FDPs under the regulatory scenario. Updated discharge parameters were applied as described in Section 2.

Concentrations at the point of full mixing were then calculated using mass balance analysis, consistent with the approach detailed in the original ACS presented in the Impact Statement. This method assumes that dilution at the point of full mixing is driven by the ratio of effluent discharge to the flow in the receiving watercourse.

Figure 3 presents the ratios of effluent concentrations (black bars) and concentrations at the point of full mixing (green bars) for the 1-to-1 scenario relative to applicable guidelines or background levels. For Policy 2 parameters (aluminum, iron, and phosphorus), background concentrations were used for comparison; for other parameters, PWQO or CWQG-FAL values were applied. A Policy 2 parameter is receiver water quality that does not meet the PWQO or CWQG-FAL values and is defined by Procedure B-1-5 as it shall not be further degraded and practical measures should be taken to improve the water quality to the PWQO values.

Reference: **Surface Water Quality – Effluent Mixing**

Figure 3: Ratios of Concentrations to Guidelines/Background for West Buskegau River (a) and North Driftwood River (b) in the 1-to-1 Scenario

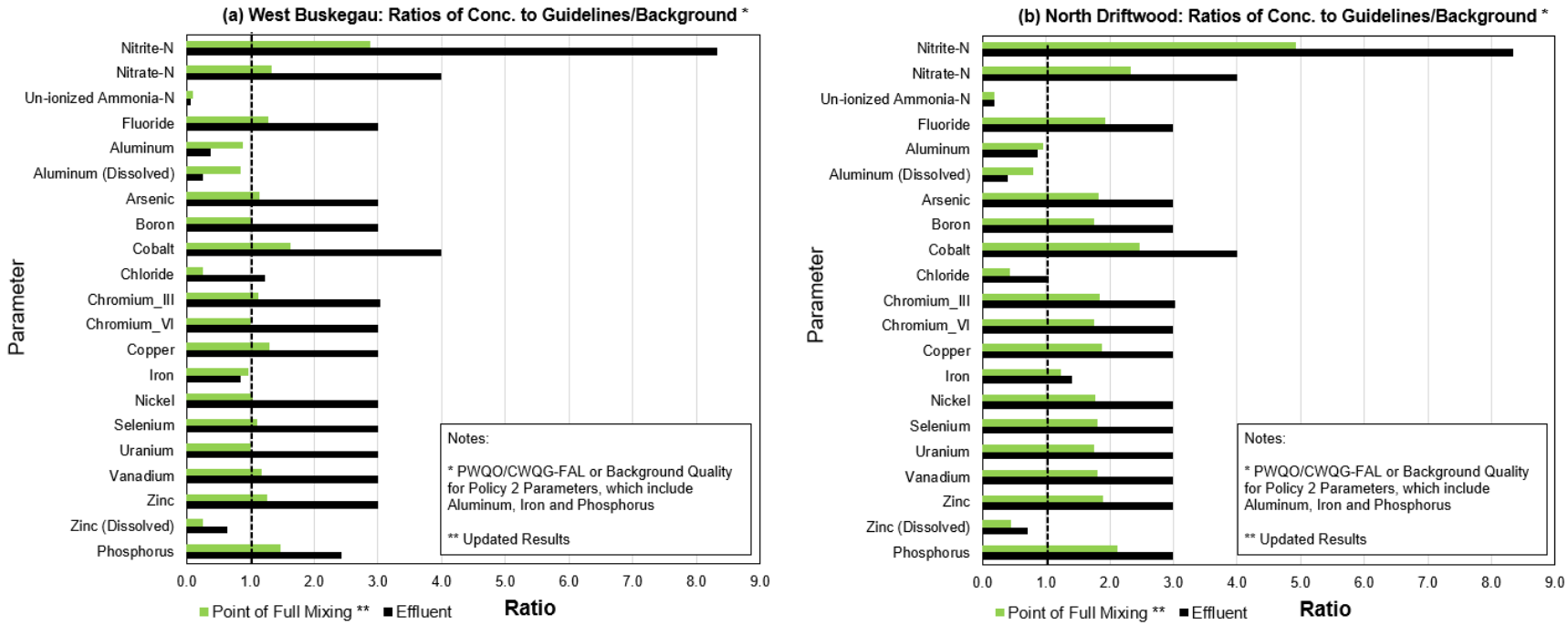


Figure 3 indicates that effluent is discharged at concentrations that vary relative to guidelines or background. Some parameters, such as un-ionized ammonia, aluminum, iron, and dissolved zinc, are discharged at levels that are a fraction of the applicable guideline or background. Others, such as nitrite, are discharged at concentrations up to ~8 times the CWQG-FAL. Most parameters fall within the range of approximately three (3) times the guideline or background level.

After mixing (i.e., green horizonal bars in Figure 3), concentrations at the point of full mixing decrease substantially and approach guideline or background levels. For most parameters, concentrations drop to below the guideline/background or up to two (2) times that level. The exception is nitrite, which remains elevated at 4–5 times the guideline/background in the NDR even after full mixing.

Concentration ratios presented in Figure 3 are associated to the first point in receivers where effluent is mixed with receiver waters. As water moves downstream, these concentrations are expected to further decrease due to natural assimilation processes in the receiving watercourses. This trend will be demonstrated in subsequent sections of this memorandum.

4.2.2 Mixing Zones Extent; 1-to-1 Scenario

Consistent with the approach presented in the original ACS, mass balance results are reported at the pour points of sub-watersheds within the Project Area and at four locations downstream of the Project Area (Figure 1). For the NDR, these locations extend up to 87.1 km downstream of the discharge points. The extent of the mixing zone is expressed as the distance from the downstream FDP (FDP-SP-02) to the point where concentrations meet applicable guidelines or background levels. For the WBR, the reported extent of mass balance results are up to 41.3 km downstream of FDP-SP-01. Figure 4 presents the locations of the extents of 1-to-1 mixing zones in the NDR and WBR for the different POPCs

Figure 5(a) compares the extent of mixing zones for each parameter under the original Impact Statement (blue bars) and the updated 1-to-1 scenario (red bars) in the NDR. The stars in the figure indicate the point of full mixing, which is the downstream edge of the mixing zone in both the original and updated cases. Figure 5(b) compares the extent of mixing zones in the WBR in the 1-to-1 scenario.

The updated results show a substantial reduction in mixing zone lengths compared to the original ACS. Under the Impact Statement assumptions, mixing zones for several parameters in the NDR extended close to the full 87.1 km assessment limit. In contrast, under the 1-to-1 scenario, these distances are significantly shorter—generally less than 30 km, and in many cases below 20 km Figure 5(a). Iron and phosphorus, for which no reduction in the extent of mixing zone was achieved in the NDR in comparison to results presented in the Impact Statement are among Policy 2 parameters with limited assimilative capacity offered by receivers.

Similarly, the updated scenario in the WBR shows a marked reduction in mixing zone lengths for most parameters compared to the original ACS. Under the Impact Statement assumptions, several parameters extended close to the full 41.3 km assessment limit in the WBR. In contrast, under the 1-to-1 scenario, these distances are significantly shorter for arsenic, boron, chromium VI and III, nickel, selenium, uranium, and vanadium, generally falling below 25 km, and in some cases below 15 km, which are similar to the NDR results.

Phosphorus

Nitrite

Nitrate
Fluoride
Arsenic
Cobalt
Chromium III
Chromium VI
Copper
Selenium
Vanadium
Zinc

Boron
Nickel
Uranium

Un-Ionized Ammonia
Aluminum
Aluminum (Dissolved)
Chloride
Zinc (Dissolved)

Nitrite
Nitrate
Fluoride
Cobalt
Copper
Zinc
Phosphorus

Vanadium

Arsenic
Chromium III
Nickel
Selenium

Boron
Chromium VI
Uranium

Un-Ionized Ammonia
Aluminum
Aluminum (Dissolved)
Chloride
Iron
Zinc (Dissolved)

ND-D
ND-C
ND-B
ND-A
ND1 (Model Limit)
ND3
ND5
ND6
ND7
ND8
ND11
WB1 (Model Limit)
WB3
WB5
WB6
WB9
WB-A
WB-B
WB-C
WB-D
FDP-SP-01
FDP-SP-02
FDP-SP-03
FDP-TMF-SP
JCDS
JC1
JC2

Stantec

CANADA NICKEL COMPANY

Legend

- Project Area
- Local Study Area
- Regional Study Area

Base Features

- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Watercourse
- Municipal Boundary - Lower Tier
- Waterbody
- Subwatershed Outlet
- Subwatershed Outlet (Outside Model)
- Discharge Location
- Existing Condition Subwatershed
- Subwatershed Reports to Mine Water Management System

0 5 10 km

1:400,000 (At original document size of 11x17)

Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2023.
3. Refer to 'Attachment SW Qual-02.2' for details about parameters and their mixing zones.



Project Location
Timmins, Ontario

160930456 REVA
Prepared by jsegato on 2025-12-18

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
4

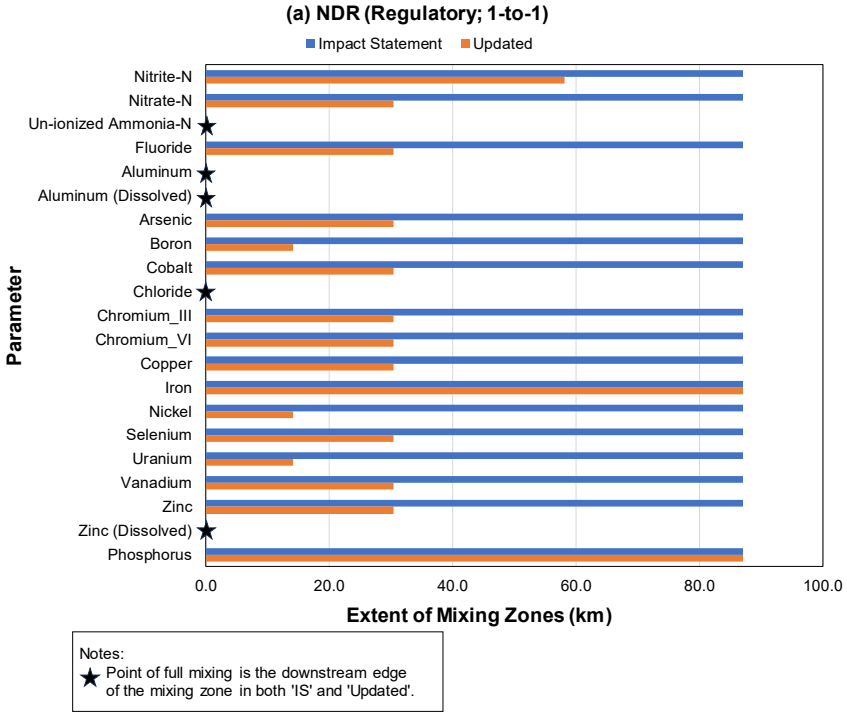
Title
Extent of Mixing Zones in 1-to-1 Discharge Scenario (Regulatory Condition)

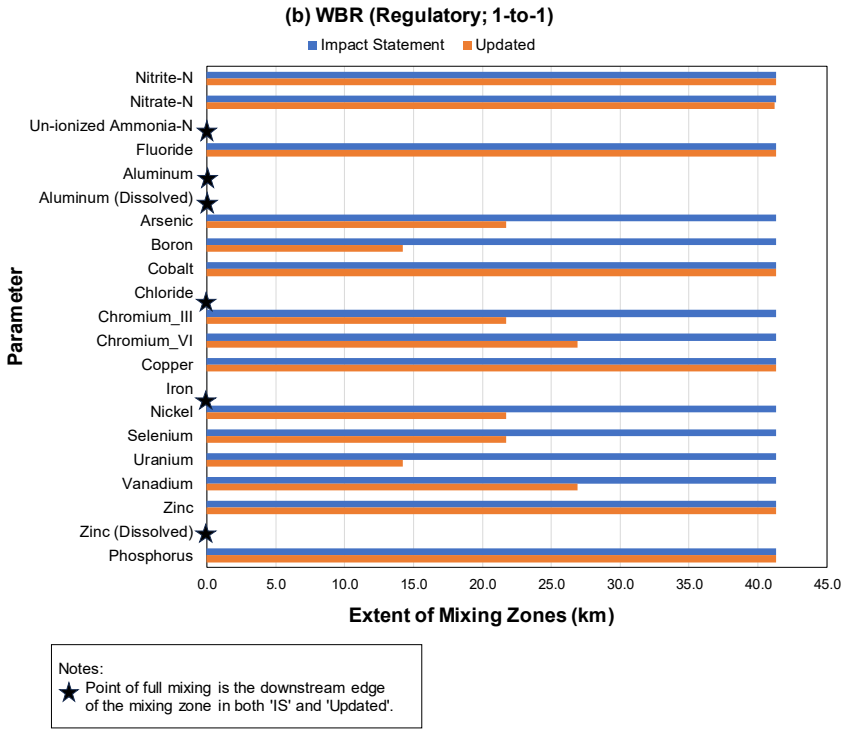
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\\Ca0004-pfs\sol1\01\160930456\active\160930456\16093045 6\gis_cad\gis\mxd\SW\R\160930456_IR_SurfaceWater.aprx\160930456_IR_SW_Quality_FigK_1_to_1 Revised 2025-12-18 By: jsegato

Reference: **Surface Water Quality – Effluent Mixing**

Figure 5: Mixing Zone Extent in NDR (a) and WBR (b); Regulatory Case, 1-to-1 Scenario



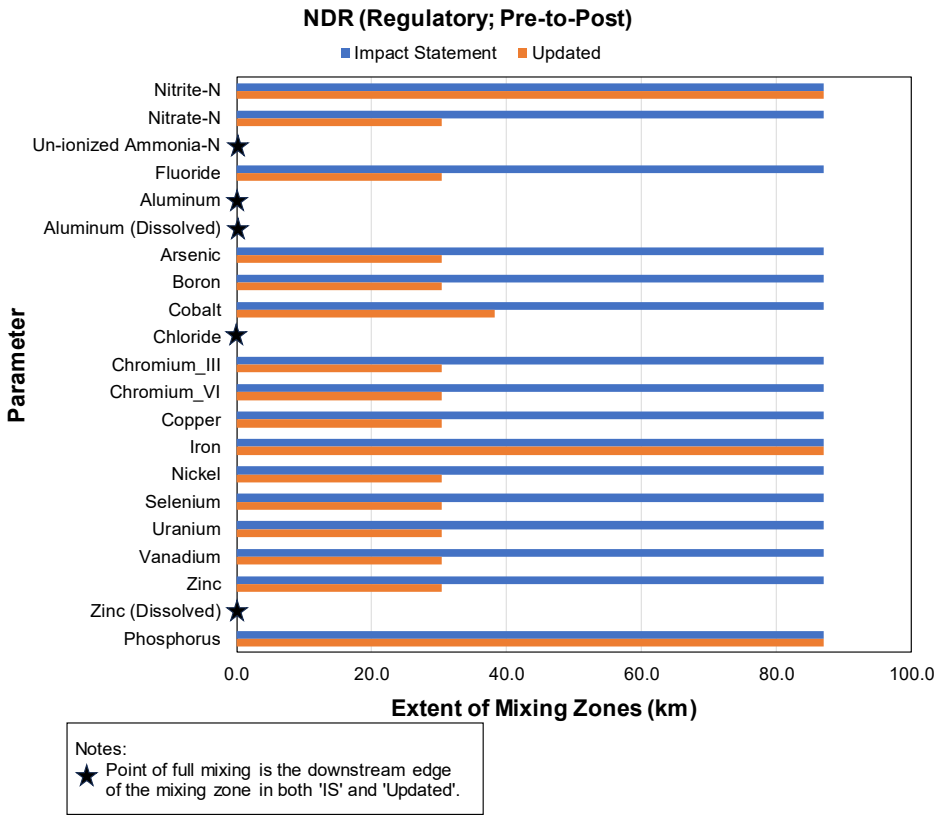


The improvement in mixing zones within the NDR and WBR is achieved solely through discharge management, without any changes to treatment criteria. The results highlight the critical role of discharge control in reducing mixing zone lengths and improving alignment with provincial policy expectations. By adjusting effluent volumes relative to receiver flows, the updated scenario demonstrates a feasible approach to minimizing downstream water quality impacts. Section 5, which discusses sensitivity analysis results, further demonstrate the role of discharge management in controlling the extent of mixing zones.

4.2.3 Mixing Zones Extent; Pre-&-Post Scenario

Mass balance results were identified in the Pre-&-Post scenario only for the NDR, as the 1-to-1 scenario in the WBR was considered as the more conservative case between 1-to-1 and Pre-&-Post scenarios. Figure 6 compares the extent of mixing zones for each parameter under the original Impact Statement (blue bars) and the updated Pre-&-Post scenario (orange bars).

Figure 6: Mixing Zone Extent in the North Driftwood River; Regulatory Case, Pre-&-Post Scenario



The updated scenario shows a significant reduction in mixing zone lengths (from 87.1 km to less than 30 km for the majority of parameters). Other than nitrite, iron and phosphorus, other parameters exhibited reduction in the mixing zone extent. The findings in the Pre-&-Post scenario are similar to results presented in the 1-to-1 scenario. Under the Impact Statement assumptions, several parameters extended close to the last mixing point in the NDR at the confluence of the NDR and the Abitibi River. In contrast, under the Pre-&-Post scenario, these distances are significantly shorter, generally falling below 30 km. Figure 7 presents the locations of the extents of Pre-&-Post mixing zones in the NDR for the different POPCs

Among parameters with no reduction in mixing zone length, Iron and phosphorus are Policy 2 parameters in the system that would limit its assimilative capacity. For nitrite, as mass balance calculations presented in the ACS do not account for in-stream cycling, they overestimate the mixing zone because nitrite is assumed as a conservative constituent (i.e., fully mixed downstream without transformation). Nitrite is inherently unstable in aquatic systems, typically undergoing rapid oxidation to nitrate via nitrite-oxidizing bacteria (nitrification), or, under low-oxygen conditions, further reduced to nitrogen gases. Health Canada notes that “nitrate is found more commonly than nitrite in aqueous environments, as the nitrite ion is more unstable” (Health Canada 2013).

Phosphorus

Nitrite

Cobalt

Nitrite
Fluoride
Arsenic
Boron
Chromium III
Chromium VI
Copper
Nickel
Selenium
Uranium
Vanadium
Zinc

Un-Ionized Ammonia
Aluminum
Aluminum (Dissolved)
Chloride
Zinc (Dissolved)

ND-D
ND-C
ND-B
ND-A
ND1 (Model Limit)
ND3
WB1 (Model Limit)
ND5
ND6
ND7
ND8
ND11
WB-A
WB-B
WB-C
WB-D
WB3
WB5
WB6
WB9
FDP-SP-01
FDP-SP-02
FDP-SP-03
FDP-TMF-SP
JCDS
JC1
JC2

Smooth Rock Falls
TOWN OF SMOOTH ROCK FALLS
TOWNSHIP OF FAUQUIER-STRICKLAND
TOWN OF COCHRANE
CITY OF TIMMINS
Cochrane
Gardiner
Clute
Genier
Larocque
Driftwood
Hunta
Cochrane
5TH STREET
Dunning
Abitibi
Nahma
Brower
Florida
Monteith
Kelso
Porquis Junction
Nellie Lake
Potter
Tunis
Arpin
Côté
Fauquier
Grégoires Mill
Strickland
Departure Lake
Lower Sturgeon
Frederick House Lake
Little Abitibi Lake
Chin Lake

HIGHWAY 11
HIGHWAY 634
HIGHWAY 579
HIGHWAY 668
HIGHWAY 636
HIGHWAY 652
HIGHWAY 655
HIGHWAY 67
ROSS ROAD
HANNA ROAD
JACOBS HILL ROAD
MUNICIPAL ROAD

Thorning River
Abitibi River
Sucker River
Chin River
Louis River
Foisie River
Flint Creek
Calder Creek
Pullen Creek
Pellman Creek
Bower Creek
Jocko Creek
Kidd Creek
Lennox Creek
Aubin Creek
Sak Creek
Pickerel Creek
Wicklow River
Frederick House River
Burstegau River
West Burstegau River
North Driftwood River
North Mustigo River
Mattagami River
Groundhog River
Marten Creek
Wellington Creek
Strickland Creek
Hagger Creek
Sydere Creek
Salve Creek
Bradburn Creek
Smith Creek
Clute Creek
Foster Creek
Munroe Creek
Brower Creek
Roy Creek
Wally Creek
Cliffside Creek
Sam Creek
Paton Creek
Hudson Creek
Wesley Creek
Marion Creek
Nat River
Aitken Creek
Thorburn Creek
Geary Creek
Barnett Creek
Enid Creek
Byers Creek
Kapuskotia River
Shallow River
May Creek
Slim Creek
Dundonald Creek
Oke Lake
South Creek
Manning Creek
Nesbitt Creek
Lower Sturgeon
Kingsmill Creek
Wavy Creek
Carbonneau River
Rat Creek
Stringer Creek
Lawyer Creek
East Mustigo River
Benard Creek
Trappers Creek
Hess Creek
Eddie Creek
Maher Creek
Workman Creek
Potter River
Flood Wood River
Little Abitibi River
Audrey Creek
Shackleton Creek
Moose Creek
Lamarche Creek
Gaulin Creek
Marten Creek
Wellington Creek
Strickland Creek
Hagger Creek
Sydere Creek
Palmer Creek
Wakusmi River
Nat River
Barnett Creek
Enid Creek
Kapuskotia River
Byers Creek
Aitken Creek
Thorburn Creek
Geary Creek
Kidd Creek
Jocko Creek
Flint Creek
Calder Creek
Bower Creek
Pellman Creek
Pullen Creek
Rat Creek
Lennox Creek
Aubin Creek
Oke Lake

4.3 Mixing Zone Updates (Normal Case)

Similar mixing zone assessments conducted for the regulatory scenario were also performed for the normal flow scenario. The key difference is that, in the normal case, mean annual flow in the receiving watercourse was used to estimate discharge under both the 1-to-1 and Pre-&-Post scenarios. As a result, the magnitude of discharge is greater, and more water is available in the receiver for mixing. Results for the NDR (both discharge scenarios) and for the WBR (1-to-1 scenario only) are presented in Tables 2, which summarizes findings for the NDR and the WBR in both discharge scenarios.

Table 2: Mixing Zone Extent in Receivers in the Normal Case

	Receiver					
	North Driftwood River			West Buskegau River		
Description	Impact Statement	1-to-1	Pre-&-Post	Impact Statement	1-to-1	Pre-&-Post
Parameters with Mixing Zones beyond Full Mixing Point	Nitrate	None	None	None	None	n/a
Extent of Mixing Zone	3.6 km	-	-	-	-	n/a

Under the normal flow scenario for the NDR, mixing zones in the 1-to-1 and Pre-&-Post scenario ended between discharge point and the point of full mixing. Same conditions were true in the Impact Statement with the exception of nitrate, for which the mixing zone extended approximately 3.6 km downstream from the discharge location. The reduction of the mixing zone of nitrate is attributed to discharge management. For the WBR, both Impact Statement and updates results indicated that mixing zones were prior to the point of full mixing for the entire set of PoPCs. Figure 2 shows the distance to the point of full mixing in the two receivers.

5 Sensitivity Analysis

To evaluate the influence of discharge management on mixing zone length, a sensitivity analysis was conducted using two scenarios based on the 7Q20 low-flow statistic of the receiving streams. The first sensitivity analysis scenario was the 1-to-1 discharge scenario, and second scenario involved further reducing discharge by half, i.e., a 1-to-0.5 ratio where discharge was set equal to half of the 7Q20 flows. Mass balance calculations were applied under the second scenario to compare results with those in the first scenario. Figure 8 illustrates the comparative mixing zone lengths for the two scenarios.

The results clearly show noticeable improvements when the effluent discharge is reduced to half of the 7Q20 flow. For most parameters, the mixing zone length decreases substantially, with reductions being particularly significant in the NDR for nitrate, fluoride, arsenic, boron, chromium III and VI, copper, nickel, selenium, uranium, vanadium, and zinc. In the NDR, other than iron and phosphorus (as Policy 2 parameters) and nitrite (which is a conservative estimate due to not accounting for the respective processes in watercourses), and cobalt, other parameters had mixing zones in the NDR that were smaller than 5 km. Cobalt concentrations in the mixing zone in the NDR ranged between the PWQO value of 0.9 µg/L to 1.5 µg/L.

In the WBR, even though there were reduction in mixing zones in the 1-to-0.5 scenario compared with the 1-to-1 scenario, reductions were more moderate than those in the NDR. Nitrite and phosphorus had mixing zones that extended to the confluence of the WBR with the Frederick House River, and cobalt had a 22-km mixing zone (with concentrations ranging from 0.9 µg/L to 1.4 µg/L, ~60% higher than the PWQO). Other parameters had mixing zones that extended from the point of full mixing in the WBR to 14 km downstream (smaller than the 22-km mixing zone in the 1-to-1 scenario).

Results indicate that reducing discharge from 1-to-1 to 1-to-0.5 significantly decreases the mixing zone extent, demonstrating the importance of discharge control in minimizing downstream water quality impacts. These findings suggest that dynamic discharge strategies based on the hydrograph are worth exploring in subsequent (e.g., permitting) phases. Such an approach could further reduce mixing zones during sensitive low-flow periods for regulatory compliance objectives, while optimizing operational flexibility during higher flows. This is related to SW Qual-02.4, which required demonstrating (at the conceptual level) the plausibility of adaptive water management measures for controlling changes to surface water quality from planned effluent.

The foregoing assessment demonstrates that discharge management in relation to receiver flow can reduce the *in situ* concentrations of PoPCs at the point of full mixing. The assessment also demonstrates that discharge management can substantially reduce the extent of mixing zones to lengths that are reasonable and expected to be in line with Ontario approval policy for mixing zones.

Both the NDR and WBR are Policy 2 receivers for parameters with proposed longer mixing zones such as iron and phosphorus because of the conservative assumption that all downstream contributing waters are Policy 2 as well until they converge with the Abitibi and Frederick House Rivers, respectively. As a result, there is no dilution-based assimilative capacity to improve receiver quality.

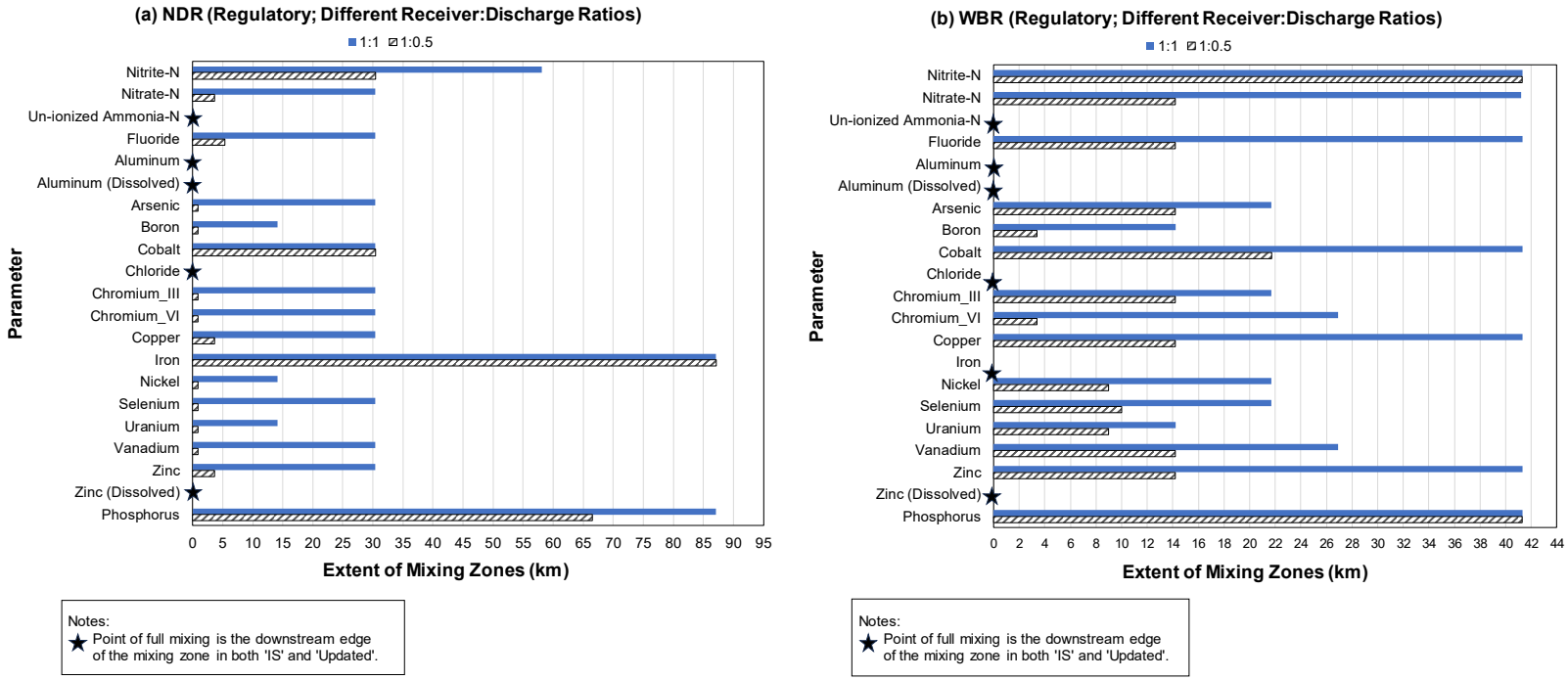
The 1-to-1 and Pre- & Post- discharge scenarios on the NDR and 1-to-1 discharge scenario to the WBR are contingent on the WBR taking excess effluent that cannot be discharged to the NDR. These scenarios are also contingent on internal water storage capacity within the mine holding water up to three months during specific times of the year to allow excess water drawdown. The mine water management plan has the requisite water storage capacity for this scenario; however, the store and release capacity could be reduced if the effluent discharge rate could be increased above the treatment plant rated capacity. Under the existing water balance and 1-to-1 and Pre- & Post- discharge scenarios the effluent treatment plant rated capacity limits discharge under period of high receiver flow. To reduce required water storage to draw down excess water, if the collection ponds incorporated a “discharge-ready cell” of treated water then during periods of high flow such as spring melt or larger rainfall- runoff periods the mine could release more water at the 1-to-1 and Pre- & Post- conditions. The ability to release more excess water under high flow conditions is important not only to reduce internal storage requirements but as demonstrated in this memo, when receiver flows are normal and higher the mixing zones become very short in length. Thus a “discharge-ready cell” that could pump to maintain the relevant discharge regime would ultimately improve the holistic mixing regime to both the NDR and WBR.

During the permitting phase when Canada Nickel is working with MECP on an Industrial Sewage Works (ISW) Environmental Compliance Approval (ECA), further refinement of the discharge regime may be undertaken, including the potential to define a flow below which no effluent is discharged. Further refinement may also consider the need for effluent to support low flows and the receiver’s aquatic community under low water conditions. Other considerations may include effluent criteria refinement and the relatively lower sensitivity of the receiving waters aquatic community.

The revised mixing zone assessment demonstrates the achievability of reducing mixing zone lengths, which will be further advanced in the permitting phase. Canada Nickel has confidence that working with MECP and DFO/ECCC during the ISW ECA permitting process a final discharge regime can be accommodated which reduces the extent of mixing zones to acceptable levels and is protective of the receiving environment. A Director's Deviation, if required, would address parameters where reasonable and practicable measures such as BATEA treatment have been applied but Policy 2 conditions may persist despite these measures. If such a Deviation is required, MECP has tools at their disposal to authorize the discharge. Appendix C of MECP B-1-5 lays out the process that a Directors Deviation application must follow.

Reference: **Surface Water Quality – Effluent Mixing**

Figure 8: Mixing Zone Extent in 1-to-1 and 1-to-0.5 Discharge Scenarios



6 References

Health Canada. 2013. Guidelines for Canadian drinking water quality: Guideline technical document—Nitrate and nitrite. Water and Air Quality Bureau, 128.

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Stantec Consulting Ltd. 2024. Crawford Nickel Project: Assimilative Capacity Study.

Attachment SW Qual-03 Surface Water Quality – Methylmercury Production

NTD: To be provided under separate cover

Attachment SW Qual-04 Lorax Environmental - IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d

TECHNICAL MEMORANDUM

To:	**Grahame Sterling and Jonathan Cooper (Ausenco)**
From:	**John Dockrey (Lorax)**
Date:	**November 21, 2025**
Subject:	**IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d**

1. Introduction

This memorandum has been generated by Lorax Environmental Services Ltd. (Lorax) for Canada Nickel Company (CNC) to support responses to IACC comments on the Crawford Nickel Project Impact Statement. Responses to comments SW-Qual-04, GCH-02b, GCH-02c (partial response) and GCH-02d are provided in the following sections.

2. SW Qual-04 – Sediment Contamination

2.1 Comment

The required information to resolve this comment is stated as follows:

1. *Provide the partition coefficients used for each element presented in Table 3.6 (the Suspended Solid Composition and Contributions to Total Concentrations) and justify their conservativeness. Explain why Cr(VI) is not included in Table 3.6 or provide the information for Cr(VI).*
2. *Clarify water quality predictions by confirming whether the predictions presented in the tables and figures of Section 4 represent total concentrations or dissolved concentrations. If the predictions are dissolved concentrations, explain how the consideration of particulate metal settling ensures a conservative approach. If they are not conservative estimates, update the water quality predictions using total concentration and the comparison against the criteria.*

2.2 Response

Part 1

Suspended solids in collection ponds are expected to originate from disturbance of overburden and blasted rock excavated from the mine pit. The composition of total suspended solids will reflect the elemental composition of this parent material. The relative contribution of overburden versus waste rock and ore will depend on the stage of mine life and material handling practices. However, a significant majority of the material being handled consists of waste rock. Geochemical characterization results show that waste rock and ore tends to have higher trace metal content than overburden (WSP, 2024). Therefore, as a conservative assumption, the average composition of

waste rock and ore was used to infer the metal content of suspended solids in the water quality model.

The partition coefficient (Kd) is a useful parameter for estimating the sorption of dissolved metals onto suspended solids. However, its effect on the overall composition of total suspended solids (TSS) is minimal because the amount of metal sorbed is negligible compared to the bulk mass of solids. As a result, Kd typically does not significantly change the chemical makeup of TSS (U.S. EPA, 2005).

Using Ni as an example, the sorbed concentration (C_s) can be calculated by multiplying the sorption coefficient (Kd) by the dissolved concentration (C_d):

$$C_s = Kd \times C_d$$

For a dissolved Ni concentration of 0.026 mg/L (maximum upper case pond concentration) and the upper-end Kd for Ni of 500 L/kg (ranges from 50 to 500 L/kg as reported in USEPA, 1999), the sorbed concentration would be 13 mg/kg. Considering that the solids component of TSS form mine rock contains approximately 851 mg/kg (Table 3.6 of Appendix K of Project Impact Statement), the influence of sorbed metals calculated using a partition coefficient is negligible. While Kd can estimate sorption to solids, its effect on overall TSS composition is minimal and is not tracked in the water quality model.

Hexavalent chromium is not expected to be an appreciable component of TSS. In geologic material chromium occurs primarily in the trivalent form [Cr(III)] (CCME, 1999), solid-phase Cr(VI) minerals are known to exist but are rare (Motzer, 2004). Any Cr(VI) generated from mine rock oxidation would speciate as an oxyanion (e.g., $HCrO_4^-$ or CrO_4^{2-}) and would be relatively soluble in the alkaline-pH conditions expected in collection ponds (Ajouyed et al., 2010). Partition coefficient (Kd) values for Cr(VI) range from 0.1 to 1 L/kg (USEPA, 1999), much lower than most metal cations (e.g., Ni), reflecting the high mobility and weak sorption potential under alkaline conditions. Using the equation above with the maximum Cr(VI) dissolved concentration (C_d) in pond water quality (0.027 mg/L) and a Kd of 1 L/kg, would result in a sorbed concentration (C_s) of 0.027 mg/kg. Assuming a maximum TSS of 30 mg/L, this sorbed mass of Cr(VI) would contribute 0.00081 µg/L to the total concentrations. This contribution is negligible compared to dissolved concentrations and the CCME guideline concentration of 1 µg/L.

Part 2

The results of the water quality model are discussed in terms of dissolved concentrations in section 4 of Appendix K of the Project Impact Statement. The predicted total concentrations assuming 10ppm, 15ppm and 30ppm TSS are provided for each water management pond in Appendix D.3.

These concentrations are calculated by adding the total concentrations presented in Table 3.6 to the dissolved concentrations predicted at each water management pond.

3. GCH-02b - Geochemical Characterization of Tailings

3.1 Comment

The required information to resolve this comment is as follows:

1. Provide detailed descriptions of the methods used to generate tailings samples for geochemical characterization, including the representativeness of the ore samples used and any treatments applied (including IPT carbonation).
2. Clarify whether additional tailings samples are available to expand the geochemical characterization program. If samples are available, expand the geochemical characterization program to include these samples. Provide a revised water quality model using worst case scenario source terms. Demonstrate how this revised model will inform protective monitoring and water treatment plans.
3. Provide updated assessments of changes to water quality, and effects to fish and fish habitat based on the worst-case scenario model predictions, as appropriate, recognizing the uncertainty associated with limited tailings samples available.

3.2 Response

3.2.1 Part 1 and 2:

In 2021 four samples of tailings were generated using the metallurgical process that CNC expected to be used for ore refinement. These samples include three dunite samples, and one peridotite sample. Two of the dunite samples (CBS-003, CANA-13) and the peridotite sample (CBS-001) were sourced from material in the main zone of the pit, and the third dunite sample (CDS-003) was sourced from the east zone of the pit (WSP, 2024). These samples were used to initiate four humidity cell tests which provided the geochemical loading rates used in source term prediction.

The number of tailings samples available during the assessment of a proposed mine are typically limited due to the resources and effort required for metallurgical testing. However, the variability of the ore body itself can be characterized by examining drill core of ore samples that will form the mill feed. This dataset can then be used to assess the representativeness of tailings. The ABA and metals composition of tailings kinetic test samples are compared to static testing results on ore in Table 1 and Table 2, respectively. In general, the tailings show elevated values of total S and Cr, and notably lower concentrations of Co, Fe, Ni, K and Zn. These differences can partially be accounted for by metallurgical processing which targets the extraction of Co, Fe, Ni and elements associated with their mineral phases (e.g., penlandite [$(Fe, Ni)_9S_8$], hazelwoodite [Ni_3S_2], awaruite

[Ni_3Fe]). Overall, the primary metal leaching mechanism for most metals is oxidation of sulphide minerals. Therefore, owing to their elevated S content the tailings kinetic tests are expected to provide a conservative estimate of geochemical loading rates for source term derivation.

One limitation of the tailings kinetic tests is that the in-process tailings (IPT) carbonation process that is currently being proposed at CNC to capture CO_2 was not incorporated into 2021 metallurgical testing. The IPT carbonation enhances a natural geochemical process where CO_2 reacts with ultramafic magnesium and calcium-bearing silicate or hydroxide minerals to store carbon dioxide in stable mineral forms.

The key reaction in IPT Carbonation involves the highly reactive mineral brucite [$Mg(OH)_2$], which reacts rapidly with aqueous carbonate species (produced through injecting gaseous CO_2 into the tailings slurry) to precipitate carbonate minerals that store CO_2 ($MgCO_3 \cdot xH_2O$). This reaction can be summarized as: $Mg(OH)2+CO2 \rightarrow MgCO3 \cdot xH2O$. The resultant mineral is a hydrated magnesium carbonate called nesquehonite. This transformation effectively locks the greenhouse gas into a solid, environmentally benign mineral form. This is often referred to as mineral carbonation or in-situ mineral sequestration. The tailings at Crawford are rich in brucite which allows for them to store CO_2.

In 2024 additional tailings metallurgical testing was completed at SGS-Lakefield which incorporated the IPT process. These samples were completed in parallel with non-carbonated samples (baseline samples), which provide a point of comparison to demonstrate the influence of the IPT process. The influence of CO_2 injection on process water chemistry was assessed by comparing duplicate samples processed with and without IPT carbonation (Table 1). The results show that the impact on metal concentrations in process water was variable. Parameters which showed a consistent increase of >50% in both tests resulting from IPT treatment included TDS, alkalinity, Ba, Co, Mg, Mo, Ni, Sn and Tl. The increase in alkalinity and Mg concentrations is consistent with the IPT approach of adding CO_2 and dissolving reactive Mg minerals (e.g., brucite) to reprecipitate nesquehonite and other Mg-carbonates. This process may liberate any trace elements associated with brucite and other minerals that could be dissolved by elevated CO_2 concentrations, and precipitate elements that co-precipitate with Mg-carbonates (e.g., Mn). Note that the increased concentration of these parameters did not result in exceedance of PWQO/CCME or MDMER guidelines. In terms of source term predictions, the average of post-IPT process water chemistry shown in this table was incorporated into the mill source term predictions for Base Case and Upper Case scenarios (Section 3.4 of Appendix K). Therefore, the potential for the IPT process to impact process water chemistry is captured by the current water quality model.

Four new tailings samples that have recently been produced and will be analyzed for ABA, elemental analysis, SFE, supernatant water and HCTs, but are not available now as the samples have just been produced and IPT carbonation has not yet been completed.

3.2.2 Part 3:

Water quality model results using Upper Case source terms are provided in response to comment GCH-02d. These source terms incorporate 90th percentile loadings from the existing tailings HCTs and the post-IPT metallurgical supernatant to predict tailings runoff and mill water, respectively.

Table 1:
Acid base accounting and metals analysis for dunite tailings samples compared to statistics on dunite ore samples.

		Dunite Tailings			Dunite Ore Samples (n = 62)				
		CANA-13	**CBS-003**	**CDS-003**	**Max**	**P90**	**P50**	**P10**	**Min**
ABA									
Paste pH	no unit	9.7	9.68	9.82	9.84	9.729	9.52	9.251	8.98
Mod. NP	t CaCO3/1000 t	285	212	251	342	254.7	186	132.8	9.2
Sulphur (total)	%	0.125	0.105	0.091	1.64	0.11	0.04	0.013	0.006
Acid Leachable SO4-S	%	<0.04	0.08	0.1	0.72	0.078	<0.04	<0.04	<0.04
Sulphide	%	0.09	<0.04	<0.04	0.99	0.079	0.04	0.04	0.04
Carbon (total)	%	0.154	0.197	0.142	2.24	0.3417	0.135	0.0971	0.024
Metals									
Arsenic	µg/g	<0.5	<0.5	<0.5	4.9	0.7	<0.5	<0.5	<0.5
Barium	µg/g	0.3	0.45	0.49	110	4	0.955	0.311	0.22
Beryllium	µg/g	<0.02	<0.02	<0.02	0.24	0.039	<0.02	<0.02	<0.02
Cadmium	µg/g	<0.02	<0.02	<0.02	0.07	0.04	<0.02	<0.02	<0.02
Calcium	µg/g	530	380	670	100000	5760	1200	218	71
Chromium	µg/g	1100	1600	2300	4700	2990	1050	376	250
Cobalt	µg/g	70	80	83	200	140	130	110	39
Iron	µg/g	34000	45000	30000	87000	77000	65000	50000	38000
Lead	µg/g	0.17	0.1	0.77	7	0.487	0.24	0.051	0.05
Magnesium	µg/g	280000	250000	260000	280000	250000	240000	210000	63000
Manganese	µg/g	660	910	820	1400	1100	960	716	540
Molybdenum	µg/g	0.2	0.2	0.1	0.4	0.2	0.1	0.1	0.1
Nickel	µg/g	1900	1500	980	3700	3190	2500	2010	120
Potassium	µg/g	39	28	34	13000	177	77.5	35.1	26
Selenium	µg/g	<0.7	<0.7	<0.7	0.7	<0.7	<0.7	<0.1	<0.1
Sodium	µg/g	79	79	62	140	120	63	40	33
Strontium	µg/g	1.2	1.5	1.7	480	22.7	1	0.515	0.26
Thallium	µg/g	<0.02	<0.02	<0.02	0.23	0.03	<0.02	<0.02	<0.02
Uranium	µg/g	0.009	0.004	0.009	0.11	0.0306	0.0105	0.002	0.002
Vanadium	µg/g	11	14	15	100	22	13	6.24	5.6
Yttrium	µg/g	0.56	0.46	0.71	3.8	1.29	0.6	0.24	0.13
Zinc	µg/g	18	20	18	63	56.9	43	30	9.7

Note: values shaded orange are greater than 90th percentile statistics. Value shaded blue are lower than 10th percentile.

Table 2:
Acid base accounting and metals analysis for the peridotite tailings sample compared to statistics on peridotite ore samples.

		Peridotite Tailings	Peridotite Ore (n=33)				
		CBS-001	Max	P90	P50	P10	Min
ABA							
Paste pH	no unit	9.58	9.93	9.788	9.39	9.094	8.9
Mod. NP	t CaCO3/1000 t	99.9	266	147	84	43	12
Sulphur (total)	%	0.025	0.227	0.0744	0.023	0.0074	0.006
Acid Leachable SO4-S	%	<0.04	0.13	0.066	<0.04	<0.04	<0.04
Sulphide	%	<0.04	0.1	0.04	0.04	0.04	0.04
Carbon (total)	%	0.279	5.81	2.982	0.277	0.0602	0.019
Metals							
Arsenic	µg/g	<0.5	27	11.6	<0.5	<0.5	<0.5
Barium	µg/g	2	160	9.8	2.5	0.756	0.51
Beryllium	µg/g	0.048	0.14	0.078	0.03	<0.02	<0.02
Cadmium	µg/g	<0.02	0.07	0.05	<0.02	<0.02	<0.02
Calcium	µg/g	6900	170000	36200	15000	5500	3300
Chromium	µg/g	2000	3700	2820	1500	496	370
Cobalt	µg/g	44	170	140	120	100	43
Iron	µg/g	27000	98000	85800	72000	58000	36000
Lead	µg/g	0.51	0.73	0.514	0.27	0.058	0.05
Magnesium	µg/g	170000	250000	228000	200000	134000	84000
Manganese	µg/g	640	1800	1300	1100	970	770
Molybdenum	µg/g	2.4	1.9	0.1	0.1	0.1	0.1
Nickel	µg/g	520	3300	1980	1300	624	290
Potassium	µg/g	71	1500	402	100	51.8	21
Selenium	µg/g	<0.7	0.8	<0.7	<0.7	<0.1	<0.1
Sodium	µg/g	24	1900	556	110	30	23
Strontium	µg/g	2	850	114	2.7	1	0.69
Thallium	µg/g	<0.02	0.05	0.028	<0.02	<0.02	<0.02
Uranium	µg/g	0.015	0.2	0.038	0.013	0.0026	0.002
Vanadium	µg/g	23	150	57.8	33	18.2	17
Yttrium	µg/g	1.9	14	3.37	2.22	1.375	0.7
Zinc	µg/g	13	76	49.8	35	20.2	14

Note: values shaded orange are greater than 90th percentile statistics. Value shaded blue are lower than 10th percentile.

Table 3:
Comparison of tailings supernatant decant from sample IPT-1 and IPT-2 from before (baseline tailings) and after (IPT tailings) the IPT carbonation process.

Parameter	Unit	CCME/PWQO*	MDMER	IPT 1 Baseline Tailings		IPT 1 IPT Tailings		IPT 2 Baseline Tailings		IPT 2 IPT Tailings	
LIMS				14510-MAY24		14510-MAY24		14510-MAY24		14510-MAY24	
Temp Upon Receipt	°C	-	-	19	---	19	---	19	---	19	---
TSS	mg/L	-	-	14	---	14	---	21	---	17	---
TDS	mg/L	-	-	540	---	1040	---	603	---	1010	---
pH	No unit	6.0-9.0	6.0-9.5	**9.91**	---	**9.74**	---	**9.33**	---	**9.02**	---
Alkalinity	mg/L as $CaCO_3$	-	-	364	---	762	---	519	---	874	---
Conductivity	µS/cm	-	-	798	---	1220	---	945	---	1410	---
Acidity	mg/L as $CaCO_3$	-	-	<2	---	<2	---	<2	---	<2	---
F	mg/L	0.12	-	<0.06	---	<0.06	---	<0.06	---	<0.06	---
Cl	mg/L	120	-	85	---	88	---	67	---	63	---
SO_4	mg/L	218	-	61	---	100	---	36	---	51	---
NO_2	as N mg/L	0.06	-	<0.03	---	<0.03	---	<0.03	---	<0.03	---
NO_3	as N mg/L	2.94	-	0.69	---	<0.06	---	0.08	---	0.52	---
NO_2+NO_3	as N mg/L	-	-	0.69	---	<0.06	---	0.08	---	0.52	---
NH_3+NH_4	as N mg/L	2.7	76	<0.1	---	<0.1	---	<0.1	---	<0.1	---
Thiosalts	as S_2O_3 mg/L	-	-	<10	---	<10	---	<10	---	<10	---
Metals		-	-	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**
Hg	mg/L	0.000026	0.0001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Hardness	mg/L as $CaCO_3$	-	-	507	468	936	919	624	589	1040	1000
Ag	mg/L	0.00025	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Al	mg/L	variable**	-	0.029	<0.001	0.028	<0.001	0.093	<0.001	0.069	<0.001
As	mg/L	0.005	0.1	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0003	0.0005	0.0004
Ba	mg/L	-	-	0.00057	0.00058	0.00097	0.00101	0.00234	0.00223	0.0037	0.00365
Bi	mg/L	-	-	0.00003	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Ca	mg/L	-	-	1.36	1.28	1.24	1.24	2.53	1.66	3.32	2.48
Cd	mg/L	0.0001	-	0.000004	<3E-06	0.000003	0.000004	0.000004	0.000007	0.000009	0.000015
Co	mg/L	0.0009	-	0.000786	0.000074	0.00273	0.00169	0.000713	0.00007	0.000624	0.000144
Cr	mg/L	0.001	-	0.0187	0.00173	0.0195	0.0013	0.0323	0.00009	0.0242	0.00041
Cu	mg/L	0.005	0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fe	mg/L	0.3	-	0.158	<0.007	0.159	<0.007	0.328	<0.007	0.246	<0.007
K	mg/L	-	-	3.81	3.72	3.55	3.59	4.69	4.62	4.02	3.88
Li	mg/L	-	-	0.0048	0.0044	0.0097	0.0096	0.0134	0.0128	0.0109	0.011
Mg	mg/L	-	-	122	113	227	222	150	142	251	241
Mn	mg/L	0.29	-	0.00833	0.00007	0.00829	0.00016	0.0884	0.064	0.0371	0.0209
Mo	mg/L	0.073	-	0.0031	0.0026	0.0048	0.0046	0.0073	0.0067	0.011	0.0106
Na	mg/L	-	-	32.2	30.5	35.2	36.2	33	32.2	31.6	31.3
Ni	mg/L	0.025	0.25	0.0181	0.0014	0.0182	0.0023	0.0236	0.0043	0.0219	0.0069
P	mg/L	-	-	0.015	0.012	0.019	0.019	0.017	0.015	0.023	0.02
Pb	mg/L	0.003	0.08	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009
Sb	mg/L	-	-	0.0009	0.001	0.001	0.0011	<0.0009	0.0009	0.0009	0.001
Se	mg/L	0.001	0.005	0.00028	0.00055	0.00043	0.0007	0.0005	0.00058	0.00072	0.00087
Si	mg/L	-	-	1.72	0.21	2.48	0.92	2.62	0.39	2.23	0.56
Sn	mg/L	-	-	0.00009	0.00009	0.00176	0.00182	0.00008	0.00011	0.00088	0.00089
Sr	mg/L	-	-	0.00114	0.00126	0.0014	0.00141	0.00315	0.00265	0.00444	0.00372
Th	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Ti	mg/L	-	-	0.0015	<0.0001	0.0015	<0.0001	0.0047	<0.0001	0.0036	<0.0001
Tl	mg/L	0.0008	-	0.00001	0.00001	0.000057	0.000056	0.000017	0.000014	0.000062	0.000059
U	mg/L	0.005	-	0.000017	0.000004	0.000003	0.000002	0.000002	0.000006	<2E-06	0.000003
V	mg/L	-	-	0.0002	0.00008	0.00019	0.00007	0.00048	0.00012	0.00035	0.0001
W	mg/L	-	-	0.00041	0.00028	0.00214	0.00205	0.00148	0.00142	0.00205	0.00198
Y	mg/L	-	-	<0.00002	<0.00002	<0.00002	<0.00002	0.00002	<0.00002	0.00002	<0.00002
Zn	mg/L	0.02	0.4	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.

IPT tailings that exceed are 1.5x greater than IPT baseline samples are shaded orange, while IPT tailings that are 0.5x IPT baseline samples are shaded blue.

4. GCH-02c – Geochemical Characterization – ARD/ML Assessment

4.1 Comment

1. Discuss the discrepancy between the modified Sobek NP and CO_3-NP results for overburden and provide a rationale for why these results represent an accurate assessment of the potential for acid rock drainage from overburden.
2. Revise the water quality models (see also GCH-02d) and the ML/ARD management plan to reflect:
    a. The most conservative estimate of NP (CO_3-NP) to manage the waste rock generated at the site. Management of waste rock may include segregation and/or blending of the PAG and NPAG materials to enhance buffering of potential acid drainage that may be produced from the PAG materials.
    b. Contingency measures in relation to the results of ongoing geochemical testing at the site.
3. Develop a comprehensive plan to continue geochemical testing of mine materials for a more accurate assessment of ARD/ML potential and discuss how gaps in the geochemical sampling program will be addressed and results will be incorporated into the ongoing refinements to the water quality model and ML/ARD management plan during provincial permitting relative to project timelines.

4.2 Response

Part 1: Response to be provided by Stantec.

Part 2 (partial response): An Upper Case water quality prediction has been developed as part of response to GCH-02d. The model maintains the assumption that all mine rock and tailings are non-PAG, consistent with the conclusions of WSP, (2024). The Upper Case model does not incorporate any blending or waste management measures that could reduce geochemical loadings.

Part 3: Response to be provided by Stantec.

5. GCH-02d – Water quality model – geochemical characterization inputs

5.1 Comment

1. Revise the water quality model to ensure that all source term inputs are fully supported by the results of the geochemical characterization program. This revision should:
    a. Address the identified discrepancies in the representation of overburden and waste rock, particularly in relation to metal leaching potential and Cr(VI) exceedances.

b. Align the updated model with TISG requirements by presenting base, worst-case, and sensitivity scenarios, alongside a detailed description of all input parameters and assumptions used.

2. Provide a plan to:

   a. Update the Water Quality Model to include kinetic testing data for overburden materials and incorporate realistic Cr(VI) concentrations based on observed exceedances in waste rock and overburden, to inform ongoing refinements to optimize the ARD/ML management plan and inform provincial permitting.

3. Conduct and include a sensitivity analysis to account for imperfect segregation of mine rock types (namely waste rock, overburden, clay), considering the variability in metal leaching potential across different material types. These updates will improve the reliability of the Water Quality Model and ensure it adequately supports the ML/ARD management plan, reducing uncertainties in mine site effluent water quality predictions and enabling more effective mitigation of potential risks to water quality, and fish and fish habitat

5.2 Response

5.2.1 Part 1

Waste Rock

In geologic material chromium occurs primarily in the trivalent form [Cr(III)] (CCME, 1999). Chromium(III) is relatively insoluble at neutral pH and is not affectively oxidized by atmospheric oxygen alone due to kinetic limitations (Stanin, 2004). The primary natural oxidant of Cr(III) is Mn(IV/III)-oxides such as birnessite (CCME, 1999; Oze et al., 2007). Rates of Cr(VI) production are controlled by the solubility and dissolution rates of Cr(III) host minerals, the solution pH, and the accessibility of aqueous Cr(III) to mixed valence Mn(IV/III)-oxides (Oze *et al.,* 2007). Owing to the specific conditions required for natural Cr(VI) formation, its natural occurrence remains uncommon despite the general abundance of Cr(III) in the earth's crust. While not a comprehensive compilation, Oze et al., (2007) provides a brief summary of seven occurrences where geogenic Cr(VI) has been investigated:

1) Spring waters from ultramafic rocks near Cazadero, Ca.
2) Pore waters of serpentine soils in Tehama County, Ca.
3) Groundwaters at ophiolite complex in the La Spezia Province of Italy;
4) Groundwater in the Leon Valley, Mexico, attributed to ultramafic rocks of the Sierra de Guanajuato.

5) Groundwater from mafic alluvial deposits in the Majove Desert, originating from the San Gabriel Mountains which host mafic and ultramafic rocks.
6) Ground water from Aromas Red Sands aquifer associated with an ophiolite complex;
7) Phosphorous amended soils derived from ultramafic rocks in New Caledonia,

The examples summarized in this paper illustrate the link of geogenic Cr(VI) occurrences with ultramafic rock exposures. This observation is consistent with Project humidity cell test results, which found that Cr(VI) generation to be primarily associated with ultramafic ore and tailings samples, while mafic rock types (gabbro, basalt and metavolcanic) composing most waste rock typically show concentrations below the detection limits (Table). These mafic rock types are expected to dominate waste rock production (87%). The remaining 13% of waste rock is composed of ultramafics (peridotite, dunite and pyroxenite) that will be co-disposed with other rock types in the impoundment facility. The release of Cr(VI) from ultramafic rock types will be limited by interaction of pore water with mafic rock types which can attenuate Cr(VI) through sorption owing to the less alkaline pH (Ajouyed et al., 2010). Specific requirements for ultramafic waste rock handling will be defined in the ML/ARD Mine Waste Management Plan. Therefore, the Base Case source term applied the maximum concentration observed in mafic HCT tests (gabbro, basalt, metavolcanic) to the waste impoundment source term of 0.6 ug/L. A sensitivity which considers conservative upscaling of Cr(VI) loading from ultramafic rock types in the impoundment is completed using 90th percentile HCT rates in the Upper Case sensitivity.

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Table 4:
Hexavalent chromium concentration statistics from humidity cell tests (HCTs).

Lithology		Basalt				Gabbro			Metavolcanic
HCT		CR21-GT-03 300-310	CR21-GT-07 510-520	CR21-GT-09B 490-500	CR22-GT-11 300-310	P1-Gab-EZ-1	CR20-41 365-375	CR21-GT-04B 350-360	P1-MetV-MZ-4
Material Type	Units	Waste Rock	Waste Rock	Waste Rock	Waste Rock	Waste Rock	Waste Rock	Waste Rock	Waste Rock
Max	µg/L	0.3	0.6	<0.2	<0.2	0.4	0.5	0.5	0.4
p90	µg/L	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	0.3	0.3
p75	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2
Median	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p25	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p10	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
min	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Measurements	n	28	28	28	28	10	28	28	10
Lithology		Dunite			Peridotite		Pyroxenite		
HCT		P1-Dun-MZ-7	CR21-146 510-520	CR22-193A 200-210	P1-Per-EZ-2	CR20-34 555-565	CR20-78 100-110	P1-Pyr-MZ-1	
Material Type	Units	Ore	Ore	Ore	Waste Rock	Waste Rock	Waste Rock	Waste Rock	
Max	µg/L	0.3	1.6	7.1	1.0	2.1	1.0	0.9	
p90	µg/L	0.2	0.7	3.9	0.4	0.9	0.2	0.7	
p75	µg/L	<0.2	0.5	2.9	0.3	0.4	<0.2	0.4	
Median	µg/L	<0.2	0.2	2.4	<0.2	<0.2	<0.2	0.3	
p25	µg/L	<0.2	<0.2	1.2	<0.2	<0.2	<0.2	<0.2	
p10	µg/L	<0.2	<0.2	0.9	<0.2	<0.2	<0.2	<0.2	
min	µg/L	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	
Measurements	n	10	28	28	29	28	28	29	
Lithology		Dunite	Dunite	Dunite	Peridotite				
HCT		CANA-13	CBS-003	CDS-003	CBS-001				
Material Type	Units	Tailings	Tailings	Tailings	Tailings				
Max	µg/L	11	3.9	5.8	8				
p90	µg/L	7.2	3.2	3.9	1.9				
p75	µg/L	5.1	2.4	2.3	1.6				
Median	µg/L	2.5	1.7	1.1	1.0				
p25	µg/L	1.2	0.6	0.7	0.7				
p10	µg/L	0.4	<0.2	0.5	0.6				
min	µg/L	<0.2	<0.2	0.4	0.5				
Measurements	n	41	41	41	42				

Values that are above CCME guideline for hexavalent chromium of 1 µg/L are highlighted red.

Overburden

Overburden at the project is composed of glacial till containing a heterogenous mix of clay, silt, sand, gravel and boulders deposited by glacial action (Ausenco, 2021). Geochemical testing shows that the overburden ranges from alkaline to mildly-acidic (paste pH of 8.4 to 5.4), and is deplete in Cr content (max = 83 ppm, median = 35.5 ppm, min = 13ppm) relative to average continental abundance (100 ppm) (WSP, 2024). The metal leaching potential of overburden was assessed using shake flask extractions, which included 24 tests on clay and silt samples and 26 tests on organic peat and topsoil material. These samples showed a number of exceedances, notably for Cr(VI) which was above 1 µg/L in most samples. However, these test results are considered unreliable for several reasons:

- The filter integrity was likely compromised by the high clay/fines content of overburden samples. This is a common feature of SFE tests on fine grained overburden samples, and is evidenced by high concentrations of Al and Fe (average of 0.28 and 0.23 mg/L, respectively) which are relatively insoluble under the neutral-pH and aerobic test conditions of the SFEs.
- Elevated concentrations of Al and Fe are known interferences with Cr(VI) analysis by the ion chromatography method (EPA2.18.6/EPA306-A) utilized at SGS (Lee and Kim, 2022).
- The observed behavior of Cr(VI) in SFE leachate were inconsistent with first principles governing metal oxyanion mobility. Specifically, mildly acidic SFE tests yielded Cr(VI) concentrations in comparable concentrations as alkaline SFE tests. Although this outcome is not impossible, it contrasts with the expected Cr(VI) behavior which speciates as an oxyanion and is relatively insoluble under mildly acidic conditions (Fenti *et al.,* 2020).

Due to these concerns a subsequent round of testing on overburden was completed to determine if improved filtering techniques using a 0.2 um high-capacity filter would eliminate the TSS and analytical interference inferred from the first round of test results. The re-analysis results and sample IDs are shown in Table 5, and show that that Cr(VI) concentrations were reduced by 79% to 94% in all samples except test 58211. Sample 58211 is notable as it showed the highest Al and Fe concentrations (1.21 and 0.96 mg/L) which are higher than the first round of testing. Overall, the re-analysis showed a significantly reduced Cr(VI) leaching potential for overburden, and demonstrated that the overburden SFE test Cr(VI) results reported in WSP (2024) overestimate dissolved concentrations. The laboratory report on the SFE re-analysis is provided in Appendix A.

Owing to the low confidence in 2024 overburden SFE tests, Base Case source terms used waste rock HCT loading rates to represent overburden in the waste impoundment. This approach was modified in the Upper Case source terms to incorporate 90th percentile SFE test data from WSP (2024) which is known to be conservative, as per the IACC comment GCH-02d request.

Table 5:
Shake flask extraction results for hexavalent chromium in duplicate overburden samples using 0.45 and 0.2 µm filter.

Sample ID	Overburden Type	Mineral/ Organic	Cr(VI) µg/L	Cr(VI) µg/L	% Diff
			2024 Baseline Study 0.45 um filter	2025 Re-analysis 0.2 um filter	
58215	Clay	Mineral	1.4	0.3	-79%
58212	Clay	Mineral	3.6	<0.2	-94%
167367	Clay	Mineral	4.7	0.4	-91%
58217	Clay	Mineral	1.8	0.2	-89%
167730	Clay	Mineral	4.5	0.4	-91%
167731	Clay	Mineral	2.8	<0.2	-93%
58201	Clay	Mineral	2.5	0.2	-92%
58221	Clay	Mineral	3.3	0.8	-76%
167739	Clay	Mineral	2.1	0.8	-62%
167378	Silt	Mineral	1.7	0.3	-82%
58211	Organic	Organics	1.5	2.8	87%
167729	Organic	Organics	1.6	<0.2	-88%

Humidity Cell Cycles

The humidity cell test cycles used in Base Case source term derivation are shown in Table 3-3 of Appendix K of the Project Impact Statement.

5.2.2 Part 2 and 3

An updated water quality model with upper case source terms has been developed and is provided as an Addendum (Lorax, 2025). The model incorporates the following modifications:

- Humidity cell tests used 90th percentile loading rates calculated from the latest test results.
- Incorporation of hexavalent chromium loading from ultramafic rock types in the impoundment facility using 90th percentile humidity cell loading rates.
- Overburden stored in impoundment facility is represented using shake flask extraction results reported in WSP (2024).
- Mineral solubility controls applied using the 10th percentile pH observed in HCT tests.
- Nitrogen source terms using analogue mine data apply 75th percentile nitrogen loss rates.

A description of model inputs and results is provided in an Lorax (2025).

6. Closure

Please contact the undersigned if you require further information or clarification.

Regards,

LORAX ENVIRONMENTAL SERVICES LTD.

John Dockrey, MSc., P.Geo. (BC, NT/NU, ON)
Senior Geochemist

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Attachment SW Qual-05 Summary of Surface Water Analytical Data (2021 to 2024)

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					JCRK-01						JCRK-02												JCRK-03	
Sample Date					30-Jan-24	21-Feb-24	14-Mar-24	3-Apr-24	22-Jul-24	29-Oct-24	30-Jan-24	16-Feb-24	18-Mar-24	3-Apr-24	2-May-24	18-Jun-24	10-Jul-24	10-Jul-24	14-Aug-24	16-Sep-24	15-Oct-24	7-Nov-24	4-Dec-24	23-Jan-24	16-Feb-24
Sample ID					JCRK-01	JCRK-01	JCRK-01	JCRK-01	JCRK-01	JCRK-01	JCRK-02	JCRK-02	JCRK-02	JCRK-02	JCRK-02	JCRK-02	JCRK-02	SWDup2	JCRK-02	JCRK-02	JCRK-02	JCRK-02	JCRK-02	JCRK-03	JCRK-03
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					525076	526950	528767	530422	542267	555389	525076	526588	528865	530422	533248	538939	541068	541068	544965	550592	553944	556185	558653	524739	526588
Laboratory Sample ID					1971923	1978219	1984541	1990625	2032588	2075172	1971924	1976931	1984899	1990626	2000884	2020726	2028310	2028314	2042744	2057340	2069590	2077989	2086960	1970818	1976932
Sample Type	Units	CCME	PWQO	BC MECC														Field Duplicate							
Metals - Dissolved																									
Chromium	µg/L	n/v	n/v	n/v	0.9	0.7	0.9	0.1	0.6	0.7	1	0.8	1.2	0.5	0.6	1.1	1.4	1.3	197	22.6	1	1.2	1.5	1.2	0.8
Metals - Total																									
Chromium	µg/L	n/v	n/v	n/v	0.7	0.7	0.8	1.3	0.7	1.2	2.5	1.8	6.5	0.6	0.8	1.6	2.2	2.2	1.3	3.7	2	1.6	3.1	1.8	1.4
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	-	-	-	-	<1	<1	-	-	-	-	-	<1	<1	<1	<1	***<4***	<1	1	<1	-	-
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	-	-	-	-	<1.4	<1.4	-	-	-	-	-	1.6	2.2	2.2	1.5	4.4	2	<1.4	3.1	-	-

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					JCRK-03											JC-S-01							
Sample Date					14-Mar-24	2-Apr-24	2-May-24	2-May-24	18-Jun-24	10-Jul-24	14-Aug-24	16-Sep-24	16-Sep-24	9-Oct-24	7-Nov-24	5-Dec-24	23-Jan-24	16-Feb-24	13-Mar-24	2-Apr-24	2-May-24	18-Jun-24	10-Jul-24	14-Aug-24
Sample ID					JCRK-03	JCRK-03	JCRK-03	SWDup	JCRK-03	JCRK-03	JCRK-03	JCRK-03	SWDup1	JCRK-03	JCRK-03	JCRK-03	JC-S-01	JC-S-01	JC-S-01	JC-S-01	JC-S-01	JC-S-01	JC-S-01	JC-S-01
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					528767	530135	533248	533248	538939	541068	544965	550592	550592	553299	556185	558785	524739	526588	528629	530135	533248	538939	541068	544965
Laboratory Sample ID					1984542	1989748	2000885	2000888	2020727	2028311	2042745	2057341	2057346	2067285	2077990	2087425	1970819	1976933	1984163	1989749	2000886	2020728	2028312	2042746
Sample Type	Units	CCME	PWQO	BC MECC				Field Duplicate					Field Duplicate											
Metals - Dissolved																								
Chromium	µg/L	n/v	n/v	n/v	1.3	0.9	0.6	0.6	1	1	0.7	0.4	0.3	1	1.2	1.4	0.7	1.1	0.3	0.7	0.4	0.8	0.9	1.2
Metals - Total																								
Chromium	µg/L	n/v	n/v	n/v	1.3	0.9	0.8	1	1.3	1.4	0.7	0.3	0.4	1.2	1.9	2.2	0.7	0.8	0.5	0.8	0.7	0.8	0.9	1.1
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	<1	<1	<1
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	-	-	-	-	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	1.9	2.2	-	-	-	-	-	<1.4	<1.4	<1.4

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					JC-S-01				MATR-01						MATR-02								
Sample Date					16-Sep-24	15-Oct-24	18-Nov-24	4-Dec-24	1-May-24	28-Jun-24	25-Jul-24	13-Aug-24	3-Sep-24	3-Oct-24	25-Jan-24	22-Feb-24	13-Mar-24	1-Apr-24	25-Jul-24	3-Oct-24	3-Oct-24	11-Nov-24	11-Nov-24	3-Dec-24
Sample ID					JC-S-01	JC-S-01	JC-S-01	JC-S-01	MATR-01	MATR-01	MATR-01	MATR-01	MATR-01	MATR-01	MATR-02	MATR-02	MATR-02	MATR-02	MATR-02	MATR-02	SWDup1	MATR-02	SWDup2	MATR-02
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					550592	553944	557063	558653	533248	539777	542670	544965	548050	552598	524826	526950	528629	530135	542670	552598	552598	556658	556658	558653
Laboratory Sample ID					2057342	2069591	2081140	2086961	2000883	2023574	2034113	2042743	2050821	2064689	1971047	1978218	1984162	1989747	2034114	2064690	2064693	2079726	2079729	2086959
Sample Type	Units	CCME	PWQO	BC MECC																	Field Duplicate		Field Duplicate	
Metals - Dissolved																								
Chromium	µg/L	n/v	n/v	n/v	46.2	1	0.7	1	0.6	0.5	0.5	0.4	0.4	0.4	0.6	0.6	0.8	0.8	0.4	0.3	0.4	0.8	0.7	1
Metals - Total																								
Chromium	µg/L	n/v	n/v	n/v	1	1.2	0.8	1.3	0.8	0.9	0.7	0.6	0.7	0.8	0.9	0.8	0.8	0.8	0.7	0.9	1.1	1.7	2.6	2
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	***<2***	<1	<1	<1	-	<1	<1	<1	<1	<1	-	-	-	-	<1	<1	<1	<1	**2[BC]**	<1
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	<1.4	<1.4	<1.4	<1.4	-	<1.4	<1.4	<1.4	<1.4	<1.4	-	-	-	-	<1.4	<1.4	<1.4	1.7	<1.4	2

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					MATR-REF									NDR-S-02									
Sample Date					7-May-24	27-Jun-24	27-Jun-24	22-Jul-24	14-Aug-24	17-Sep-24	29-Oct-24	25-Nov-24	4-Dec-24	23-Jan-24	23-Jan-24	15-Feb-24	12-Mar-24	12-Mar-24	1-Apr-24	7-May-24	28-Jun-24	24-Jul-24	13-Aug-24	13-Aug-24
Sample ID					MATR-Ref	MATR-Ref	SWDup	MATR-Ref	MATR-Ref	MATR-Ref	MATR-Ref	MATR-Ref	MATR-Ref	NDR-S-02	SWDup	NDR-S-02	NDR-S-02	SWDup	NDR-S-02	NDR-S-02	NDR-S-02	NDR-S-02	NDR-S-02	SWDup3
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					533913	539777	539777	542267	544965	550592	555389	557897	558653	524739	524739	526522	528493	528493	530135	533913	539777	542693	544965	544965
Laboratory Sample ID					2003034	2023575	2023577	2032589	2042750	2057345	2075174	2084204	2086967	1970825	1970827	1976725	1983625	1983628	1989750	2003035	2023576	2034207	2042751	2042753
Sample Type	Units	CCME	PWQO	BC MECC			Field Duplicate								Field Duplicate			Field Duplicate						Field Duplicate
Metals - Dissolved																								
Chromium	µg/L	n/v	n/v	n/v	1.7	0.6	0.6	0.4	0.4	0.3	0.7	0.6	0.8	0.8	0.8	0.6	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7
Metals - Total																								
Chromium	µg/L	n/v	n/v	n/v	2	0.9	0.9	0.6	0.6	0.4	1.4	0.8	1.9	0.8	0.8	0.8	0.9	1	1.2	0.8	1.9	1.8	2.8	2.7
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	-	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	<1	<1
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	-	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	1.9	-	-	-	-	-	-	-	1.9	1.8	2.8	2.7

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					NDR-S-02					NDRS04							NDR-S-04b						
Sample Date					9-Sep-24	3-Oct-24	11-Nov-24	5-Dec-24	5-Dec-24	6-Aug-21	21-Oct-21	30-May-22	30-May-22	30-Aug-22	13-Oct-22	1-Jun-23	25-Jan-24	16-Feb-24	12-Mar-24	1-Apr-24	7-May-24	10-Jun-24	25-Jul-24
Sample ID					NDR-S-02	NDR-S-02	NDR-S-02	NDR-S-02	SWDup1	NDR-S-04	NDR-S-04	NDR-S-04	CNC-DUP-01	NDRS04	NDR-S-04	NDR-S-04	NDR-S-04b	NDR-S-04b	NDR-S-04b	NDR-S-04b	NDR-S-04b	NDR-S-04b	NDR-S-04b
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	CNC	CNC	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	ALS	ALS	ALS	ALS	ALS	ALS	ALS	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					549812	552598	556658	558785	558785	L2625067	L2655497	L2711537	L2711537	WT2213095	WT2218393	WT2315817	524826	526588	528493	530135	533913	538074	542670
Laboratory Sample ID					2054508	2064692	2079728	2087427	2087428	L2625067-3	L2655497-1	L2711537-1	L2711537-7	WT2213095-007	WT2218393-004	WT2315817-002	1971048	1976934	1983627	1989751	2003036	2017513	2034115
Sample Type	Units	CCME	PWQO	BC MECC					Field Duplicate				Field Duplicate										
Metals - Dissolved																							
Chromium	µg/L	n/v	n/v	n/v	1.3	0.6	0.8	1.2	1.2	0.41	0.51	0.51	<0.5	0.64	0.69	<0.5	0.8	0.7	1	0.9	0.8	1	0.9
Metals - Total																							
Chromium	µg/L	n/v	n/v	n/v	0.9	1.6	1.1	2	1.5	0.94	0.71	0.88	0.91	2.03	0.69	2	1.2	1.1	1	0.9	0.8	1.4	1.8
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	<1	<1
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	<1.4	1.6	<1.4	2	1.5	-	-	-	-	-	-	-	-	-	-	-	-	1.4	1.8

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					NDR-S-04b							NDR-S-06												
Sample Date					13-Aug-24	3-Sep-24	3-Oct-24	11-Nov-24	11-Nov-24	5-Dec-24	5-Dec-24	30-Jan-24	22-Feb-24	11-Mar-24	3-Apr-24	2-May-24	10-Jun-24	11-Jul-24	11-Jul-24	14-Aug-24	14-Aug-24	16-Sep-24	16-Sep-24	9-Oct-24
Sample ID					NDR-S-04b	NDR-S-04b	NDR-S-04b	NDR-S-04b	SWDup3	NDR-S-04b	SWDup2	NDR-S-06	NDR-S-06	NDR-S-06	NDR-S-06	NDR-S-06	NDR-S-06	NDR-S-06	SWDup3	NDR-S-06	SWDup2	NDR-S-06	SWDup3	NDR-S-06
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					544965	548050	552598	556658	556658	558785	558785	525076	526950	528493	530422	533248	538074	541230	541230	544965	544965	550592	550592	553299
Laboratory Sample ID					2042748	2050822	2064691	2079727	2079730	2087426	2087429	1971925	1978220	1983626	1990633	2000887	2017512	2028844	2028845	2042747	2042752	2057343	2057348	2067286
Sample Type	Units	CCME	PWQO	BC MECC					Field Duplicate		Field Duplicate								Field Duplicate		Field Duplicate		Field Duplicate	
Metals - Dissolved																								
Chromium	µg/L	n/v	n/v	n/v	0.7	1.5	0.7	0.9	0.8	1.1	1.2	1.1	0.9	0.9	0.2	0.6	1	0.9	0.9	0.7	0.7	0.6	0.8	1.2
Metals - Total																								
Chromium	µg/L	n/v	n/v	n/v	2.4	1.3	3.5	1	1.1	1.5	1.6	1.3	1.6	0.9	0.6	0.7	1.6	1.7	1.7	2.5	2.2	1.5	2.5	2.3
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	2.4	<1.4	3.5	<1.4	<1.4	1.5	1.6	-	-	-	-	-	1.6	1.7	1.7	2.5	2.2	1.5	2.5	2.3

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					NDR-S-06				PC-01												UWC-01			
Sample Date					9-Oct-24	7-Nov-24	4-Dec-24	4-Dec-24	24-Jan-24	15-Feb-24	19-Mar-24	3-Apr-24	21-May-24	25-Jun-24	17-Jul-24	22-Aug-24	10-Sep-24	7-Oct-24	5-Nov-24	3-Dec-24	25-Jan-24	1-Apr-24	25-Jul-24	3-Oct-24
Sample ID					SWDup2	NDR-S-06	NDR-S-06	SWDup3	PC-01	PC-01	PC-01	PC-01	PC-01	PC-01	PC-01	PC-01	PC-01	PC-01	PC-01	PC-01	UWC-01	UWC-01	UWC-01	UWC-01
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					553299	556185	558653	558653	524739	526522	529236	530422	535527	539241	541934	545785	549812	552993	556045	558653	524826	530135	542670	552598
Laboratory Sample ID					2067287	2077991	2086965	2086970	1970826	1976726	1986255	1990634	2008542	2021702	2031307	2045501	2054505	2066244	2077534	2086958	1971046	1989746	2034112	2064688
Sample Type	Units	CCME	PWQO	BC MECC	Field Duplicate			Field Duplicate																
Metals - Dissolved																								
Chromium	µg/L	n/v	n/v	n/v	1.1	0.9	1.2	1.1	1.1	0.8	1.6	0.4	1.9	1.3	0.9	0.5	0.6	0.5	1.2	1.8	1	0.9	0.6	0.6
Metals - Total																								
Chromium	µg/L	n/v	n/v	n/v	2	1.4	1.3	1.4	0.9	1.1	2	1	2.6	1.5	0.9	0.6	0.5	0.9	1.3	2.9	2.1	0.7	0.5	0.7
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	<1	<1	<1	<1	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	-	-	<1	<1
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	2	<1.4	<1.4	1.4	-	-	-	-	-	1.5	<1.4	<1.4	<1.4	<1.4	<1.4	2.9	-	-	<1.4	<1.4

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					WBR-P-03												WBR-P-04							
Sample Date					24-Jan-24	15-Feb-24	15-Feb-24	12-Mar-24	4-Apr-24	12-May-24	19-Jun-24	16-Jul-24	22-Aug-24	10-Sep-24	7-Oct-24	6-Nov-24	3-Dec-24	24-Jan-24	15-Feb-24	12-Mar-24	4-Apr-24	12-May-24	19-Jun-24	16-Jul-24	22-Aug-24
Sample ID					WBR-P-03	WBR-P-03	SWDup	WBR-P-03	WBR-P-03	WBR-P-03	WBR-P-03	WBR-P-03	WBR-P-03	WBR-P-03	WBR-P-03	WBR-P-03	WBR-P-03	WBR-P-04	WBR-P-04	WBR-P-04	WBR-P-04	WBR-P-04	WBR-P-04	WBR-P-04	WBR-P-04
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					524739	526522	526522	528493	530422	534305	538939	541831	545785	549812	552993	556045	558653	524739	526522	528493	530422	534305	538939	541831	545785
Laboratory Sample ID					1970823	1976723	1976727	1983623	1990631	2004520	2020730	2030948	2045503	2054506	2066245	2077535	2086968	1970824	1976724	1983624	1990632	2004521	2020731	2030949	2045504
Sample Type	Units	CCME	PWQO	BC MECC			Field Duplicate																	
Metals - Dissolved																								
Chromium	µg/L	n/v	n/v	n/v	1	0.7	0.7	0.8	0.2	0.6	0.8	0.8	0.7	0.7	0.6	0.8	1	0.8	0.6	0.7	0.3	1.1	0.8	0.8	0.8
Metals - Total																								
Chromium	µg/L	n/v	n/v	n/v	1.2	0.8	1	1	0.7	0.6	0.8	0.8	0.8	1.5	0.9	1	1.3	1	0.6	0.7	0.7	1	0.8	0.8	0.9
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	-	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	-	-	-	-	-	<1	<1	<1
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	-	-	-	-	-	-	<1.4	<1.4	<1.4	1.5	<1.4	<1.4	<1.4	-	-	-	-	-	<1.4	<1.4	<1.4

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					WBR-P-04																WBR-S-06			
Sample Date					10-Sep-24	7-Oct-24	6-Nov-24	3-Dec-24	24-Jan-24	15-Feb-24	12-Mar-24	4-Apr-24	12-May-24	19-Jun-24	16-Jul-24	22-Aug-24	10-Sep-24	7-Oct-24	6-Nov-24	6-Nov-24	3-Dec-24	24-Jan-24	27-Feb-24	20-Mar-24	4-Apr-24
Sample ID					WBR-P-04	WBR-P-04	WBR-P-04	WBR-P-04	WBR-S-04	WBR-S-04	WBR-S-04	WBR-S-04	WBR-S-04	WBR-S-04	WBR-S-04	WBR-S-04	WBR-S-04	WBR-S-04	WBR-S-04	SWDup1	WBR-S-04	WBR-S-06	WBR-S-06	WBR-S-06	WBR-S-06
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					549812	552993	556045	558653	524739	526522	528493	530422	534305	538939	541831	545785	549812	552993	556045	556045	558653	524739	527328	529236	530422
Laboratory Sample ID					2054507	2066246	2077536	2086969	1970821	1976722	1983622	1990628	2004518	2020729	2030945	2045499	2054503	2066241	2077532	2077537	2086963	1970822	1979648	1986254	1990629
Sample Type	Units	CCME	PWQO	BC MECC																Field Duplicate					
Metals - Dissolved																									
Chromium	µg/L	n/v	n/v	n/v	0.8	0.8	0.8	1	1.1	1.1	0.9	0.3	0.8	1	1.1	0.7	0.7	0.8	1	1	1.6	1.1	1.5	1.5	<0.1
Metals - Total																									
Chromium	µg/L	n/v	n/v	n/v	0.7	1.1	1.1	1.5	1.7	1.2	1.4	0.8	1.5	1.9	2	1.1	0.7	1.4	1.9	2	1.5	1.8	2.6	2	1.6
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	<1	<1	<1	<1	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	2[BC]	-	-	-	-
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	<1.4	<1.4	<1.4	1.5	-	-	-	-	-	1.9	2	<1.4	<1.4	<1.4	2	2	<1.4	-	-	-	-

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					WBR-S-06									WBR-S-07					WBR-S-Ref					
Sample Date					4-Apr-24	12-May-24	25-Jun-24	16-Jul-24	22-Aug-24	10-Sep-24	7-Oct-24	6-Nov-24	3-Dec-24	27-Feb-24	4-Apr-24	16-Jul-24	16-Jul-24	7-Oct-24	24-Jan-24	15-Feb-24	19-Mar-24	3-Apr-24	21-May-24	25-Jun-24
Sample ID					SWDup	WBR-S-06	WBR-S-06	WBR-S-06	WBR-S-06	WBR-S-06	WBR-S-06	WBR-S-06	WBR-S-06	WBR-S-07	WBR-S-07	WBR-S-07	SWDup1	WBR-S-07	WBR-S-Ref	WBR-S-Ref	WBR-S-Ref	WBR-S-Ref	WBR-S-Ref	WBR-S-Ref
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					530422	534305	539241	541831	545785	549812	552993	556045	558653	527328	530422	541831	541831	552993	524739	526522	529236	530422	535527	539241
Laboratory Sample ID					1990635	2004519	2021701	2030946	2045500	2054504	2066242	2077533	2086964	1979649	1990630	2030947	2030950	2066243	1970820	1976721	1986253	1990627	2008541	2021700
Sample Type	Units	CCME	PWQO	BC MECC	Field Duplicate												Field Duplicate							
Metals - Dissolved																								
Chromium	µg/L	n/v	n/v	n/v	0.4	4.7	1.3	0.9	0.5	0.6	0.7	1.2	1.4	1.5	0.4	1.1	0.9	0.6	1.1	0.9	1.5	0.4	2.1	1.4
Metals - Total																								
Chromium	µg/L	n/v	n/v	n/v	0.8	2.8	2.4	2.1	0.9	1.3	1.3	2.5	2.1	2.3	1.1	2.6	2.5	1.1	1.7	1.4	1.9	0.8	3.9	2.5
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	-	-	<1	<1	<1	<1	<1	<1	<1	-	-	<1	<1	<1	-	-	-	-	-	<1
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	-	-	2.4	2.1	<1.4	<1.4	<1.4	2.5	2.1	-	-	2.6	2.5	<1.4	-	-	-	-	-	2.5

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Sample Location					WBR-S-Ref						
Sample Date					17-Jul-24	22-Aug-24	10-Sep-24	7-Oct-24	7-Oct-24	5-Nov-24	3-Dec-24
Sample ID					WBR-S-Ref	WBR-S-Ref	WBR-S-Ref	WBR-S-Ref	SWDup3	WBR-S-Ref	WBR-S-Ref
Sampling Company					STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory					TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK	TESTMARK
Laboratory Work Order					541934	545785	549812	552993	552993	556045	558653
Laboratory Sample ID					2031306	2045498	2054502	2066240	2066247	2077531	2086962
Sample Type	Units	CCME	PWQO	BC MECC					Field Duplicate		
Metals - Dissolved											
Chromium	µg/L	n/v	n/v	n/v	2.9	0.6	0.8	0.7	0.6	1.3	1.5
Metals - Total											
Chromium	µg/L	n/v	n/v	n/v	2	1.5	1.1	1.3	1.2	1.8	2
Chromium (Hexavalent)	µg/L	1[B]	1[C]	n/v	<1	<1	<1	<1	<1	<1	<1
Chromium (Trivalent)	µg/L	8.9[B]	8.9[C]	n/v	2	1.6	<1.4	<1.4	<1.4	1.8	2

See notes on last page

Attachment SW Qual-05: Summary of Surface Water Analytical Data (2021 to 2024)

Notes:

CCME	Canadian Council of Ministers of the Environment
B	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Long Term
PWQO	Provincial Water Quality Objectives of the Ministry of Environment and Energy (MOEE, 1999)
C	PWQO Table 2

Metals - Di	Metals - Dissolved

Crawford Nickel Project ("the Project")

Canada Nickel's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project
(Received May 30, 2025)

Geochemistry, where Conditions Influence Water Quality and Effects to Fish and Fish Habitat and Indigenous Peoples

December 24, 2025

CANADA NICKEL COMPANY

Stantec

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Attachment GHC-01b Addendum to: "Asbestiform mineral quantification procedure- Crawford Project"
Attachment GHC-01c Description of Analytical Methods
Attachment GHC-01e-1 Talc Memo
Attachment GHC-01e-2 Updated ML/ARD Management Plan
Attachment GHC-02b-1 Lorax Environmental - IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d
Attachment GHC-02b-2 Lorax Environmental - Lorax Environmental - Crawford Nickel Project Upper-Case Source Term Sensitivity
Attachment GHC-02d Revised Water Quality Model Results

Abbreviations

Abbreviation	Full Term
ABA	acid-base accounting
ARD	acid rock drainage
CWQG	Canadian Water Quality Guidelines
FAL	Freshwater Aquatic Life
HCT(s)	Humidity Cell Test(s)
IAAC	Impact Assessment Agency of Canada
IS	Impact Statement
ML	metal leaching
MEND guidelines	Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials
NAG	Net Acid Generation
NPAG	non-potentially acid-generating
NP	neutralization potential
NPR	Neutralization Potential Ratio
PCOCs	Potential Contaminants of Concern
PWQO	Provincial Water Quality Objectives

Abbreviation	Full Term
QEMSCAN	Quantitative Evaluation of Materials by Scanning Electron Microscope
RPD	relative percent difference
SFE	Shake Flask Extraction
The Code	The Mine Rehabilitation Code of Ontario
TISG	Tailored Impact Statement Guidelines
TMF	Tailings Management Facility
WRA	Whole Rock Analysis
XRD	X-ray diffraction

Geochemistry, where Conditions Influence Water Quality and Effects to Fish and Fish Habitat and Indigenous Peoples

GCH-01 Geochemical Characterization Program – Methods and Data

Comment Description (Context and Rationale):

The geochemical characterization program is used to characterize the geochemical properties of mine materials. This is necessary to validate source term predictions used in the model to predict changes to water quality as a result of seepage and effluent discharge. Due to a number of missing or incomplete components, there is a lack of confidence that the geochemical characterization program was well designed and representative of site conditions.

Understanding representativeness of the samples will support appropriate interpretation of the results of the geochemical characterization program and associated uncertainty with changes to surface water quality and effects to fish and fish habitat and Indigenous peoples. Understanding any constraints in the geochemistry program is also important considering the predicted high influence of seepage and planned effluent discharge on surrounding waters.

Reference to TISG and IS:

TISG: Section 8.3

Required Information to Resolve Comment:

1) *Outstanding information requirements about the methods and data used for the geochemical characterization program are outlined in the next 5 rows, with respect to:*
    a) *Missing cross-sections*
    b) *Missing datasets*
    c) *Methods*
    d) *Humidity cell testing*
    e) *Representative sampling*

GCH-01a Geochemical Characterization – Missing Coss-Sections

Comment Description (Context and Rationale):

The IS does not include cross-sections or maps illustrating the locations, lithology, proximity to the ore zone, and other relevant details for samples included in the geochemical characterization program. While the geochemical characterization program in Appendix H of the IS includes 50 overburden samples (26 organic and 24 mineral soils) and over 400 samples of waste rock and ore, no maps or cross-sections identifying the locations of these samples are included. This omission significantly limits the ability to assess the spatial representativeness of the geochemical sampling program, and whether the results of the program accurately represent the characteristics of the site. With high volumes of seepage and planned effluent, the uncertainty compounds in the water quality model.

Reference to TISG and IS:

TISG: Section 8.3.1

IS: Appendix H

Required Information to Resolve Comment:

1) *Provide cross-sections or block model images that clearly identify the locations and depths of all overburden, waste rock, and ore samples included in the geochemical characterization program. Present cross sections or block model images at an appropriate scale that include mine rock samples, geology, mineralized zones, the approximate location of all open pit and underground mine development, borehole traces and identification numbers, and a scale and legend.*

2) *Develop and implement a plan to address spatial data gaps, ensuring full coverage of all lithologies and overburden areas. Alternatively, discuss how data gaps will be addressed during provincial permitting relative to project timelines.*

Canada Nickel's Response:

1) *Provide cross-sections or block model images that clearly identify the locations and depths of all overburden, waste rock, and ore samples included in the geochemical characterization program. Present cross sections or block model images at an appropriate scale that include mine rock samples, geology, mineralized zones, the approximate location of all open pit and underground mine development, borehole traces and identification numbers, and a scale and legend.*

Figure 1 of Appendix C of Appendix H includes the location of samples collected of waste by lithology from two angles, and Figure 2 and Figure 3 include spatial locations of ore and tailings samples. A borehole sampling map is provided in Appendix C of Appendix H of the IS. Additional cross sections and maps illustrating the locations, lithology, proximity to the ore zone, and other relevant details for samples included in the geochemical characterization program are provided in Attachment GHC-01a.

2) *Develop and implement a plan to address spatial data gaps, ensuring full coverage of all lithologies and overburden areas. Alternatively, discuss how data gaps will be addressed during provincial permitting relative to project timelines.*

For the Impact Statement, the geochemical characterization program utilized samples from across the available drill holes, representing the lithologies present within the project footprint. While this program provided a baseline characterization dataset, additional data collection will occur during provincial permitting and throughout construction and operations to address any remaining gaps. This approach provides spatial coverage during the progression of mining operations.

Additional samples of talc and overburden have been collected and analyzed to address these Information Requests. Preliminary results are provided in GCH-01e-1 and GCH-02d-2a, respectively. Errors in the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement) have also been corrected to demonstrate the representativeness of the sample selected for kinetic testing in response to GCH-01d.

The proposed Metal Leaching (ML)/Acid Rock Drainage (ARD) monitoring plan (Appendix L) will be implemented during construction and operations to address spatial data gaps and provide comprehensive characterization of lithologies and overburden areas. This plan includes systematic sampling of waste rock, overburden, construction materials, and tailings as mining progresses. Sampling will be designed to capture the intersected lithologies encountered, with adjustments made as new geological units are exposed.

GCH-01b Geochemical Characterization – Missing Datasets

Comment Description (Context and Rationale):

The IS does not include specific data generated by the geochemical characterization required to evaluate data completeness.

The following datasets are absent:

- *Section 2.3.4 of Appendix H describes the Whole Rock Analysis methodology to involve Lithium meta-borate fusion followed by ICP-MS analysis to be applied to 22 samples (15 waste rock, 3 ore, and 4 tailings samples). Whole Rock Analysis data is indicated as being presented in Appendix D of Appendix H. Appendix D has the Whole Rock Analysis data for the 4 tailings samples, but data for the 15 waste rock and 3 ore samples is absent.*

The IS provides quantitative mineralogy (QEMSCAN) results to support the interpretation of the ML/ARD potential testing in the geochemical characterization program. Section 3.1.1.4 of Appendix H summarizes the QEMSCAN results for 14 waste rock samples in Figures 9-13 and Section 3.1.2.4 of Appendix H summarizes the QEMSCAN results for 3 ore samples in Figures 19 - 20. The full data set for both material types is indicated to be provided in Appendix E. Appendix E includes QEMSCAN data for the tailing's samples only. The full QEMSCAN dataset for the ore and waste

rock samples is absent from the IS. This dataset is additionally needed to determine the quantity of chrysotile (asbestos) in the different rock units.

Reference to TISG and IS:

TISG: Section 8.3.1

IS: Appendix H – Sections 2.3.4, 3.1.1.4, 3.1.2.4, Appendix D, & Appendix E

Required Information to Resolve Comment:

1) *Provide the complete datasets and associated certificates of analysis for all data generated in the geochemical characterization program, including:*

    - *The full dataset for Whole Rock Analysis, specifically for the 15 waste rock and 3 ore samples referenced in Section 2.3.4 of Appendix H, which are currently missing from Appendix D.*
    - *The complete QEMSCAN dataset for waste rock and ore samples is described in Sections 3.1.1.4 and 3.1.2.4 of Appendix H, which are currently missing from Appendix E. This data must be used to support the interpretation of ML/ARD potential testing and the quantification of chrysotile (asbestos) in different rock units.*

2) *Outline a plan for how these complete datasets will be used to refine predictions of ML/ARD potential and update the ML/ARD management plan as required.*

Canada Nickel's Response:

1) *Provide the complete datasets and associated certificates of analysis for all data generated in the geochemical characterization program, including:*

    - *The full dataset for Whole Rock Analysis, specifically for the 15 waste rock and 3 ore samples referenced in Section 2.3.4 of Appendix H, which are currently missing from Appendix D.*
    - *The complete QEMSCAN dataset for waste rock and ore samples is described in Sections 3.1.1.4 and 3.1.2.4 of Appendix H, which are currently missing from Appendix E. This data must be used to support the interpretation of ML/ARD potential testing and the quantification of chrysotile (asbestos) in different rock units.*

The relevant dataset is available in the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement); however, the description of Whole Rock Analysis (WRA) is incorrect. Section 2.3.4 of Appendix H reads "WRA determines the concentrations of major oxide species by lithium meta-borate fusion, followed by ICP-MS analysis to determine the percentage of the following major elements, reported as oxides". This should read "WRA determines the concentrations of major oxide species by lithium meta-borate fusion, followed by X-ray fluorescence analysis to determine the percentage of the following major elements, reported as oxides". X-ray fluorescence was used, not ICP-MS. The XRF Certificates of Analysis of the 18 samples was included as Appendix D of the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement).

The wording for the description of mineralogy methods used within the executive summary of the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement) is unclear and did not specify which samples were measured using X-ray diffraction (XRD) versus Quantitative Evaluation of Materials by Scanning Electron Microscope (QEMSCAN). The bullet point on the description of mineralogy methods within the executive summary should read "Mineralogy by X-ray diffraction (XRD) with Rietveld refinement and Quantitative Evaluation of Materials by Scanning Electron Microscope (QEMSCAN) - 14 samples of waste rock and four samples of ore were tested using Rietveld-XRD and all tailings samples were tested using QEMSCAN." This is paired with a typo in the mentioned sections. QEMSCAN was only completed for the four tailings samples. XRD was used for mineralogy of waste rock and ore. Copies of the certificate of analysis reports for these tests were included in Appendix H of the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement). Supplemental information on the quantification of chrysotile (asbestos) in different rock units is provided in Attachment GCH-01b.

2) *Outline a plan for how these complete datasets will be used to refine predictions of ML/ARD potential and update the ML/ARD management plan as required.*

The complete datasets were provided in the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement) and the data was included in the predictions of the ML/ARD potential and ML/ARD management plan. Clarification has been provided on the datasets for Whole Rock Analysis, XRD, and QEMSCAN in response GCH-01b-1.

GCH-01c Geochemical Characterization - Methods

Comment Description (Context and Rationale):

Section 2.3 of Appendix H of the IS does not contain complete descriptions of the methods used in the analysis of tailings supernatant liquid, and leachates from Shake Flask Extraction (SFE) and Humidity Cell Tests (HCT). This information is necessary to validate the acid rock drainage and metal leaching potential of mine materials.

Reference to TISG and IS:

TISG: Section 8.3.2

IS: Appendix H – Section 2.3

Required Information to Resolve Comment:

1) *Provide complete descriptions of all methods used in the geochemical characterization program, including the analytical procedures for the chemical analysis of the supernatant liquids, SFE leachates, and HCT leachates. Descriptions should include the analytical techniques employed, detection limits, quality assurance and control measures, and any deviations from standard practices.*

Canada Nickel's Response:

1) *Provide complete descriptions of all methods used in the geochemical characterization program, including the analytical procedures for the chemical analysis of the supernatant liquids, SFE leachates, and HCT leachates. Descriptions should include the analytical techniques employed, detection limits, quality assurance and control measures, and any deviations from standard practices.*

A complete description of all methods used in the geochemical characterization program is provided in Attachment GCH-01c, including descriptions of the analytical procedures for the chemical analysis of the supernatant liquids, Shake Flask Extraction (SFE) leachates, and humidity cell tests (HCTs).

In addition to the analytical procedures provided in Attachment GCH-01c, the SFE tests for overburden samples were filtered as follows:

- Following the 24 +/- 2-hour extraction, allow samples to settle for 2-3 hours. Record the samples final pH in the SFE worksheet. The pH must be taken pre-filter. Separate the material in the leachate vessel into its component liquid and solid phases by filtering through a 0.2 µm filter. A centrifugation or an 11 µm pre-filter may be used only if the liquid/solid components will not separate prior to filtration through 0.2 µm filter.
- Following the filtration, immediately sub-sample, preserve and submit to the analytical laboratory for the desired analysis. All other remaining liquid generated from filtration must be stored a 5°C +/- 3°C until needed again.

GCH-01d Geochemical characterization – Humidity Cell Testing

Comment Description (Context and Rationale):

The IS is missing information necessary to assess whether the samples selected for humidity cell testing (HCT) in the geochemical characterization program are appropriate for capturing the metal-leaching (ML) potential of the waste rock lithologies they represent. This creates compounding uncertainty in the results of the geochemical characterization program and the water quality model.

In the geochemical characterization program, samples selected for HCT were based on their potential for ML as reflected by the shake flask extraction (SFE) test results and the percentile of element mobility produced in the test. Table 16 (Appendix H) summarizes the percentiles of constituents with potential for ML in waste rock samples selected for HCT, used as criteria and justification for their selection. Only 7 of the 11 waste rock samples selected for HCT are included. Table 23 (Appendix H) summarizes the percentiles of constituents with a potential for ML in ore samples selected for HCT, used as criteria and justification for their selection. Only 3 of the 4 ore samples selected for HCT are included. It should also be noted that the title of Table 23 refers to tailings samples, which is presumed to be a typographical error since this table occurs in the section for ore samples.

This information is required to determine whether the data generated by the kinetic test and applied in the development of source terms for the water quality model are sufficiently representative of the base-case and worst- case scenarios. This information is necessary to understand project-related changes to surface water quality, and associated effects and mitigation measures for fish and fish habitat, and Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.3.1

IS: Appendix H – Sections 2.2.5, 3.1.1.5, 3.2.1, 3.2.2 & 3.1.2.5

Required Information to Resolve Comment:

1) *Provide updated versions of Table 16 and Table 23 to include all waste rock and ore samples selected for HCT, along with clear justification for their selection based on static test results.*

2) *Review and correct, if needed, the title of Table 23, which refers to "tailings samples" instead of ore samples.*

3) *Provide a rationale for how the selected HCT samples represent the base-case and worst-case scenarios for metal leaching and acid generation, with a clear link to the criteria derived from static testing.*

4) *Discuss how ongoing testing and follow-up programs will be enforced through provincial permitting relative to project timelines. The discussion should present, where appropriate, commitments to verify geochemical predictions, develop an ML/ARD management plan, and adhere to MEND guidelines and other applicable standards for water quality modeling and management.*

Canada Nickel's Response:

1) *Provide updated versions of Table 16 and Table 23 to include all waste rock and ore samples selected for HCT, along with clear justification for their selection based on static test results.*

Updated versions of Table 16 and Table 23 from the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement) are provided in Table GCH-01d.1 and Table GCH-01d.2, respectively, below. The tables were updated to include HCTs from phase 1 with their percentiles for Potential Contaminants of Concern (PCOCs). HCTs for phase 1 included one sample of each of the 5 major lithological groups identified at the initiation of the geochemistry baseline study. Samples were selected based on the SFE results, with samples selected based on having average to above average values for PCOCs identified based on the phase 1 dataset. The phase 2 HCTs were selected to allow for more coverage of PCOCs identified once more SFE data was available, and samples were chosen considering SFE results, sample location within the site, ore/waste classification, and the abundance of each lithology. The tables also include updates to the SFE percentile by lithology to reflect a data entry error.

Table GCH-01d.1 Updated Table 16 - Summary of Percentile Constituents with Potential for ML in Waste Rock Samples Selected for HCTs

Sample ID	Lithology	SFE Percentile by Lithology (%ile)							
		Al	Cr(VI)	V	Se	Ni	Cd	As	F[1]
Gabbro CR20-41 365-375	Gabbro	**71**	**68**	**71**	43	**67**	2	8	2
Gabbro CR21-GT-04B 350-360	Gabbro	**66**	46	43	**67**	24	2	31	2
P1-Gab-EZ-1*	Gabbro	54	**73**	**94**	**82**	24	**92**	31	2
Basalt CR21-GT-03-300-310	Metavolcanic	**70**	2	**60**	**87**	32	2	**76**	2
Basalt CR21-GT-07 510-520	Metavolcanic	**77**	2	**84**	46	32	2	54	2
Basalt CR21-GT-09B 490-500	Metavolcanic	34	2	8	**62**	32	2	22	**86**
Basalt CR22-GT-11 300-310	Metavolcanic	**68**	2	32	57	**60**	2	**84**	2
P1-MetV-MZ-4*	Metavolcanic	30	2	**83**	2	**60**	**98**	**90**	**81**
Peridotite CR20-34 555-565	Peridotite	**84**	**74**	**71**	**88**	58	**85**	**71**	2
P1-Per-EZ-2*	Peridotite	56	37	**65**	42	29	2	2	2
P1-Pyr-MZ-1*	Pyroxenite	20	55	55	**64**	55	5	**64**	5

Notes:
Bolded values indicate key parameters for HCT selection process (between 60 and 100%ile by lithology)
%: Percentile
*: Phase 1 samples added to the table compared to Table 16 of the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement).
1: Fluoride is only a PCOC for select lithologies.

Table GCH-01d.2 Updated Table 23 – Summary of Percentile of Constituents with a Potential for ML in Ore Samples Selected for HCTs

Sample ID	Lithology	SFE Percentile by Lithology (%ile)							
		Al	Cr(VI)	V	Se	Ni	Cd	As	F
Dunite CR21-146 510-520	Dunite	21	**90**	**66**	**70**	**87**	2	2	2
Dunite CR22-193A 200-210	Dunite	21	**69**	28	2	**62**	2	2	2
P1-Dun-MZ-7*	Dunite	**88**	2	**66**	**70**	21	**96**	2	2
Peridotite-01 CR20-78 100-110	Peridotite	47	21	15	**67**	38	2	2	2

Notes:
Bolded values indicate key parameters for HCT selection process (between 60 and 100%ile by lithology)
%ile: Percentile
*: Phase 1 samples added to the table compared to Table 23 of the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement).

2) *Review and correct, if needed, the title of Table 23, which refers to "tailings samples" instead of ore samples.*

Table 23 within the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement) should have been titled Summary of Percentiles of Constituents with a Potential for Metal Leaching in Ore Samples Selected for HCTs. An updated version of Table 23 is provided in our response to GCH-01d-1.

3) *Provide a rationale for how the selected HCT samples represent the base-case and worst-case scenarios for metal leaching and acid generation, with a clear link to the criteria derived from static testing.*

The kinetic test program was designed to estimate rates of acid generation and neutralization and drainage chemistry from site materials. HCT samples were selected based on the results of the SFE tests to represent both base-case and worst-case scenarios for ML and considered the acid generating potential. The selection criteria were directly linked to the outcomes of static testing, which provided initial characterization of acid generation potential and ML risk (see footnote to Tabe 16 of the Crawford Geochemistry Characterization Report in Appendix H of the Impact Statement and in response to GCH-01- 1). The process also considered lithological diversity, acid generation potential, and the need for conservatism in sample selection.

Specifically, samples whose concentrations of constituents of potential concern (COPCs) for ML exceeded the 60th percentile up to 96th percentile in SFE testing were selected for HCTs. This approach targets materials with elevated metal content relative to the broader dataset, thereby capturing worst-case conditions. COPCs with median or representative values for key geochemical parameters were also inherently included which provides a range of data to represent the base-case and upper case site conditions by the testing program.

Errors were identified in Table 16 and Table 23 of the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement). Specifically, the SFE percentile values by lithology for certain parameters were reported as being lower than their actual values. These inaccuracies have now been corrected, as detailed in the response to GCH-01d-1. The corrected data confirm that the selected HCT samples are representative of the upper percentile range for COPCs. This ensures that the HCT selection process adequately reflects the upper-bound scenarios for ML potential.

Additionally, samples with negligible carbonate Neutralization Potential Ratio (NPR) and relatively lower Net Acid Generation (NAG) pH values were targeted to evaluate conservatism in using the carbonate NPR alone for ARD classification when the bulk NPR result more accurately reflects acid generation potential for this site.

Ultimately, the recommended set of HCTs reflects a balance between compositional representativeness (for base-case) and targeted conservatism (for worst-case), directly linked to criteria established through static testing. The information has been used to develop both the base case and upper-case model scenarios (see response to IR GCH-02d-3), with model sensitivities for chromium described in response to IR GCH-02d-1.

4) *Discuss how ongoing testing and follow-up programs will be enforced through provincial permitting relative to project timelines. The discussion should present, where appropriate, commitments to verify geochemical predictions, develop an ML/ARD management plan, and adhere to MEND guidelines and other applicable standards for water quality modeling and management.*

Ontario Regulation 35/24, made under the *Mining Act*, prescribes Ontario standards for the rehabilitation of advanced exploration and mine production projects and other mine sites, as well as prescribing the required content of closure plans. The Mine Rehabilitation Code of Ontario (the Code) is incorporated by reference into Ontario Regulation 35/24. The Code defines the standards for rehabilitation, including protective measures to be taken in respect of closure. The objective of Part 7 of the Code is to ensure that the potential for significant ML or ARD is determined and, where such potential exists, that effective prevention, mitigation, and monitoring strategies are developed and implemented. Part 7 -Metal Leaching and Acid Rock Drainage Requirements of the Code requires the development of a sampling program for materials remaining on the site that have been excavated, exposed or otherwise disturbed by mining activities. The sampling and testing program and data interpretation is required to be developed and conducted by a qualified professional in accordance with the Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND guidelines).

Condition 4.2 of Schedule 1 of Ontario Regulation 35/24 also requires that materials, and conditions created as a result of mining, that produce or may produce ARD or ML shall be dealt with in accordance with the management plan required under the Code.

Schedule 2 of Ontario Regulation 35/24 also requires current site conditions to be documented in the closure plan with details of surface water and groundwater that indicates whether and to what extent they will be affected by the project.

In addition, provincial Environmental Compliance Approvals for the Project will require a series of water monitoring programs typically with trigger thresholds and associated action plans should a trigger threshold be exceeded. The trigger thresholds are based on verifying the predicted effects of the Project on water and protective of the receiving environment. The ML/ARD source terms were used in the prediction of effects on water.

A proposed ML/ARD management plan is included in Appendix L of the Impact Statement and will be updated during permitting to reflect permit requirements.

GCH-01e Geochemical Characterization – Representative Sampling

Comment Description (Context and Rationale):

Appendix B of Appendix H of the IS reveals key gaps in the representativeness of the sampling program for the geochemical characterization studies. This information is used to assess the validity of the predicted acid rock generation and metal leaching potential of mine materials, which informs the source terms applied in the water quality model for the site, the design of tailing and waste rock management facilities, the ML/ARD management plan, and the assessment of changes to water quality, and associated effects to fish and fish habitat and Indigenous peoples.

As project design evolves, predicted tonnages and lithologies may change. It is critical to verify that sampling and geochemical characterization remain representative of the revised mine plan. Any data gaps from under-sampling particular materials or lithologies must be addressed to ensure accurate source term predictions and a robust ML/ARD management plan.

Inclusion of Lithologies:

- *The ML/ARD management plan (Appendix L, section 2.3, Table 2.1) identifies six lithologies, including talc (2.7% of waste rock, 5.0% of ore), while the baseline geochemical characterization program for waste rock (Appendix H, Appendix B, Table 4) includes only five. The talc lithology was excluded from the geochemical characterization program, meaning that it does not inform the water quality model or ML/ARD management plan.*

Quantification of Tonnages:

- *The baseline geochemical characterization for ore (Appendix H, Appendix B, section 4.0) reports 1,672 Mt of ore to be extracted but lists tonnages totaling only 1,610 Mt (e.g., 1,372 Mt dunite, 230 Mt peridotite, 4 Mt pyroxenite, 1 Mt gabbro, 3 Mt basalt), leaving 62 Mt unaccounted for.*
- *Tonnage discrepancies exist between the ML/ARD management plan and the geochemical characterization program. For instance, the ML/ARD plan (Appendix L, section 2.3, Table 2.1) identifies gabbro as 59% of waste rock, whereas Appendix H reports it as 29%.*
- *Representative sampling that reflects evolving mine plans is essential to ensuring that data are available to inform an up-to-date water quality model. These inconsistencies create compounding uncertainty in the geochemical characterization of mine materials and in predictions of seepage composition. A comprehensive and up-to-date geochemical characterization program is required to understand changes to surface water quality due to the release of seepage and assess effects to fish and fish habitat and Indigenous peoples.*

Reference to TISG and IS:

TISG: Section 8.3.1

IS: Appendix H – Appendix B, Section 4.0 & Section 6.0, Appendix L – Section 2.3 & Section 4.1

Required Information to Resolve Comment:

1) Present plans for:

- *Expansion of the geochemical sampling program to include all lithologies, ensuring representative sampling and reconciliation of tonnage discrepancies.*
- *Conducting site-specific testing during planning, construction, and early operations.*
- *Updating water quality models and the ML/ARD management plan to reflect these improvements and ensure the predictions align with site-specific conditions.*

Alternatively, discuss how gaps in the geochemical sampling program will be addressed during provincial permitting relative to project timelines.

Canada Nickel's Response:

1) Present plans for:

- *Expansion of the geochemical sampling program to include all lithologies, ensuring representative sampling and reconciliation of tonnage discrepancies.*
- *Conducting site-specific testing during planning, construction, and early operations.*
- *Updating water quality models and the ML/ARD management plan to reflect these improvements and ensure the predictions align with site-specific conditions.*

Alternatively, discuss how gaps in the geochemical sampling program will be addressed during provincial permitting relative to project timelines.

Canada Nickel has documented the presence of localized talc alteration within the Crawford deposit, specifically within dunite, peridotite, pyroxenite, and gabbro lithologies. Canada Nickel recognizes the Impact Assessment Agency of Canada (IAAC) comments regarding insufficient geochemical characterization of talc, particularly in relation to its potential to contribute to ML and ARD and has provided a memorandum in Attachment GCH-01e-1 to provide further supporting information in regard to IAACs concerns.

In response to Information Requests, additional static testing of talc samples (classified as waste rock [n=10] and ore [n=11]) has been initiated. Available static test results (acid-base accounting and total elemental composition; Tables GCH-01e-1 to GCH-01e-4) and copies of the certificates of analysis are included in Attachment GCH-01e-1. In summary, the geochemical signature of talc zones is similar to that of the waste rock and ore; the main difference is magnesite +/-silica (quartz) assemblage of minerals replaces serpentine and brucite, decreases in magnetite, chrome-spinel, and nickel minerals and an

increase in calcite-dolomite (see Attachment GCH-01e). Talc has been identified as a minor component of the logged lithologies at Crawford (3.8% of almost 150,000 m of core) and were previously included in the geochemistry characterization program within the four main lithologies.

Static test results of talc specific samples in waste rock and ore, are generally within the range of measured results for waste rock and ore. Based on the modified Sobek NPR values, talc samples were classified as non-potentially acid-generating (NPAG). Chromium, magnesium, and nickel in ore were consistently elevated above 10 times the average upper continental crust. Select waste rock samples were elevated above 10 times the average upper continental crust in chromium, copper, magnesium, nickel and selenium. Concentrations greater than the screening criteria do not indicate that elevated concentrations will occur in leachate or seepage from the sample; and rather identifies parameters of potential concern that are explored using leachate testing. Talc is a minor lithology and the geochemistry of talc samples is similar to the materials previously assessed as part of the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement) it was determined reasonable to use the results for the water quality predictions and effects assessment.

Talc was included in the ML/ARD management plan (Table 2.1) and the Water Quality model report (Table B-2) because of its implications for processing. A follow-up geochemical characterization and monitoring program for waste materials during construction and operations has been proposed as part of the ML/ARD Management Plan (Appendix L of the Impact Statement) with updates to the plan provided in Attachment GCH-01e-2. The ML/ARD management plan will be updated for permitting and beginning of construction and a detailed pre-construction sampling program will be developed during the permitting phase. The sampling and testing program and data interpretation are required to be developed and conducted by a qualified professional in accordance with the MEND guidelines throughout the life of mine.

GCH-02 Geochemical Characterization Program – Results

Comment Description (Context and Rationale):

There are a number of inconsistencies identified in the results of the geochemical characterization program that, along with the lack of confidence in the representativeness of the program, create compounding uncertainty in the inputs to the water quality model and associated effects to fish and fish habitat and Indigenous peoples. Due to the scale of the project and the anticipated quantity of mine materials that will be produced over the life of the project, it is necessary to understand the geochemical characteristics of those materials and building confidence that contaminants will be managed properly. Understanding any constraints in the geochemistry program is also important considering the predicted high influence of seepage and planned effluent discharge on surrounding waters.

Reference to TISG and IS:

TISG: Section 8.3

Required Information to Resolve Comment:

Outstanding information requirements about the results of the geochemical characterization program and how they were incorporated into the water quality model are outlined in the next 4 rows, with respect to:

a. *ARD/ML potential in construction materials*
b. *Geochemical characterization – tailings*
c. *Geochemical characterization – ARD/ML Assessment*
d. *Water quality model – geochemical characterization inputs*

GCH-02a ARD/ML Potential in Construction Materials

Comment Description (Context and Rationale):

Based on the results of the geochemical characterization program, IAAC is not confident in the suitability of clay and waste rock to be used in construction as proposed, due to the potential for metal leaching (ML).

The IS indicates that clay and waste rock from the East Zone will be used as construction material for haul roads, the tailings dam, and other infrastructure. The geochemical characterization in Appendix H indicates that a primary concern for the waste rock generated by the project is ML, with 53% of waste rock material being a source of contaminants of concern, including Cr(VI), Al, As, U, Cu, and V.

Section 5.2.1.1 of the IS indicates that confirmatory waste rock samples will be screened to evaluate the potential for the development of acid rock drainage (ARD), and only used if the criteria indicate it is non-potentially acid-generating (NPAG). However, the potential for ML, even in NPAG materials, is a remaining concern due to its potential to degrade water quality and affect fish and fish habitat, including through bioaccumulation of certain contaminants in species consumed by Indigenous peoples as country foods.

It is unclear from the ML/ARD management plan how it was assessed that clay and waste rock from the site is suitable for road construction and how any metal leaching from materials used for construction will be monitored, mitigated, or managed. IAAC is of the opinion that this gap should be addressed prior to construction, considering this would be difficult to reverse after these materials have been used for construction and contaminants have been released. The lack of cohesion between the ML/ARD management plan and the geochemical characterization program prevents a sufficient understanding of potential changes to surface water quality and effects to fish and fish habitat and Indigenous peoples.

Reference to TISG and IS:

TISG: Section 8.3.3

IS: Appendix K – Section 4, Appendix H – Section 3.1.5.1

Required Information to Resolve Comment:

1) *Provide a description of how detailed criteria and supporting data will be used to evaluate the suitability of clay and waste rock for construction purposes, including how confirmatory testing will ensure these materials meet non-potentially acid-generating (NPAG) requirements.*

2) *Outline intentions to have a monitoring plan for metal leaching from construction materials, particularly for aluminum (Al), arsenic (As), chromium (Cr(VI)), vanadium (V), and other elements exceeding CCME or PWQO guidelines, as identified in the Geochemistry Characterization Report.*

3) *Outline adaptive management strategies to address exceedances detected during operations, including mitigation measures to prevent contamination of water quality and effects to fish health, growth and survival.*

Ensure alignment with applicable guides, standards, and legislative frameworks, such as MEND 1.20.1, to reduce uncertainty and strengthen the ML/ARD management plan.

Canada Nickel's Response:

1) *Provide a description of how detailed criteria and supporting data will be used to evaluate the suitability of clay and waste rock for construction purposes, including how confirmatory testing will ensure these materials meet non-potentially acid-generating (NPAG) requirements.*

Construction materials will be identified prior to and during construction activities and subjected to confirmatory testing prior to usage. Based on the results of the geochemical characterization program, there is a low potential for acid generation from site materials. Based on the modified Sobek NPR values, about 98% of analyzed waste rock samples were classified as non-potentially acid-generating (NPAG) which was consistent with NAG test results on a subset of 20 waste rock samples. Similarly, 100% of analyzed ore, tailings, clay, and lime amended clay samples were classified as NPAG. About 85% of organic rich overburden samples were classified as NPAG whereas 100% of mineral rich overburden samples were NPAG. Overall, excavated materials at the Project Area and the materials to be used for construction, including clay and waste rock, are not likely to generate acid drainage based on the modified Sobek acid-base accounting (ABA) and NAG test results.

Confirmatory testing of construction materials for construction purposes will involve collecting representative samples at the recommended rates (e.g., 1 per 10,000 tonnes) as outlined in Table 5.1 in the ML/ARD management plan (Appendix L). The samples will be analyzed for ABA, SFE, and elemental concentrations. A detailed pre-construction sampling program will be developed during the permitting phase. If during the pre-construction phase sampling program, PAG material is identified, the material will be flagged for disposal and not used for construction and an alternate source of construction materials will be identified. If PAG materials are identified by confirmatory testing results, a sampling program will be deployed to assess if the PAG materials can be sufficiently blended with NPAG materials to result in overall classification as NPAG prior to using as construction materials. If blending is deemed insufficient, PAG materials will be managed independently, and based on recommendations from a qualified professional.

Quality assurance and quality control will be maintained by collecting replicate samples and evaluating data reproducibility using relative percent difference (RPD) calculations. If the RPD value indicates heterogeneity of the materials or issues related to laboratory accuracy or sample collection, additional testing on a larger number of samples will be completed and reviewed by a qualified professional to investigate the cause prior to determination whether the materials meet the NPAG standards for construction. Continuous monitoring and review of laboratory results by a qualified professional will be included during construction, with adaptive sampling rates and protocols based on results and regulatory requirements.

From the ML/ARD Management Plan:

> "During the construction phase, waste rock generated from the East Zone of the Open Pit will be initially available for use as construction materials for haul roads, tailings dam, and other infrastructure.
>
> Construction rock will be crushed using a mobile aggregate crusher to produce aggregate. Additional rock required for construction is assumed to be purchased from local quarries. Excess waste rock will be stored temporarily at laydown areas or stockpiled in the Impoundment Facility. Confirmatory waste rock samples from the Project Area or aggregate from local quarries will be used to assess the suitability of waste rock for use as construction material, and the assessment will be conducted by a qualified professional. Confirmatory samples will be screened against the criteria identified in Section 5.1.4 to evaluate the potential of the material to develop ARD. Waste rock may be used for construction material if screening criteria indicate it is NPAG as follows:
>
> - If a minimum of three confirmatory samples from a given lithology are below the screening criteria, the material may be used for construction.
> - If a sample from a given lithology exceeds the screening criteria, a minimum of 10 samples will be used to determine the median value. If the median values of either modified Sobek NPR or NAG pH meet the screening criteria, the material may be used for construction. The results will be evaluated before the rock can be used for construction."

2) *Outline intentions to have a monitoring plan for metal leaching from construction materials, particularly for aluminum (Al), arsenic (As), chromium (Cr(VI)), vanadium (V), and other elements exceeding CCME or PWQO guidelines, as identified in the Geochemistry Characterization Report.*

Chapter 34 of the Impact Statement describes the follow up and monitoring programs that will be developed to monitor for potential effects, validate predictions of the Impact Statement and to confirm the effectiveness of mitigation measures. Such plans include a proposed Surface Water Follow-up and Groundwater Follow-up Program, each of which will monitor for evidence of potential ML and corresponding impacts on the environment, as well as a ML/ARD Management Plan to outline measures for the prevention, identification, mitigation, and management of ML/ARD during and after excavating and extracting of the mined materials including overburden, waste rock, ore, and tailings.

A Conceptual ML/ARD Management Plan was included in the Impact Statement (Appendix L) to outline measures for the prevention, identification, mitigation, and management of ML and ARD during and after excavating and extracting of the mined materials including overburden, clay, waste rock, ore, and tailings. The ML/ARD Management Plan includes a section for contact water monitoring for ML from construction materials and mine wastes, particularly for aluminum, arsenic, chromium, vanadium, and other elements exceeding the Canadian Water Quality Guidelines (CWQG) for the protection of Freshwater Aquatic Life (FAL) and Provincial Water Quality Objectives (PWQO), as identified in the Geochemistry Characterization Report (Appendix H of the Impact Statement).

The groundwater monitoring plan will include monitoring wells located upgradient, downgradient, and cross gradient of mine infrastructure such as the Impoundment Facility and TMF. Surface water monitoring will be conducted in the receiving environment, lakes and rivers. Groundwater and surface water samples will be analyzed for aluminum, arsenic, chromium, vanadium, and other elements that are predicted to exceed the CWQG-FAL and PWQO, as identified in the Geochemistry Characterization Report (Appendix H of the Impact Statement). The groundwater and surface water monitoring programs will include an adaptive management component with trigger thresholds to alert to changing conditions prior to a significant environmental effect. Trigger thresholds are staged to allow an early indicator system so that minor changes in data could be appropriately followed, monitored, and acted upon as necessary. If a trigger threshold is exceeded, a subsequent investigation will be completed to understand the cause.

3) *Outline adaptive management strategies to address exceedances detected during operations, including mitigation measures to prevent contamination of water quality and effects to fish health, growth and survival.*

As outlined in the response to comment GCH-02a-2 above, the follow-up monitoring programs for groundwater and surface water will include an adaptive management component with trigger thresholds to alert to changing conditions prior to a significant environmental effect. Trigger thresholds are staged to allow an early indicator system so that minor changes in data could be appropriately followed, monitored, and acted upon as necessary. If a trigger threshold is exceeded than a subsequent investigation will be completed to understand the cause. Canada Nickel is committed to implementing technical and economically feasible mitigation measures if monitoring indicates that specified levels of environmental change have been reached or exceeded as a result of Mine development or operation.

The following measures are proposed in the Impact Statement to mitigate water quality effects on the receiving environment:

- Implement a ML/ARD Management Plan to reduce and limit the known and potential risks of ML/ARD associated with the Project, thereby reducing potential effects to water quality.
- Install contact water collection ditches around the stockpiles, Impoundment Facility, and Tailings Management Facility (TMF).
- Implement progressive rehabilitation to reduce infiltration into the Impoundment Facility and TMF, thereby reducing the amount of water and loading to groundwater.
- Routinely monitor construction areas to identify areas of potential erosion and apply appropriate erosion and sedimentation control measures in accordance with the Erosion and Sediment Control Plan.
- Maintain haul roads, site roads, and access roads in good condition to reduce erosion, improve water flow and manage vegetation growth within the ditches.
- Recycle contact water for use on site (e.g. dust suppression, makeup water in the Process Plant) where practical.

- Collect runoff and groundwater inflows from the Open Pit and pump water to sedimentation ponds prior to being treated, as needed, and discharged to the receiving environment.
- Design the seepage collection ditches to intercept shallow groundwater seepage from the TMF, Ore Stockpiles, and Impoundment Facility.
- Design contact water collection and sedimentation ponds to provide onsite storage of local runoff with the size and residence times necessary to promote sediment removal.
- Treat water effluents prior to discharge to the receiving environment, as required, to meet regulatory criteria as well as criteria developed through the receiving watercourse Assimilative Capacity Study.
- Implement water treatment through use of water treatment plant to receive discharge from the TMF and collection ponds.
- Reducing the Project footprint in the West Buskegau River and Jocko Creek watersheds to the extent possible.
- Avoiding placement of mine infrastructure in the West Buskegau River mainstem to the east and the headwater lakes of the North Driftwood River watershed to the west of the Project Area.
- Constructing mine infrastructure in a progressive manner to delay alteration of fish habitat, to the extent practical.
- Maintaining riparian buffers around fish-bearing watercourses and waterbodies within the Project Area to the extent possible.
- Installing open-bottom structures with abutments above the ordinary high-water mark at stream crossings of permanent fish-bearing mainstem channels.
- Installing appropriately sized closed-bottom culverts at crossings of ephemeral streams or permanent fish-bearing or non-fish-bearing tributaries of mainstem channels.
- Develop a Site-Wide Water Management Plan that includes measures to divert clean, non contact water around the Project and capture run-off in collection ponds during construction.

Additional mitigation measures that may be implemented during operation of the Mine to mitigate unforeseen effects of the Mine on water quality of the receiving environment may include:

- Installation of larger seepage collection pumps, where necessary, to address persistent seepage flows detected in the seepage collection ditches that cannot be adequately captured by existing sump stations.
- Modifications to the existing ditch system to increase seepage collection efficiency (e.g., modification of ditch geometry, alignment, or construction materials).

- Installation of one or multiple groundwater pump-back wells that could serve as a hydraulic barrier.
- Installation of a barrier wall that could include sheet pile, grout curtain, or localized grouting of bedrock.
- Passive treatment options for groundwater such as permeable reactive barriers.
- Improve water treatment options.
- Reduce or cease Project effluent discharge.

Feasibility and implementation decisions beyond that committed to in the Impact Statement will be made based on the circumstances and considerations at the time and incorporated into required permitting at that time.

GCH-02b Geochemical Characterization – Tailings

Comment Description (Context and Rationale):

The geochemical characterization program in Appendix H of the IS includes the characterization of four tailings samples and associated process water. The IS does not include information about where the four tailings' samples were sourced from to demonstrate representativeness. Considering the quantity of tailings that are anticipated to be generated over the life of the project (1,586 million tonnes), and the high potential for contamination from tailings due to their fine grained nature, IAAC does not have confidence that the geochemical characterization of the tailings provides an accurate assessment of contamination potential.

Based on the CO3-NP analysis of the four tailings samples, 75% of the tailings are classified as uncertain and could be potentially acid generating (PAG). It is recognized that the availability of tailings samples can be limited during the planning stages of a project, due to mineral processing not having begun, and available samples being generated by processing test samples which can differ in composition from the feed used during operations. The representativeness of the tailings generated during testing is therefore inherently limited and directly influenced by the representativeness of the ore samples used for their generation.

Additional information on the geochemical characterization of the tailings is needed to understand how runoff and seepage from exposed tailings may influence the composition of seepage and associated water treatment requirements. Confidence in predictions of seepage quality are necessary to understand changes to surface water quality and associated effects to fish and fish habitat and Indigenous peoples. Understanding the tailings geochemistry also helps inform the need for mitigation for migratory birds and species of importance to indigenous peoples that may come into contact with tailings.

Reference to TISG and IS:

TISG: Section 8.3, Section 8.6

IS: Appendix H – Appendix B, Sections 4.0 & 5.0, and Appendix K – Section 2.3, Appendix C.4 – Section 1.3, Appendix L – Section 5.2.4

Required Information to Resolve Comment:

1) *Provide detailed descriptions of the methods used to generate tailings samples for geochemical characterization, including the representativeness of the ore samples used and any treatments applied (including IPT carbonation).*

2) *Clarify whether additional tailings samples are available to expand the geochemical characterization program. If samples are available, expand the geochemical characterization program to include these samples. Provide a revised water quality model using worst case scenario source terms. Demonstrate how this revised model will inform protective monitoring and water treatment plans.*

3) *Provide updated assessments of changes to water quality, and effects to fish and fish habitat based on the worst-case scenario model predictions, as appropriate, recognizing the uncertainty associated with limited tailings samples available.*

4) *Provide a comprehensive plan that outlines:*

   - *ongoing sampling and testing of tailings generated during operations, including tailings that have undergone IPT carbonation, that will ensure that predictions of runoff and seepage can be validated, and adaptive management strategies can be implemented.*
   - *how source terms and predictive models will be refined to better match observed conditions relative to project timelines*
   - *Alternatively, discuss how gaps in the geochemical sampling program will be addressed during provincial permitting relative to project timelines.*

Canada Nickel's Response:

1) *Provide detailed descriptions of the methods used to generate tailings samples for geochemical characterization, including the representativeness of the ore samples used and any treatments applied (including IPT carbonation).*

See Attachment GCH-02b-1 Lorax Environmental - IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d and Attachment GCH-02b-2 Lorax Environmental - Lorax Environmental - Crawford Nickel Project Upper-Case Source Term Sensitivity.

2) *Clarify whether additional tailings samples are available to expand the geochemical characterization program. If samples are available, expand the geochemical characterization program to include these*

samples. Provide a revised water quality model using worst case scenario source terms. Demonstrate how this revised model will inform protective monitoring and water treatment plans.

See Attachment GCH-02b Lorax Environmental - IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d

3) *Provide updated assessments of changes to water quality, and effects to fish and fish habitat based on the worst-case scenario model predictions, as appropriate, recognizing the uncertainty associated with limited tailings samples available.*

See Information Request S*W Qual-01.2 - effluent mixing* and Attachment GCH-02b Lorax Environmental - IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d.

4) *Provide a comprehensive plan that outlines:*

- *ongoing sampling and testing of tailings generated during operations, including tailings that have undergone IPT carbonation, that will ensure that predictions of runoff and seepage can be validated, and adaptive management strategies can be implemented.*
- *how source terms and predictive models will be refined to better match observed conditions relative to project timelines*
- *Alternatively, discuss how gaps in the geochemical sampling program will be addressed during provincial permitting relative to project timelines.*

Four new tailings samples that have recently been produced and will be analyzed for ABA, elemental analysis, SFE, supernatant water and HCTs, but are not available now as the samples have just been produced and IPT carbonation has not yet been completed.

A follow-up geochemical characterization and monitoring program for tailings during operations has been proposed as part of the ML/ARD Management Plan (Appendix L of the Impact Statement). Tailings will be sampled at a frequency of one sample per 50,000 tonnes of material from year 1 to 3 with sample frequency refinement by a qualified professional at year 4, as necessary. This will include tailings that have undergone IPT carbonation.

Part 7 - Metal Leaching and Acid Rock Drainage Requirements of the the Code requires the development of a sampling program for materials remaining on the site that have been excavated, exposed or otherwise disturbed by mining activities – this includes tailings materials.

The sampling and testing program and data interpretation are required to be developed and conducted by a qualified professional in accordance with the MEND guidelines throughout the life of mine. The proposed ML/ARD management plan (Attachment GCH-01e-2) will be implemented during construction and operations. This plan includes systematic sampling of tailings as mining progresses to capture the variability of ore geochemistry through the life of the mine, with adjustments made, as deemed necessary, by a qualified professional. The ML/ARD management plan will be updated for permitting and beginning of construction.

GCH-02c Geochemical Characterization – ARD/ML Assessment

Comment Description (Context and Rationale):

There is a lack of confidence in the IS's characterization of mine materials as being non-potentially acid generating (NPAG), based on the results of the geochemical characterization program. An accurate understanding of the potential for acid rock drainage (ARD) is necessary to validate the water quality model. Confidence in the water quality model, including for contaminants that bioaccumulate, is necessary to inform the assessment of effects and associated mitigation measures and management for fish and fish habitat and Indigenous peoples.

The IS (Appendix L, section 5.2) states that waste rock will not be segregated because preliminary geochemical characterization data shows waste rock is anticipated to be NPAG. This conclusion is based on the use of modified Sobek neutralization potential ratio (NPR) values and net acid generation (NAG) pH. However, as noted in the MEND 1.20.1 manual, this is only one method for measuring neutralization potential (NP) and the sample size used for the NAG testing is too limited to be relied upon to predict the acid drainage generation of the entire volume of the waste rock generated at the site. According to the MEND 1.20.1 manual, the CO_3-NP is a potentially useful measure for determining NP because carbonate minerals are often the only rapidly available NP source capable of matching the fastest rates of acid generation. Based on the CO_3-NP results, approximately 22% of the waste rock could be PAG.

Using CO_3-NP, all samples of overburden were classified as NPAG while modified Sobek NP classified 4% of overburden as potentially acid generating (PAG) and 4% as uncertain. The IS does acknowledge that this discrepancy is thought to be driven by the relatively low abundance of both sulphides and carbonates in the materials, and an abundance of silicate minerals; however, it is unclear why the modified Sobek method results in less neutralization potential for overburden than the CO_3-NP considering the modified Sobek method uses both carbonate and silicates as neutralization.

In the acid rock drainage and metal(loid) leaching (ARD/ML) assessment, using CO_3-NP, 7% of waste rock, 6% of ore, and 75% of tailings were assessed as uncertain; using modified Sobek NP, 1% of waste rock and 4% of overburden were assessed as uncertain. In accordance with MEND 1.20.1, materials (i.e., waste rock, ore, tailings, and overburden) classified as uncertain with NPR of between 1 and 2 are to be considered capable of generating ARD.

Additional observations regarding the ARD/ML assessment include:

- *Aluminum, arsenic, boron, cadmium, chromium VI, copper, and vanadium were identified as having potential for metal leaching exceeding Provincial Water Quality Objectives (PWQO) in waste rock materials. There is also potential for alkalinity to exceed Canadian Council of Ministers of the Environment and PWQO in all materials.*
- *Aluminum, antimony, arsenic, boron, cadmium, chromium VI, copper, thallium, and vanadium have potential for leaching exceeding PWQOs in ore.*
- *Overburden material indicates potentially elevated arsenic, aluminum, cadmium, cobalt, fluoride, chromium VI, boron, copper, iron, lead, vanadium, selenium, and zinc, with exceedances of relevant PWQOs.*

Reference to TISG and IS:

TISG: Section 8.3.1

IS: Appendix H, Appendix L – Section 4.2, Section 5.2.1 & Section 5.2.1.2

Required Information to Resolve Comment:

1) *Discuss the discrepancy between the modified Sobek NP and CO3-NP results for overburden and provide a rationale for why these results represent an accurate assessment of the potential for acid rock drainage from overburden.*

2) *Revise the water quality models (see also GCH-02d) and the ML/ARD management plan to reflect:*

   - *The most conservative estimate of NP (CO_3-NP) to manage the waste rock generated at the site. Management of waste rock may include segregation and/or blending of the PAG and NPAG materials to enhance buffering of potential acid drainage that may be produced from the PAG materials.*
   - *Contingency measures in relation to the results of ongoing geochemical testing at the site.*

3) *Develop a comprehensive plan to continue geochemical testing of mine materials for a more accurate assessment of ARD/ML potential and discuss how gaps in the geochemical sampling program will be addressed and results will be incorporated into the ongoing refinements to the water quality model and ML/ARD management plan during provincial permitting relative to project timelines.*

Canada Nickel's Response:

1) *Discuss the discrepancy between the modified Sobek NP and CO_3-NP results for overburden and provide a rationale for why these results represent an accurate assessment of the potential for acid rock drainage from overburden.*

The ARD classification of the overburden samples was based on MEND 1.20.1 criteria (Table 6 in the Crawford Geochemistry Characterization Report [Appendix H of the Impact Statement]). The ABA results are plotted in Figure 30, Figure 31, and Figure 32 and are summarized in Table 33 of the Crawford Geochemistry Characterization Report. The upper 0 to 2.5 metres of surficial materials are generally where the organic overburden materials are found, whereas the mineral overburden can be up to tens of metres thick (see Appendix B.1 - Soils and Terrain Baseline Report of the Impact Statement). Acid base accounting results for overburden indicate a low potential for acid from sulphide minerals. Select organic overburden samples had stored acidity (acidic paste pH) likely due to organic acids, with a low potential for acidity from sulphides. These select samples had measurable sulphate sulphur likely associated with secondary minerals produced from chemical weathering processes. However, leachate pH obtained from the SFE analysis of organic overburden samples was circumneutral with the minimum pH value of 7.2. Organic acids from decaying organic matter are expected in near-surface soils (organic overburden samples) and the results are consistent with anticipated overburden properties. There is one sample classified as PAG and one sample classified as uncertain using the modified Sobek NPR, both of which

are of organic material. When classified using the CO_3-NPR, all samples are classified as NPAG because there is measurable and appreciable carbonate content in the overburden and very low Acid Potential from sulphides minerals.

A large proportion of mineral overburden samples plot along or close to the 1 to 1 line (carbonate neutralization potential [NP] vs. modified Sobek NP) in Figure 30 of the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement), suggesting that carbonate minerals are the primary source of NP in the mineral overburden type. The observed discrepancy between the modified Sobek NP and CO_3-NP results for organic overburden samples and one mineral overburden sample can be attributed to differences in mineral composition and reaction rates during laboratory testing. Carbonate NP is determined based on the carbonate content in the sample, primarily from minerals such as calcite and dolomite. The presence of iron carbonates (e.g., siderite), which do not provide a surplus neutralization potential, may also impact this estimation. The presence of siderite could lead to an overestimation of NP as CO_3-NP is calculated based on the inorganic carbon content. However, the overburden samples were not analyzed for mineralogy; thus, the presence of siderite has not been confirmed. In contrast, modified Sobek NP is estimated from a titration test and stored acidity in the samples is released prior to the final NP titration. As a result, the ARD classification based on the modified Sobek NP can be considered more reliable to predict the ARD potential of the organic overburden than the CO_3-NP. This discrepancy will be investigated further through mineralogical analysis in future geochemical testing programs.

Despite the discrepancy, both organic and mineral overburden demonstrate sufficient NP to neutralize acid generation, as the results showed that most overburden (92%) are NPAG based on modified Sobek NPR values. Moreover, mixing of organic overburden with mineral overburden during excavation and stockpiling is expected to result in a bulk product with NPR >2, due to the limited Acid Potential and excess carbonate NP of samples. ARD is not expected to occur in water in contact with overburden materials. The results presented in the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement) represent an accurate assessment of the potential for ARD from overburden and additional shake flask testing completed as part of response to GCH-02d-1 further describes the overburden geochemical properties.

2) *Revise the water quality models (see also GCH-02d) and the ML/ARD management plan to reflect:*

- *The most conservative estimate of NP (CO3-NP) to manage the waste rock generated at the site. Management of waste rock may include segregation and/or blending of the PAG and NPAG materials to enhance buffering of potential acid drainage that may be produced from the PAG materials.*
- *Contingency measures in relation to the results of ongoing geochemical testing at the site.*

See Attachment GCH-02c Lorax Environmental - IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d

Additionally, preliminary management options for potentially acid generating materials have been included in the updated ML/ARD Management Plan provided in Attachment GHC-01e-2.

3) *Develop a comprehensive plan to continue geochemical testing of mine materials for a more accurate assessment of ARD/ML potential and discuss how gaps in the geochemical sampling program will be addressed and results will be incorporated into the ongoing refinements to the water quality model and ML/ARD management plan during provincial permitting relative to project timelines.*

The static test results of mined materials completed to date indicated that the buffering capacity titration tests are an effective method for estimating the NP when the carbonate NP negligibly contributes to the NP. The geochemical characterization program is ongoing and will continue through the permitting stages and as the mine plan evolves. Additional samples of tailings, talc and overburden have been collected and analyzed to address the Information Requests. Preliminary results are provided in GCH-01e-1 for talc and GCH-02d-2a for overburden and results for tailings are not yet available. The results to date indicate that the proposed management strategies in the ML/ARD Management Plan remain aligned with the geochemical characterization results to date. Even though ARD is not expected to occur in water that is in contact with the waste rock, the updated ML/ARD Management Plan incorporates a precautionary management strategy for PAG waste rock.

A follow-up geochemical characterization and monitoring program for waste materials during construction and operations has been proposed as part of the ML/ARD Management Plan. Updates to the ML/ARD monitoring plan have been completed to include an assessment of blending of PAG materials with NPAG material as a measure to mitigate the ARD potential, as provided in Attachment GCH-01e-2. The sampling and testing program and data interpretation are required as part of the permitting process to be developed and conducted by a qualified professional in accordance with the MEND guidelines throughout the life of mine. Further updates will incorporate geochemical characterization results as they become available before permitting. A detailed pre-construction sampling program will be developed during the permitting phase.

GCH-2d Water Quality Model – Geochemical Characterization Inputs

Comment Description (Context and Rationale):

The IS's water quality model does not sufficiently incorporate data from the geochemical characterization program. As a result, IAAC is unable to validate predicted changes to surface water quality due to the release of seepage, and associated effects to fish and fish habitat and Indigenous peoples. Appropriate incorporation of geochemical data in the water quality model is necessary to inform the ML/ARD site management plan and/or determine potential mitigation measures to manage effects to fish and fish habitat and Indigenous peoples due to changes in water quality in the receiving environment.

Gaps are noted in the following categories:

Representation of Impoundment Facility Composition

The Water Quality Model assumes the Impoundment Facility's source terms are entirely represented by waste rock, despite the facility also containing 16% overburden material. Overburden samples were subjected only to static testing, not kinetic testing, and were excluded from the model based on the assertion that selenium enrichment was due to high detection limits. However:

- *Static tests revealed overburden samples had significant crustal enrichment in selenium.*
- *Shake Flask Extraction tests indicated exceedances of Canadian Council of Ministers of the Environment (CCME) and Provincial Water Quality Standards (PWQO) limits for multiple elements (e.g., Al, Cr(VI), Cu, Zn) exceeding those observed in waste rock. The assumption that overburden has source terms comparable to waste rock is unsupported, necessitating its inclusion in the model with robust testing.*

Chromium (Cr(VI)) Concentrations

The model sets Cr(VI) concentrations to detection limit values for materials in the Impoundment Facility based on unsupported assertions:

- *The claim that waste rock is predominantly mafic, while ultramafic rocks are the primary source of Cr(VI), ignores that 13% of waste rock is ultramafic peridotite, which showed Cr(VI) exceedances in humidity cell test (HCT) results.*
- *The claim that HCT results showed Cr(VI) below detection limits for waste rock is contradicted by data (e.g., Figure 37, Appendix H), where Cr(VI) approached PWQO limits in mafic gabbro samples.*
- *Overburden was not tested via HCT, yet 48 of 50 overburden samples in shake flask tests exceeded CCME and PWQO for Cr(VI). The exclusion of Cr(VI) contributions from these materials is unjustified and undermines the reliability of the model's predictions for Ponds 1 and 2.*

Source Term Data

The water quality model's source term data lacks sufficient detail to understand the range of potential changes to surface water quality and effects to fish habitat and Indigenous peoples from contact water:

- *The TISG requires base, worst-case (e.g., 75th to 90th percentile), and sensitivity scenarios, but only median loading rates were used without justification for the omission of a worst-case scenario and sensitivity analysis.*
- *The TISG requires clear descriptions of input parameters and assumptions, yet the model does not detail how release rates were calculated from HCT results (e.g., test weeks, assumptions applied), or how data from ongoing tests will be used. This is critical as unstable release rates are observed for some tests, particularly those indicating increased levels of ML potential.*

Reference to TISG and IS:

TISG: Section 8.3.2

IS: Appendix K – Section 3.2.4, Appendix H – Section 3.1.4.3 & Section 3.2.1, Appendix H – Section 6.0 & Appendix B

Required Information to Resolve Comment:

1) *Revise the water quality model to ensure that all source term inputs are fully supported by the results of the geochemical characterization program. This revision should:*

   - *Address the identified discrepancies in the representation of overburden and waste rock, particularly in relation to metal leaching potential and Cr(VI) exceedances.*
   - *Align the updated model with TISG requirements by presenting base, worst-case, and sensitivity scenarios, alongside a detailed description of all input parameters and assumptions used.*

2) *Provide a plan to:*

   - *Update the Water Quality Model to include kinetic testing data for overburden materials and incorporate realistic Cr(VI) concentrations based on observed exceedances in waste rock and overburden, to inform ongoing refinements to optimize the ARD/ML management plan and inform provincial permitting.*
   - *Conduct and include a sensitivity analysis to account for imperfect segregation of mine rock types (namely waste rock, overburden, clay), considering the variability in metal leaching potential across different material types. These updates will improve the reliability of the Water Quality Model and ensure it adequately supports the ML/ARD management plan, reducing uncertainties in mine site effluent water quality predictions and enabling more effective mitigation of potential risks to water quality, and fish and fish habitat*

Canada Nickel's Response:

1) *Revise the water quality model to ensure that all source term inputs are fully supported by the results of the geochemical characterization program. This revision should:*

   - *Address the identified discrepancies in the representation of overburden and waste rock, particularly in relation to metal leaching potential and Cr(VI) exceedances.*
   - *Align the updated model with TISG requirements by presenting base, worst-case, and sensitivity scenarios, alongside a detailed description of all input parameters and assumptions used.*

See Attachment GCH-02b Lorax Environmental - IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d

2) *Provide a plan to:*

   - *Update the Water Quality Model to include kinetic testing data for overburden materials and incorporate realistic Cr(VI) concentrations based on observed exceedances in waste rock and overburden, to inform ongoing refinements to optimize the ARD/ML management plan and inform provincial permitting.*
   - *Conduct and include a sensitivity analysis to account for imperfect segregation of mine rock types (namely waste rock, overburden, clay), considering the variability in metal leaching potential across different material types. These updates will improve the reliability of the Water Quality Model and ensure it adequately supports the ML/ARD management plan, reducing uncertainties in mine site effluent water quality predictions and enabling more effective mitigation of potential risks to water quality, and fish and fish habitat*

See Attachment GCH-02b Lorax Environmental - IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d

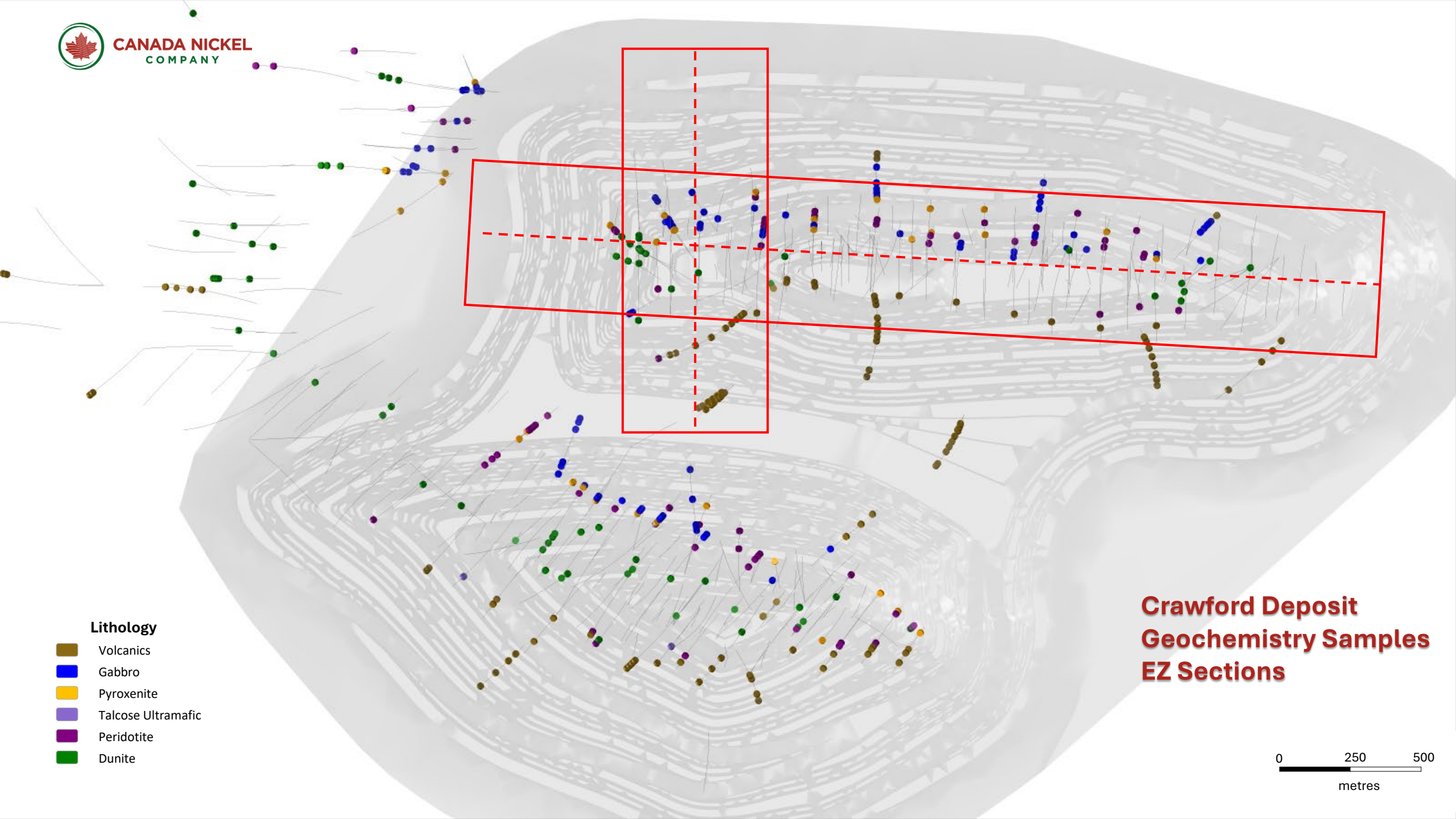
Attachments

Canada Nickel's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project (Received May 30, 2025)
Geochemistry, where Conditions Influence Water Quality and Effects to Fish and Fish Habitat and Indigenous Peoples
December 24, 2025

Attachment GHC-01a Cross-Sections of Geochemical Sample Locations

CANADA NICKEL COMPANY

Stantec

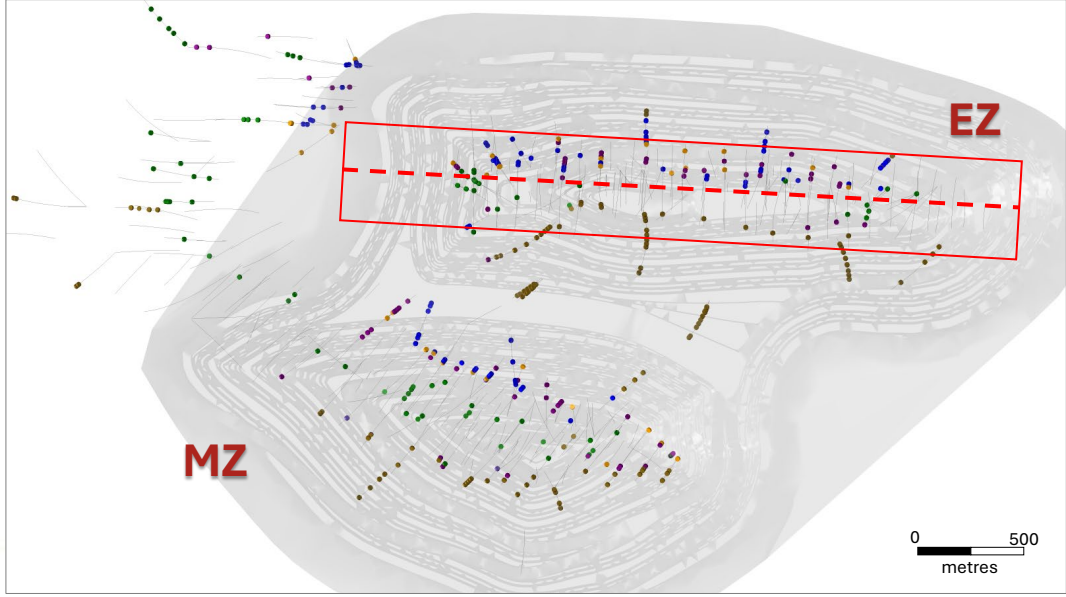

CANADA NICKEL
COMPANY
Lithology
Volcanics
Gabbro
Pyroxenite
Talcose Ultramafic
Peridotite
Dunite
Crawford Deposit
Geochemistry Samples
EZ Sections
0
250
500
metres

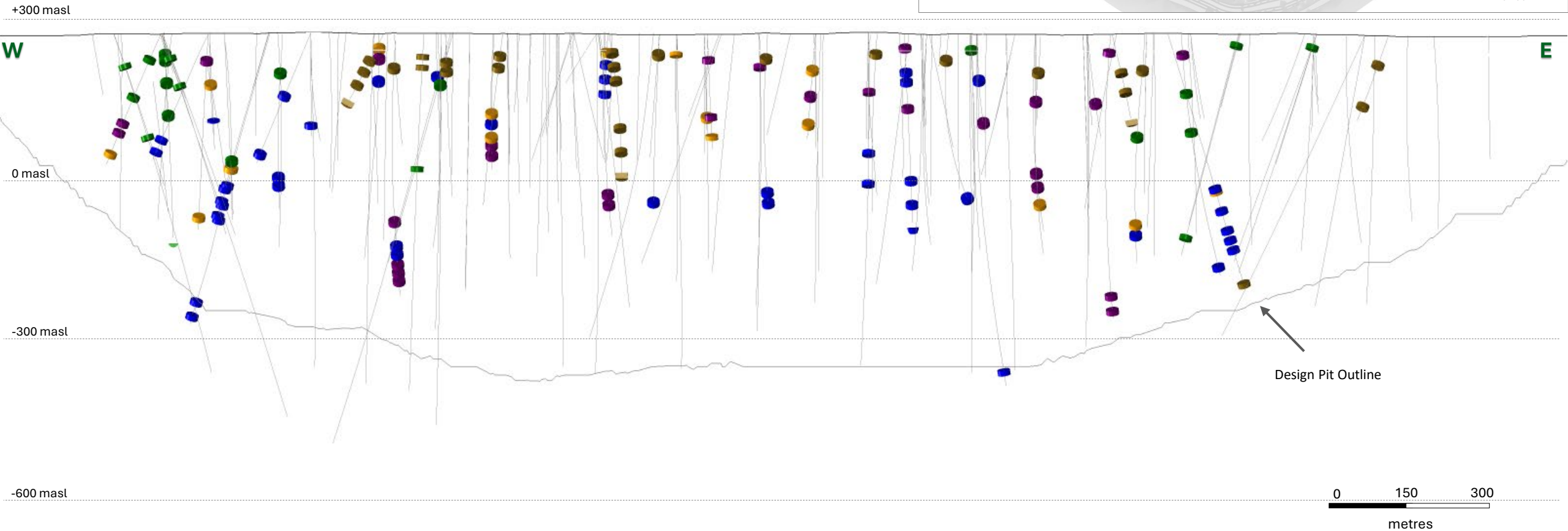
CANADA NICKEL COMPANY

EZ Looking North (Azi 003)
Geochemistry Sampling
500 m Clipping

Lithology

- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite





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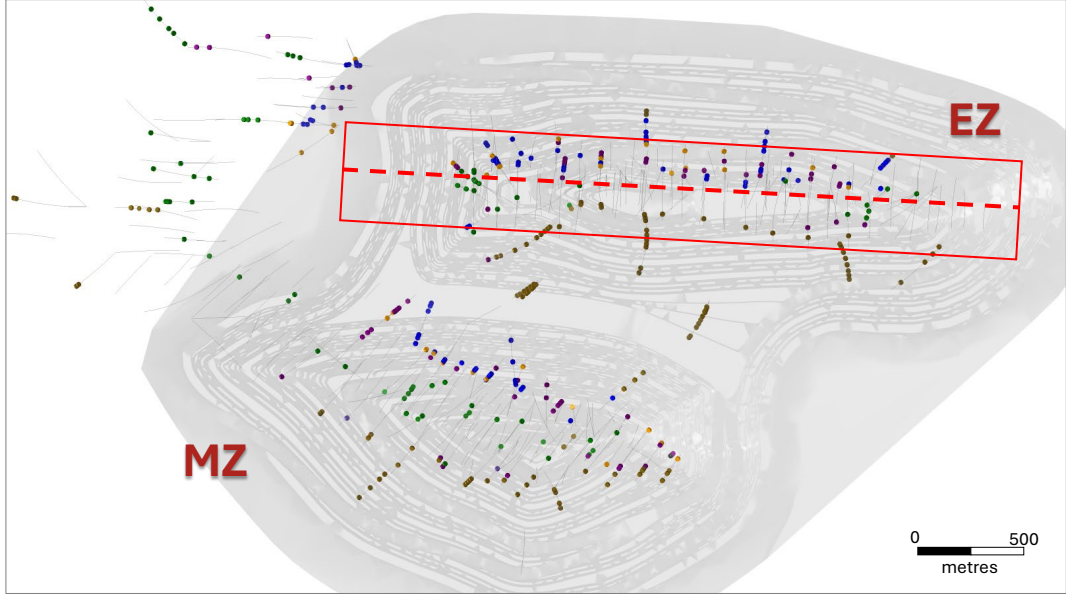
EZ Looking North (Azi 003)
Geochemistry Sampling
On Block Model
500 m Clipping

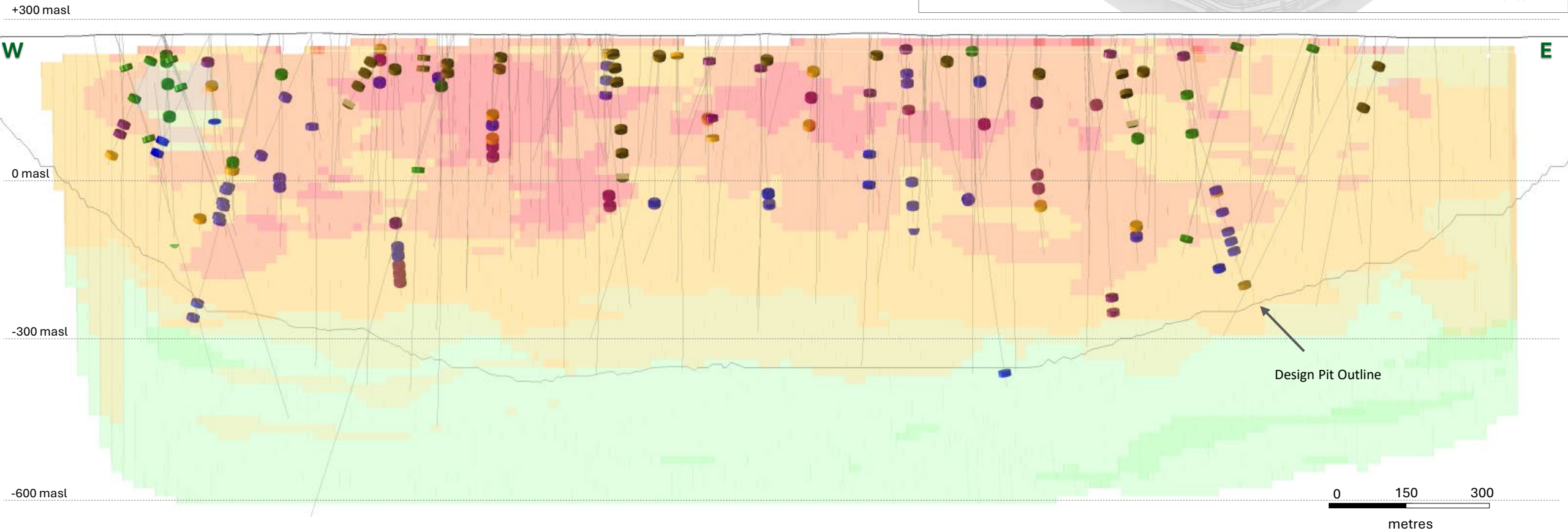
Lithology

- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite

BM (Resource Category

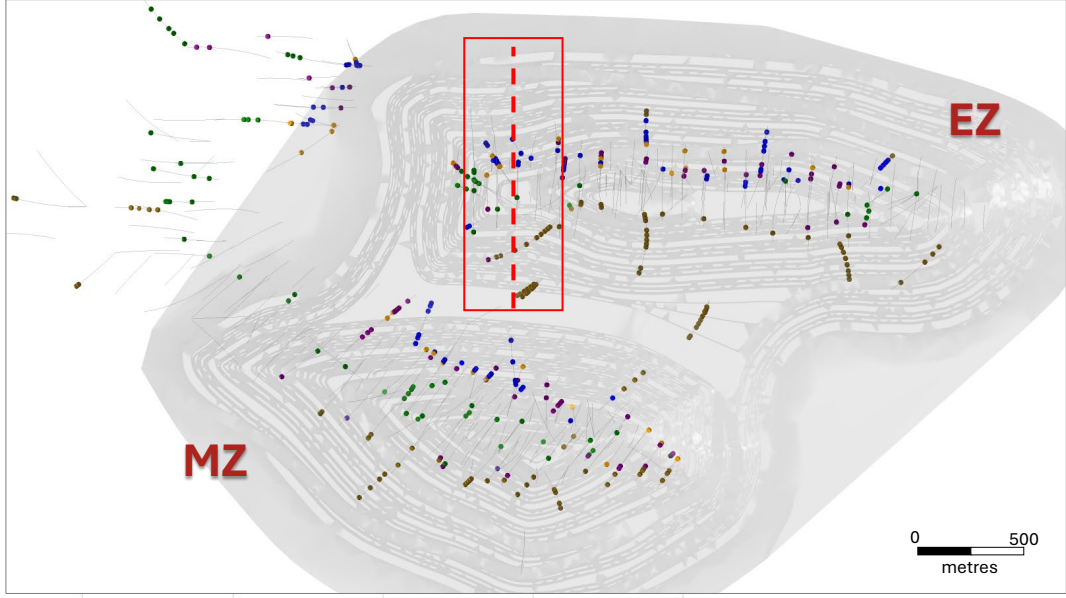
- Measured
- Indicated
- Inferred
- Waste





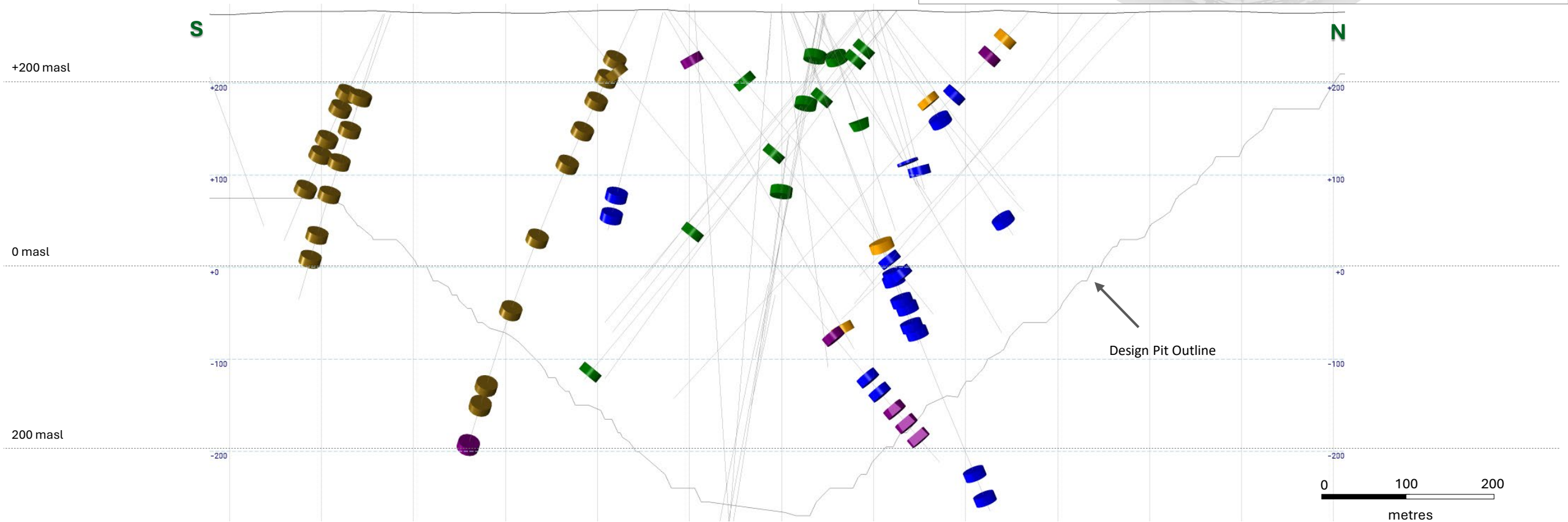
CANADA NICKEL COMPANY

EZ Looking West (Azi 270)
Geochemistry Sampling
500 m Clipping



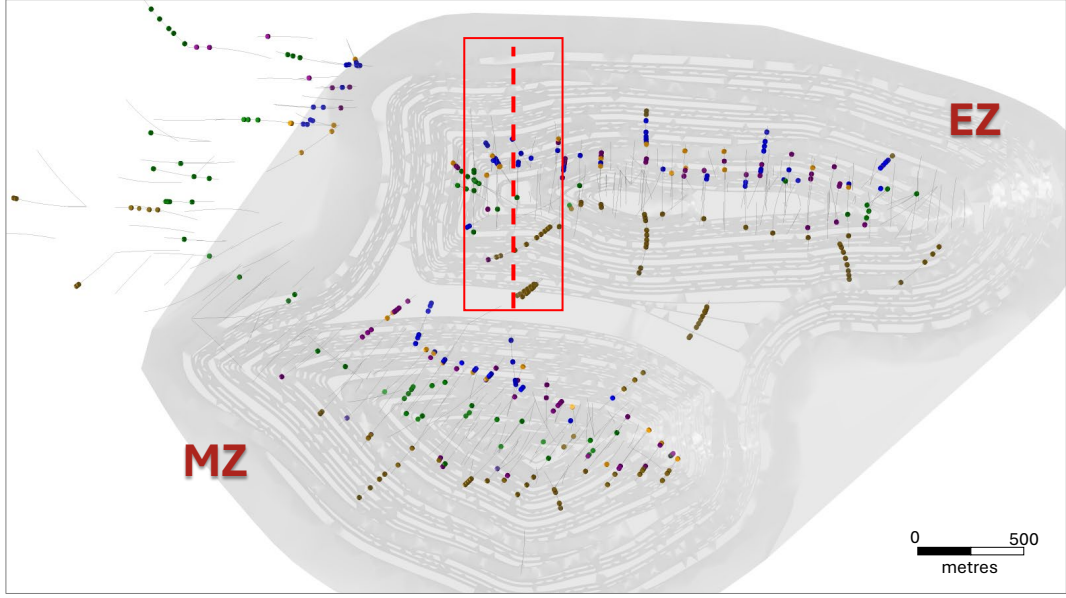
Lithology

- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite



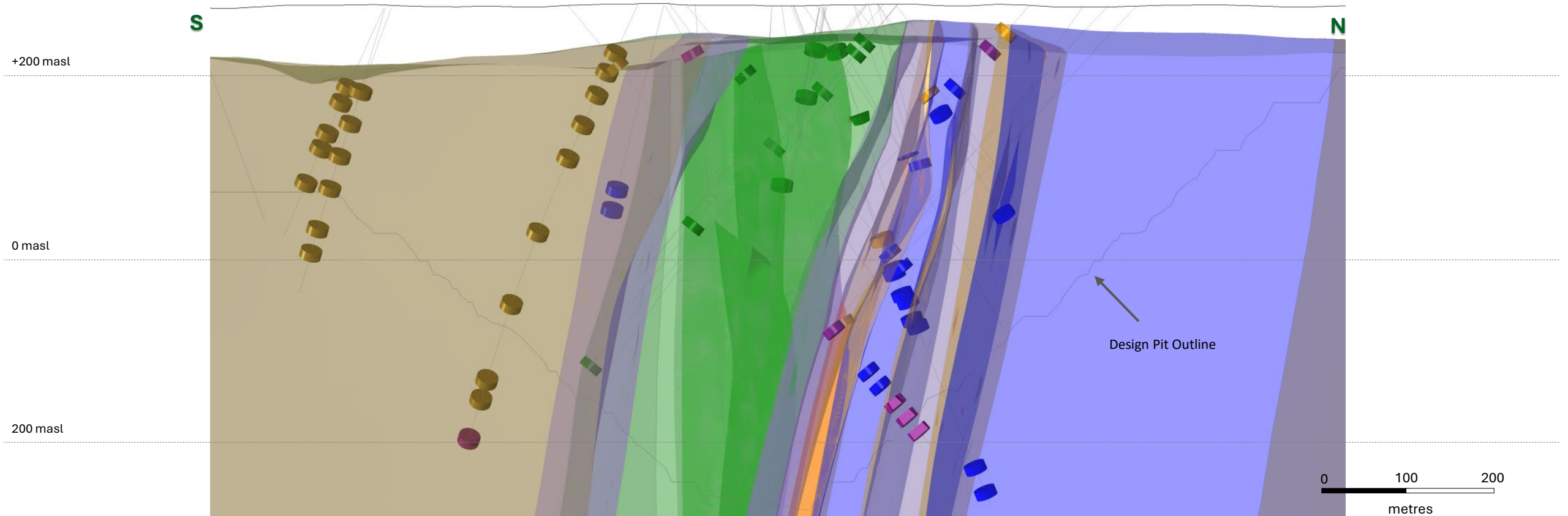
CANADA NICKEL COMPANY

EZ Looking West (Azi 270) Geochemistry Sampling On Geological Model 500 m Clipping



Lithology

- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite



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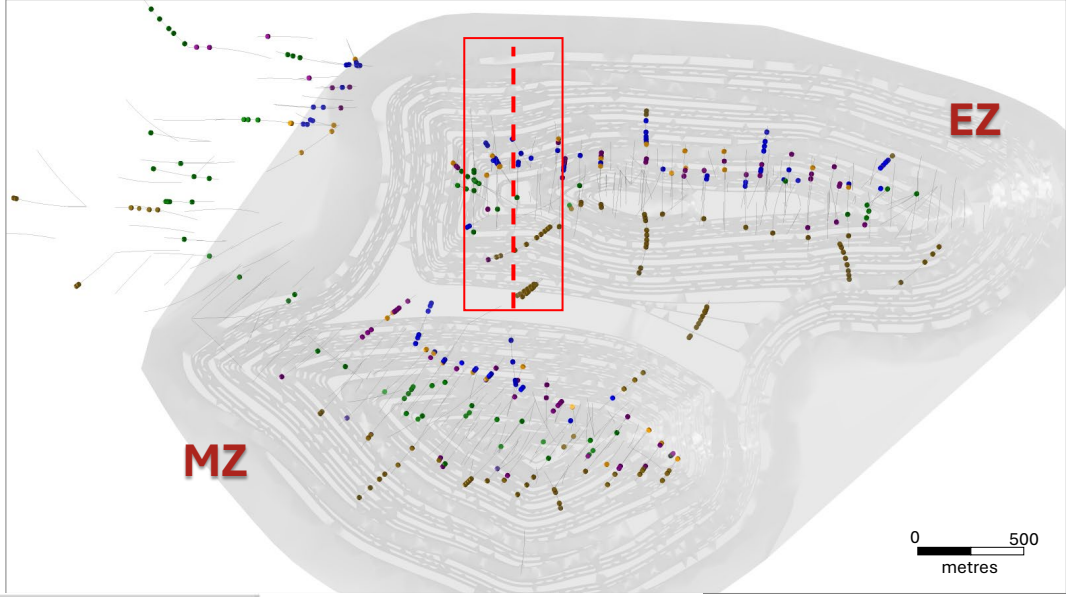
EZ Looking West (Azi 270)
Geochemistry Sampling
On Block Model
500 m Clipping

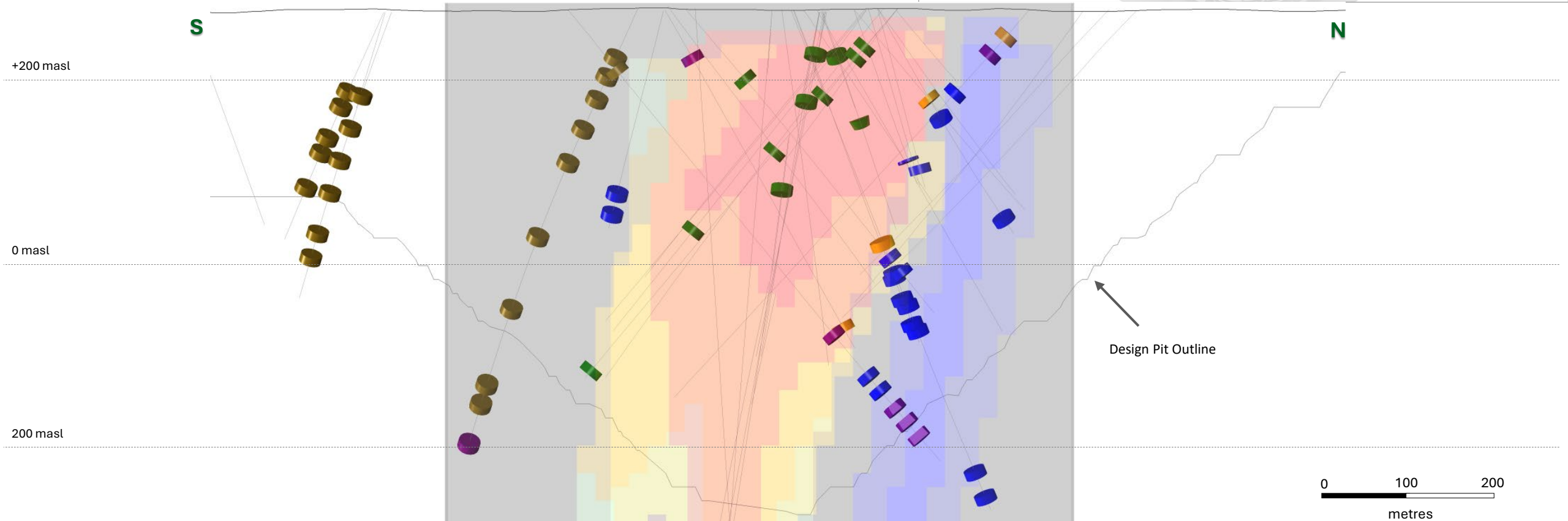
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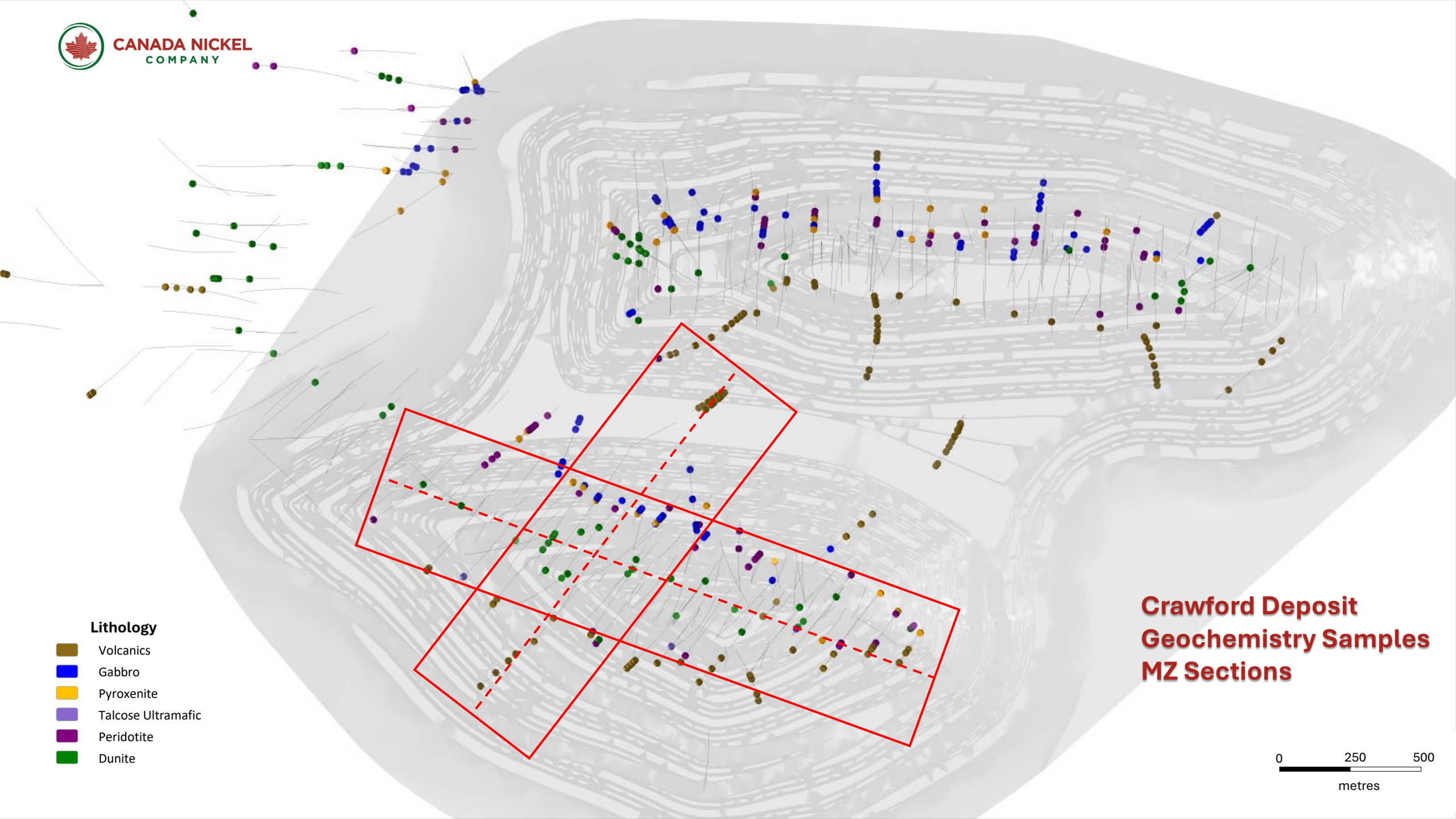
- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite

BM (Resource Category

- Measured
- Indicated
- Inferred
- Waste





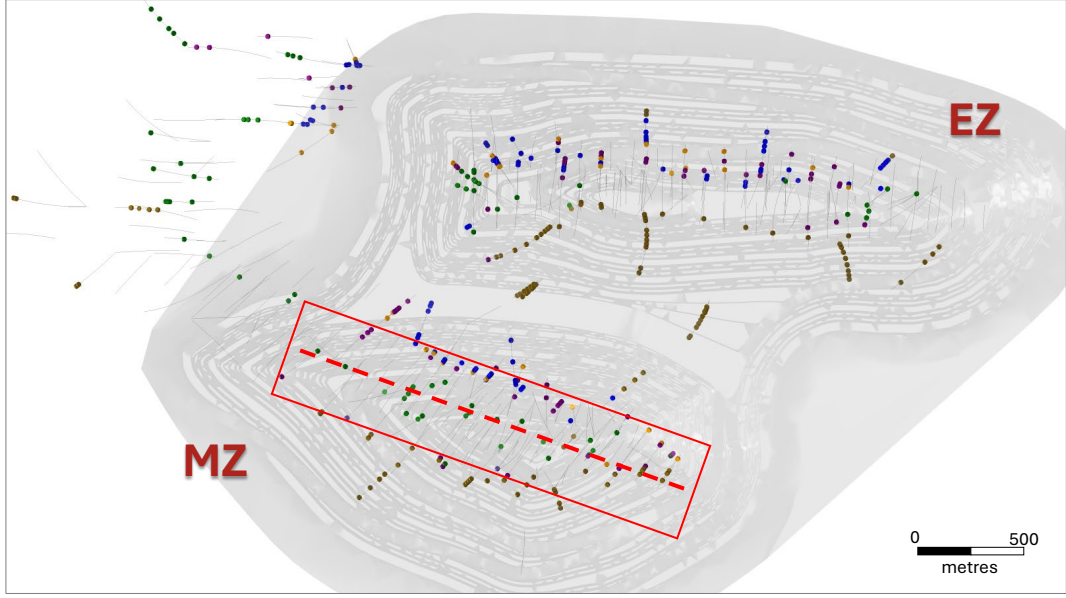

CANADA NICKEL
COMPANY
Lithology
Volcanics
Gabbro
Pyroxenite
Talcose Ultramafic
Peridotite
Dunite
Crawford Deposit
Geochemistry Samples
MZ Sections
0
250
500
metres

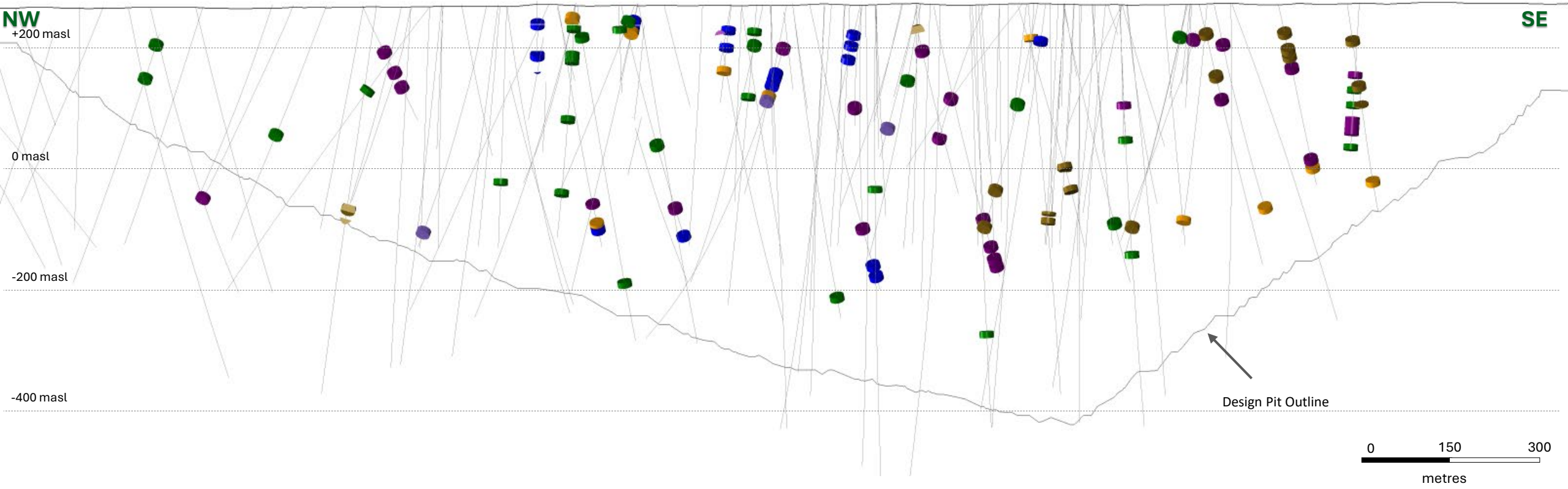
CANADA NICKEL COMPANY

MZ Looking North (Azi 020)
Geochemistry Sampling
500 m Clipping

Lithology

- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite





CANADA NICKEL COMPANY

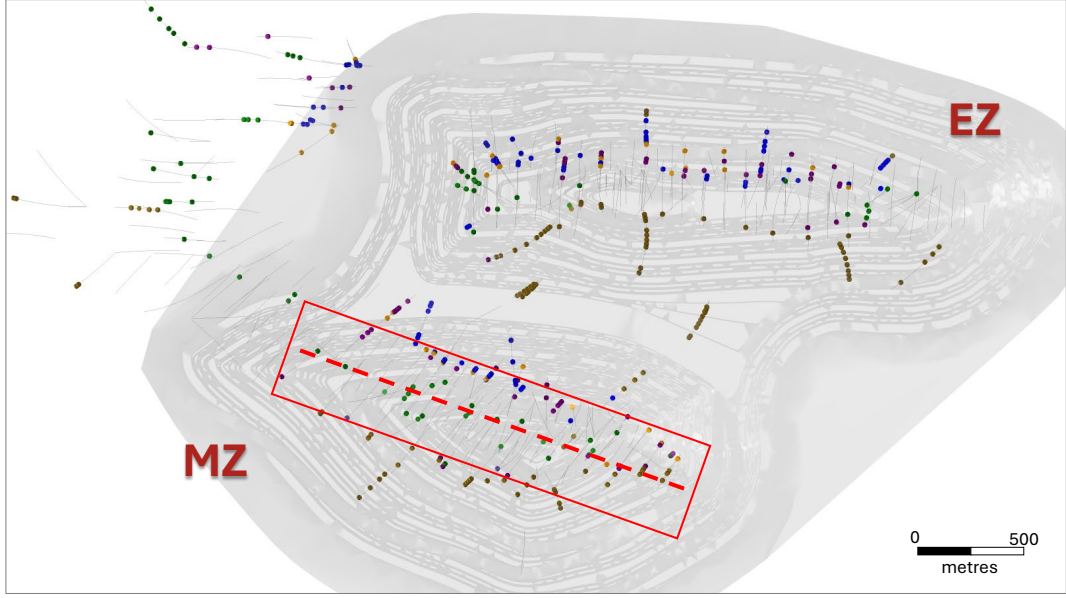
MZ Looking North (Azi 020)
Geochemistry Sampling
On Block Model
500 m Clipping

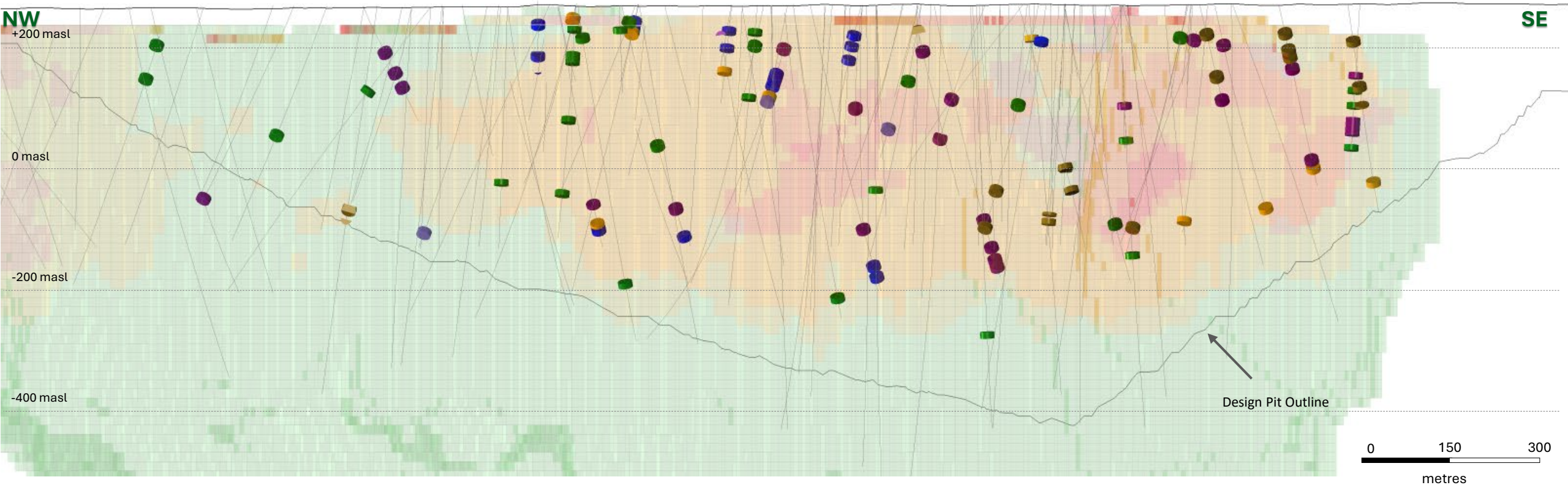
Lithology

- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite

BM (Resource Category

- Measured
- Indicated
- Inferred
- Potential



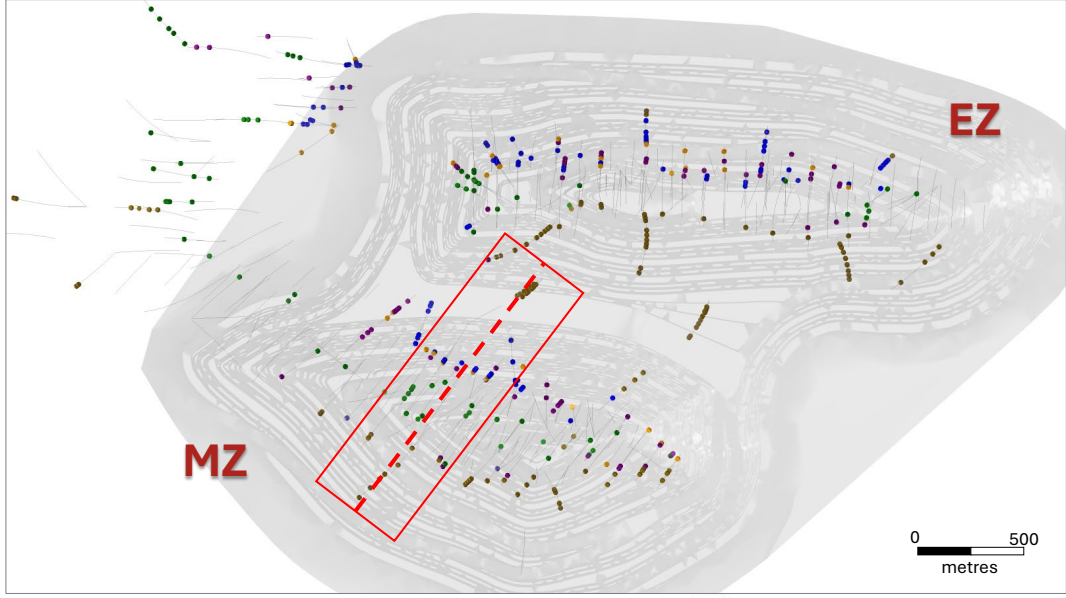


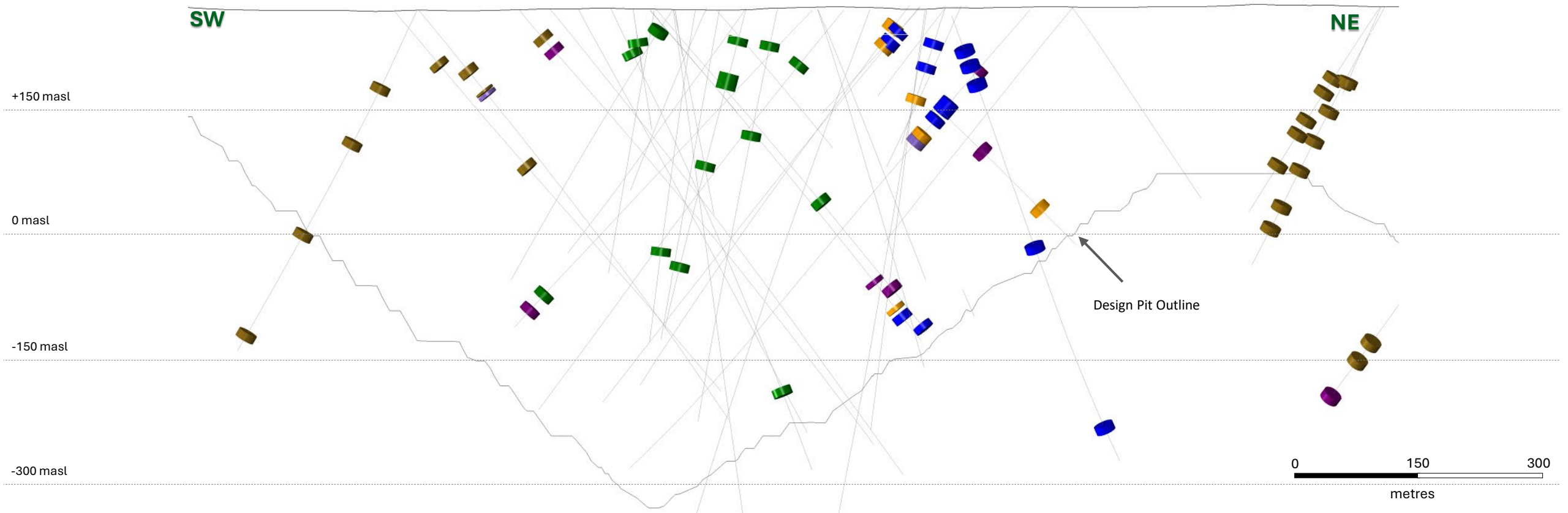
CANADA NICKEL COMPANY

MZ Looking West (Azi 300)
Geochemistry Sampling
500 m Clipping

Lithology

- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite



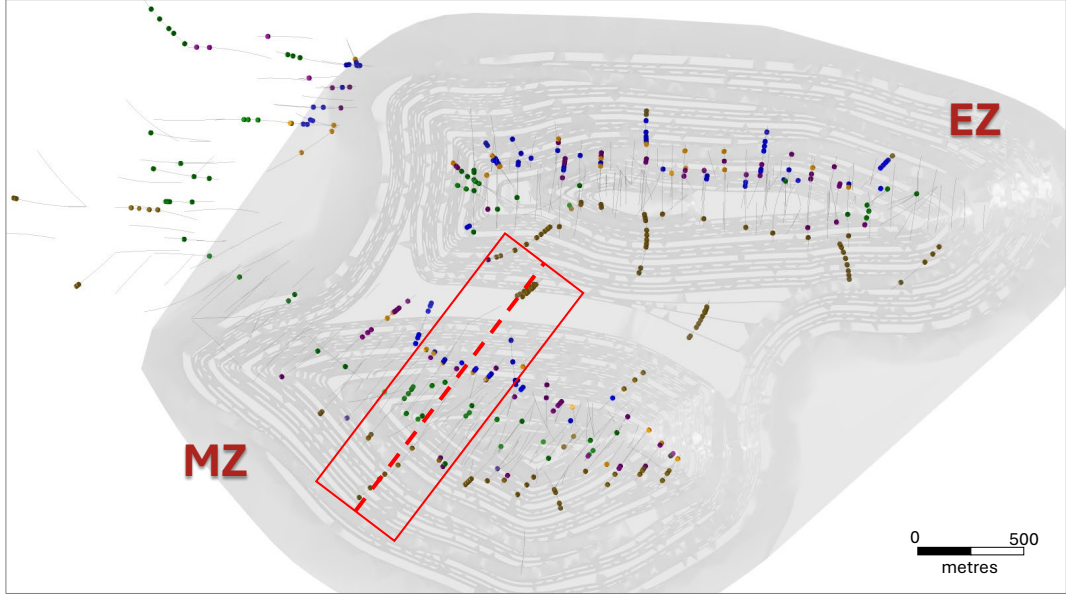


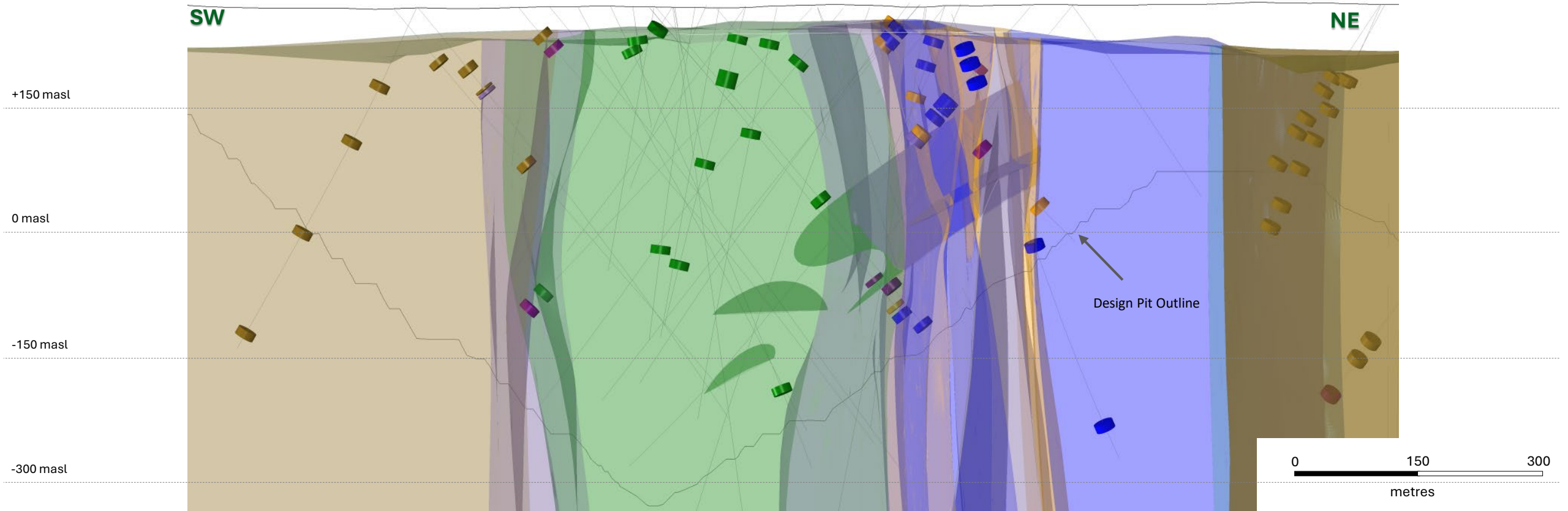
CANADA NICKEL COMPANY

MZ Looking West (Azi 300)
Geochemistry Sampling
On Geological Model
500 m Clipping

Lithology

- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite





CANADA NICKEL COMPANY

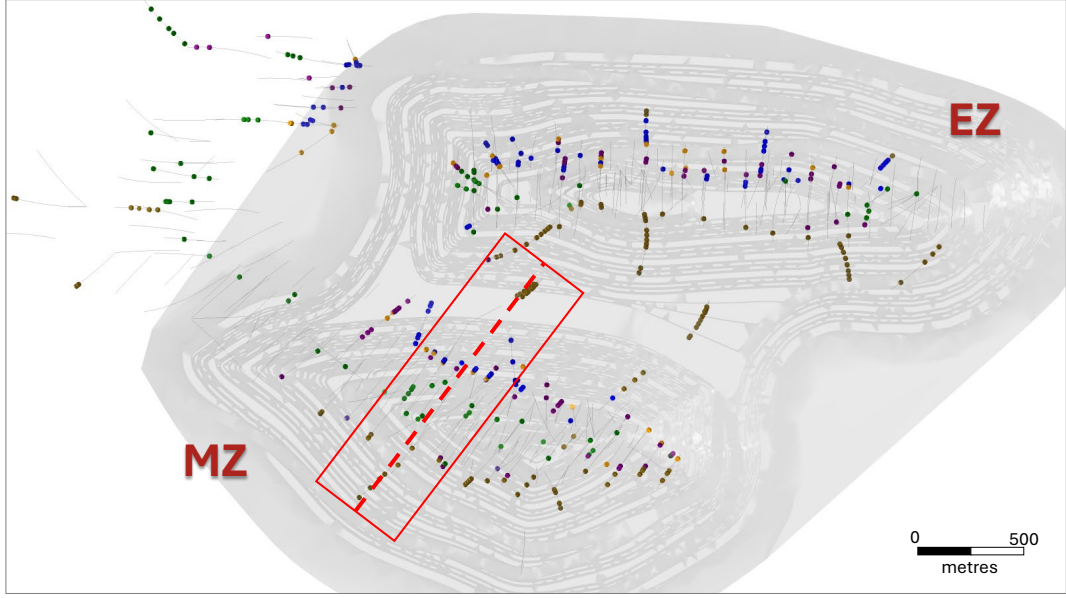
MZ Looking West (Azi 300)
Geochemistry Sampling
On Block Model
500 m Clipping

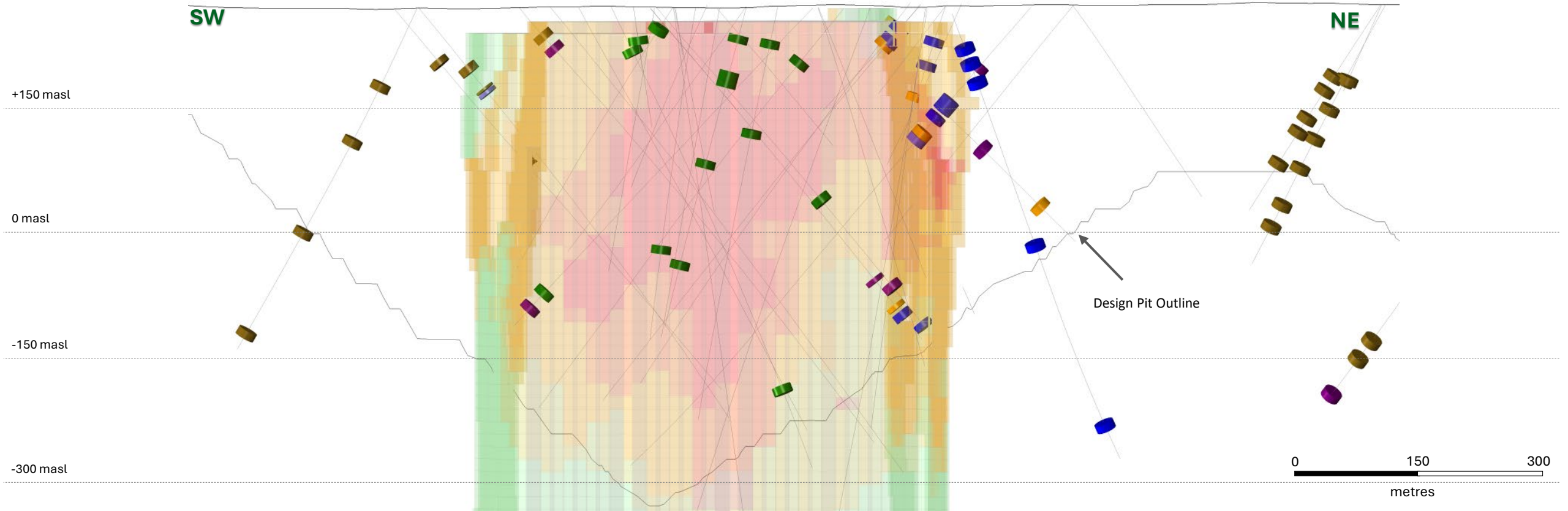
Lithology

- Volcanics
- Gabbro
- Pyroxenite
- Talcose Ultramafic
- Peridotite
- Dunite

BM (Resource Category

- Measured
- Indicated
- Inferred
- Potential





Attachment GHC-01b

Addendum to: "Asbestiform mineral quantification procedure- Crawford Project"

Introduction

Canada Nickel has documented the presence of chrysotile within the Crawford deposit, more specifically in the Dunite and Peridotite lithologies. The document titled "Asbestiform mineral quantification procedure- Crawford Project" was appended to the Crawford Nickel Project Impact Statement. On May 30th, 2025, the Impact Assessment Agency of Canada (IAAC) provided Canada Nickel with comments related to quantification of asbestiform minerals. Canada Nickel is also aware that Indigenous Nations have raised concerns related to this topic, in addition to the health and safety risks in the workplace for Indigenous Nations members working at the mine site in the future. This document is intended to respond to comments and provide further supporting information.

Canada Nickel has also been gaining knowledge and experience with the management of the risks related to the asbestiform minerals by the handling of core required for exploration activities. Indeed, Canada Nickel does have an operating procedure to protect workers from asbestiform mineral exposure. The operating procedure includes control measures, specific training, monitoring and required personal protective equipment.

The Company remains committed to ongoing evaluation of health and safety risks associated with asbestiform minerals, and the implementation of effective mitigation measures to ensure the protection of workers, communities, and the environment through all phases of the project.

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1.1 Air Quality Monitoring 3
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Appendix A: Standard Operating Procedure EXP-SOP-007

Appendix B: Air Quality Monitoring Reports

1.0 Operating Procedures

This document aligns with and supports Canada Nickel's Standard Operating Procedure EXP-SOP-007 (Appendix A), which outlines control measures, specific training, monitoring protocols, and exposure controls for working in or around areas known or suspected to contain asbestiform materials. EXP-SOP-007 was initially created for core shack operations but now contains generalized statements about best practices for working with asbestiform containing material that serves as a basis for safe work procedures across all relevant site activities. Canada Nickel intends to update this procedure as the site moves into the Construction Phase, then the Operations Phase, to reflect the risks and required measures to implement as the Project evolves.

1.1 Air Quality Monitoring

Air quality monitoring is conducted on a yearly basis by third party providers in the core shack to determine types and quantities of asbestiform minerals and validate the effectiveness of ventilation systems in areas of higher concentrations. As of September 9th, 2025, routine air monitoring tests at the Canada Nickel core shack have only identified chrysotile (Appendix B).

Personal and room air quality tests within the core logging area have consistently returned values less than 10% of the 8hr time-weighted average limit determined by OSHA (Occupational Safety and Health Administration).

Personal and room air quality tests within the core cutting and splitting areas have sometimes come back with elevated chrysotile. This is a known risk, and as such, workers within these areas wear more robust personal protective equipment such as a half mask respirator with P100 cartridges, which have been fit tested, coveralls, safety glasses, gloves, steel toe boots, as well as hearing protection due to the loudness of the core cutting machines. Core is wetted during cutting, which reduces the amount of dust that would otherwise be present, and a more robust air ventilation system was installed. These types of controls have proven to reduce the amount of chrysotile in air quality tests within the core cutting room, however, workers are advised to maintain use of their personal protective equipment. These results confirm that in controlled (enclosed) environments, it is possible to limit the risks related to the presence and management of chrysotile.

Canada Nickel remains committed to ongoing workplace monitoring of air quality through its operations. The company also prioritizes minimizing asbestos exposure through the implementation of engineering controls and expects all personnel to use appropriate personal protective equipment within areas of elevated exposure risk.

2.0 Chrysotile Abundance Methodology Review

Canada Nickel adopted the visual inspection method to quantify chrysotile based on the study carried out by another mineral exploration company (Royal Nickel Corporation, Dumont Nickel Project) who rigorously trialed other methods (including fiber counting, X-ray Diffraction, Thermal Differentiation analysis, and measurement of fibres per volume) and found that these alternative methods lacked consistency and representativeness. For example, fiber counting and measurement of fibres per volume measurement techniques depend heavily on laboratory technicians visually

estimating fibre content under a microscope from a small sample set, which can also be prone to subjectivity and variation. XRD and thermal analysis methods were found to be insufficiently sensitive to detecting low concentrations of chrysotile within rock matrix, particularly when the chrysotile signal is masked by dominant mineral phases or overlaps with similar thermal signatures.

There is no known digestive geochemical analysis that can separate serpentine family minerals into either asbestiform chrysotile or non-asbestiform lizardite and antigorite.

Therefore, Royal Nickel decided that the best method to assess asbestiform mineral presence was through the visual logging estimate and used this in the submission of their Impact Assessment, which was subsequently accepted by the authorities. For this reason, Canada Nickel adopted this approach as well.

In early 2025, Canada Nickel conducted hyperspectral Short-Wave Infrared (SWIR) scanning on 2,000m of core from Crawford. The analysis identified a characteristic absorption feature at the 1390 nm range that distinguishes chrysotile from other serpentine group minerals, which further supported visual estimation of chrysotile by core loggers.

3.0 Updated Summary and Quantification of Chrysotile Abundance

Visual assessments of chrysotile abundance remain a routine practice, conducted on all drill core drilled during and after 2022, creating a robust dataset. To reduce subjectivity and potential bias associated with visual estimates, Canada Nickel employed more than one person to log core. In May 2023, the report "Asbestiform mineral quantification procedure- Crawford Project", summarized the weighted average for rocks found at the Crawford deposit (Table 1).

Litho	Weighted Avg-ChrysotileLength%	Standard Deviation-ChrysotileLength%	Count
Dunite	1.670	0.156	3,622
Peridotite	0.921	0.078	2,965
Pyroxenite	0.215	0.005	468
Gabbro	0.024	0.007	249
Metavolcanic	0	0	31

Table 1: Weighted average of Chrysotile at Crawford by Lithology, Feb. 2023.

As of September 9th, 2025, more than 27,730m of core has been visually examined for chrysotile abundance across all lithologies encountered at Crawford. A subsequent compilation of all data up to and beyond May 2023, remain like those reported previously No other asbestiform mineral types were observed in any of the lithologies encountered. Further, routine air quality tests have only identified chrysotile in the samples.

Hyperspectral SWIR is a repeatable technique with a 500x500 micron (0.5x0.5mm) resolution. Comparing results from SWIR to Geologists observations, Geologists are overestimating the amount of chrysotile (Figure 1).

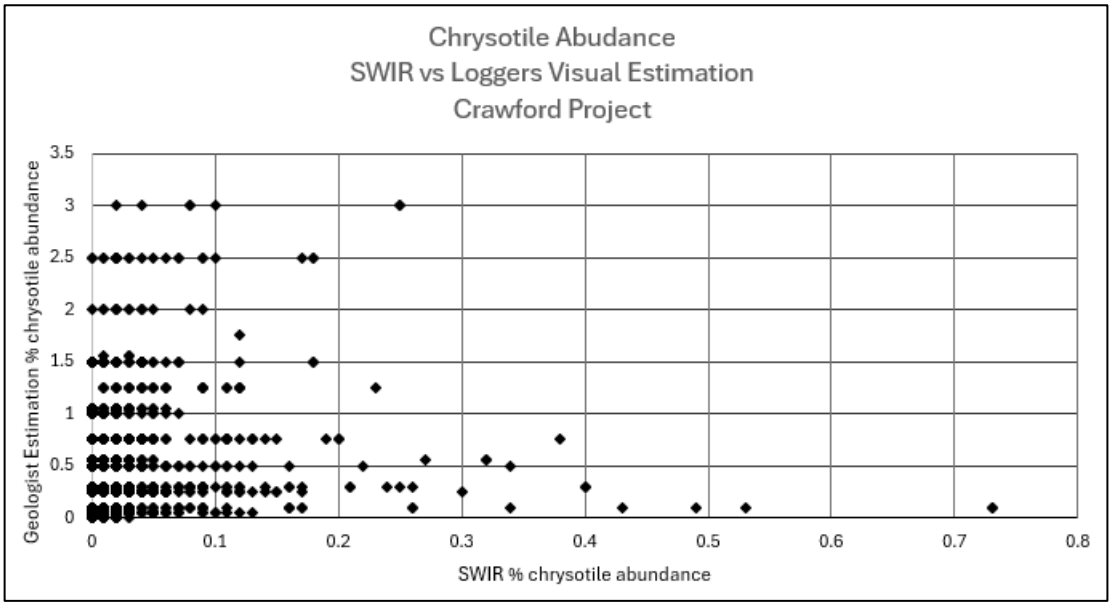


Figure 1: SWIR vs Geologist visual estimation of chrysotile abundance- Crawford Project.

4.0 Conclusion and generalized geochemical characterization statement about asbestiform minerals

The drill core assessed in the core shack is representative of the material that will enter the processing stream as ore, waste, and ultimately tailings. To date, chrysotile is the only asbestiform mineral identified in air quality tests, and its presence resides within the dunite and peridotite units. Routine operations within the core shack have consistently remained below the regulated time weighted average exposure limit for chrysotile.

Canada Nickel remains committed to the ongoing workplace monitoring of potential asbestos exposure and to continued use of and implementation of engineering controls designed to reduce risks associated with chrysotile.

Canada Nickel's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project (Received May 30, 2025)
Geochemistry, where Conditions Influence Water Quality and Effects to Fish and Fish Habitat and Indigenous Peoples
December 24, 2025

Attachment GHC-01c Description of Analytical Methods

CANADA NICKEL COMPANY

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1. SCOPE

This method outlines the procedure used to perform laboratory weathering of solid materials. It is appropriate for tailings and waste rock sample types.

2. DERIVATION

This method was derived from the ASTM D 5744 test method. The closedown procedures follow the Prediction Manual for Drainage Chemistry (MEND Project 1.20.1, December 2009).

3. METHOD DEVIATIONS

Method deviations from ASTM D 5744:

- Upon request of the client, the solid sample may be split into representative portions and sent for static tests prior to and after the humidity cell testing. The humidity cells are designed so that the “air-in” spigot is located on the side of the cell to accommodate the “rinse-water-in” spigot on the top of the sample.
- A one to one liquid to solid ratio is used with a 5% tolerance for the volume of deionized water used. The volume of deionized water is added to a measured marked line on the Nalgene wash bottle. The bottles are verified by filling the bottle to the marked line and recording the weight using a calibrated balance. Any bottles that fall outside of the set tolerance of 5% are removed from service and replaced with a new bottle.

4. PRINCIPAL OF THE METHOD

The standard humidity cell accelerates the natural weathering rate of a solid sample to promote more rapid oxidation of the solid constituents than can be accomplished in nature. It also maximizes the loading of weathering reaction products contained in the resulting weekly effluent.

Weekly cycles comprised of three days of dry air and three days of wet air pumped through the sample, followed by a leach with deionized water on day 7. Weekly leaches with deionized water ensure the removal of leachable oxidation products produced from the weathering cycle of the previous week. The weekly leachate is collected and may be analyzed for pH, sulphate, conductivity, acidity, alkalinity and metals; or any other desired analysis. Samples for metals analysis are filtered to provide dissolved concentrations. The portion of leachate sent for pH, conductivity, acidity or alkalinity analysis can be an unfiltered portion. From the analyses, leaching rates can be calculated, typically in units of mg of parameter/kg of sample/week. Also, with prior static tests such as ABA and ICP

metals analysis, rates of and times to, depletion can be calculated. The duration of the humidity cell test is typically 20 to 40 weeks, or until the desired results are obtained.

5. INTERFERENCES

None

6. SAMPLE REQUIREMENTS

Sampling information and concerns:	Representative sample must be taken.
Containers to be used:	Any; avoid plastic bags if possible for larger samples
Sample size:	Optimum sample size 3000g; Minimum sample size 600g;
Preservation required:	None
Temperature requirements for storage:	Ambient is preferred as samples may oxidize at higher temperatures
pH requirements:	None
Pre-treatment:	See section 7
Holding time (from time of collection to start of analysis):	N/A
Disposal of samples:	Refer to WI-CA-[ENV]AD-LAK-AD-014

7. Sample Preparation

7.1.1. Waste Rock Samples

1. If necessary samples may be crushed to ¼ inch (passing through a 6.3mm screen).
2. If samples appear to contain moisture, evaluate the moisture content following the procedure outlined in ME-CA-[ENV]ARD-LAK-AN-013. Use the calculation for wet weight moisture content. If there is no visible moisture proceed to the next step.

7.1.2. Tailings Samples

1. Samples are analyzed using the as received particle size. Typically, this particle size will pass through a 150-mm (100-mesh) screen.
2. If samples appear to contain moisture, evaluate the moisture content following the procedure outlined in ME-CA-[ENV]ARD-LAK-AN-013. Use the

calculation for wet weight moisture content. If there is no visible moisture proceed to the next step.

8. REFERENCES

"ASTM D 5744 Standard Test Method for Laboratory Weathering of Solid Materials Using a Humidity Cell" (Soil and Rock).

"ASTM C 702 Standard Practice for Reducing Sample of Aggregate to Testing Size"

Acid Rock Drainage Prediction Manual, MEND Report 1.20.1 Dec. 2009 as prepared by CANMET-Mining and Mineral Sciences Laboratories.

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1. SCOPE

This method uses an acid mix digestion procedure followed by ICP-MS analysis to obtain a near total digest of 60 elements on low mineralized samples.

2. DERIVATION

The digestion procedure was developed in-house using information found in Decomposition Techniques in Inorganic Analysis, Chapter 1, 1968. Application of a four-acid digestion for the near total digestion of a soil sample is a classical method primarily based on geochemical analysis applications. The quantitative analysis by ICP-MS is derived from method US EPA 200.8.

3. PRINCIPAL OF THE METHOD

The strong acid digestion requires the sample to be subjected to concentrated nitric acid to destroy any easily oxidizable material i.e. any organic matter that may be present. Hydrochloric acid addition stabilizes parameters such as Ag, Ba and Sb and higher concentrations of Fe and Al. Hydrofluoric acid is added to the sample along with nitric acid to break up any insoluble silicates. Perchloric acid is added to aid in the digestion of the samples by transforming a number of the analytes into metal perchlorates which are soluble in aqueous solutions.

Samples are then analyzed by ICP-MS. The samples are analyzed against acid matrix matched calibration materials. The samples and calibration materials are aspirated into the plasma via nebulization, where they are dissolved, vaporized, dissociated and ionized. The ions are then transported through the interface of the instrument (sampler and skimmer cones), where the ions are focused, and mass filtered by the quadruple. The mass-separated ions are then detected. Refer to *The Handbook of Inductively Coupled Plasma* by Thompson and Walsh for a more detailed description of the theory of ICP-MS. The measurement of the intensity signal is converted to concentration units via a host computer.

3.1. Elements of Interest

For additional and complete validation information, including the parameter list and reporting limits for the digestion procedure found in section 11.1, refer to the validation files on the SGS network.

4. INTERFERENCES

4.1. Digestion Interferences

Care must be taken to ensure reagents and laboratory equipment are kept as clean as possible to avoid contamination of the samples.

This method may demonstrate low analyte recovery in highly mineralized samples. A few refractory metals such as alumina, TiO_2, and various oxides may not digest entirely.

4.2. Instrument Interferences

Refer to ME-CA-[ENV]SPE-LAK-AN-006 to see interferences related to ICP-MS analysis. These would include spectral, physical, chemical and instrument interferences as well as adverse conditions.

5. SAMPLE REQUIREMENTS

Sampling information and concerns:	Representative sample must be taken.
Containers to be used:	Any; sample preparation bags, vials, glass volumetric or plastic vials
Sample size:	Optimum sample size is 10g, minimum sample size is 1g
Preservation required:	N/A
Temperature requirements for storage:	Store at room temperature
pH requirements:	N/A
Pre-treatment:	Samples must be dry and crushed to a -10-mesh size. Typically, a 250g portion is pulverized to a minimum -150 mesh size. Smaller sample sizes may be used, as long as the minimum sample requirement is met.
Holding time (from time of collection to start of analysis):	Indefinite
Disposal of samples:	Refer to WI-CA-[ENV]AD-LAK-AD-014

6. REFERENCES

Agilent 7700 Series ICP-MS, Masshunter workstation User Guide, Agilent technologies, 2014.

Agilent 7700 Series ICP-MS, Hardware Maintenance Manual, Agilent Technologies, 2009-2011

Agilent ICP-MS (7800/7900) Masshunter workstation User Guide, Agilent technologies, 2016.

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Agilent 7800/7900 ICP-MS, Hardware Maintenance Manual, Agilent Technologies, 2016.

Bock, Rudolf. A Handbook of Decomposition Methods in Analytical Chemistry. Great Britain, 1979.

Vulcan 84 automated digestion system manual

US EPA Method 3052, Microwave assisted acid digestion of siliceous and organically based matrices, Current version.

Hands-On Radiochemistry Course Manual, Volume 1, Radiochemistry Society, June 2006

US EPA Method 200.8, Environmental Protection Agency 1991. Determination of metals and trace metals in water and wastes by Inductively Coupled Plasma – Mass Spectrometry Current version.

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1. SCOPE

This method outlines the techniques used to determine the balance between acid producing and acid consuming components of a sample. It is appropriate for tailings, waste rock, sludge and soil sample types.

2. DERIVATION

This method follows the Lawrence and Wang Modified NP Procedure (1996) method from the Acid Rock Drainage Prediction Manual (MEND Project 1.20.1, December 2009.) Section 13.3.3 prepared by COASTECH Research, with the exception of the fizz test procedure which has been modified in-house. The method was developed to reduce the possibility of over-estimation of NP obtained in the Standard Sobek method. The AP is calculated using the sulfide-sulfur values (instead of total sulfur as in the Standard Sobek method) to reduce the risk of reporting non-acid forming sulfur forms such as sulphate sulfur.

3. PRINCIPAL OF THE METHOD

A sub-sample is subjected to a preliminary fizz test, and another sub-sample is weighed into a suitable container. The appropriate volume and normality of acid is then added to the sample based on the fizz test rating. The sample is shaken on a gyratory shaker table at approximately 200 ± 10rpm or less, at room temperature, and then back titrated with a base. By adding excess acid to a sample and back titrating with base, it is possible to determine the balance between acid producing and acid consuming components of a sample. An endpoint of 8.3 pH (versus 7.0 pH in the standard version) is obtained in order to ensure that iron is given enough time to precipitate.

4. INTERFERENCES

None

5. SAMPLE REQUIREMENTS

Sampling information and concerns:	Representative sample must be taken.
Containers to be used:	Any; avoid plastic bags, if possible, for larger samples
Sample size:	Optimum sample size 100g; Minimum sample size 50g;
Preservation required:	None

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Temperature requirements for storage:	Ambient is preferred as samples may oxidize at higher temperatures
pH requirements:	None
Pre-treatment:	Air or oven drying at <60°C, crushing and pulverizing to 80% -200 mesh where required. Tailings are analyzed on the as received particle size.
Holding time (from time of collection to start of analysis):	None
Disposal of samples:	Refer to WI-CA-[ENV]AD-LAK-AD-014

6. REFERENCES

Prediction Manual for Drainage Chemistry from Sulphidic Geological Materials, MEND Report 1.20.1 Dec. 2009 as prepared by CANMET-Mining and Mineral Sciences Laboratories.

Lawrence, R.W., et. al. Acid Rock Drainage Prediction Manual (MEND Project 1.16.1b, March 1991. Electronic revision June 2008), Coastech Research Inc.

American Industrial Health Association 1995. Quality assurance manual for industrial hygiene chemistry; American Industrial Health Association, Fairfax, VA, 53p.

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1. SCOPE

This method is used to determine the mass of soluble constituents in solid samples at higher water ratios. It is appropriate for tailings, waste rock, sludge and soil sample types.

2. DERIVATION

This method is derived from the Acid Rock Drainage Prediction Manual (MEND, March 1991.) Sulphidic Geologic Materials.

3. METHOD DEVIATIONS

N/A

4. PRINCIPAL OF THE METHOD

A sample is weighed into a container and deionized water is added. The container is rolled end-over-end for 24 +/-2 hours at 23°C +/- 2°C. The sample is then filtered, sub-sampled, and submitted to the Environmental or Analytical laboratory for analysis.

5. INTERFERENCES

None

6. SAMPLE REQUIREMENTS

Sampling information and concerns:	Representative sample must be taken.
Containers to be used:	HDPE
Sample size:	Optimum sample size 500g; Minimum sample size 200g;
Preservation required:	None
Temperature requirements for storage:	Ambient for as received samples; multiphase filtrate at 5°C +/- 3°C
pH requirements:	None
Pre-treatment:	See Section 7
Holding time (from time of collection to start of analysis):	Indefinite for as received sample; multiphase filtrate follows holding times for analyses required
Disposal of samples:	Refer WI-CA-[ENV]AD-LAK-AD-014

7. PROCEDURE

7.1. *Moisture Content*

Refer to ME-CA-[ENV]ARD-LAK-AN-013. All weights are to be recorded in the shake flask extraction worksheet.

7.2. *Particle Size Evaluation*

Using the solid portion of the sample, evaluate the solid for particle size by eye. Particle size reduction is required only if it will not pass through a 6.35 mm (0.25-inch mesh) sieve. If the particle size is larger than described above, prepare the solid portion of the sample for extraction by crushing, roll crushing, cutting, or grinding to the required size.

8. REFERENCES

Acid Rock Drainage Prediction Manual from Sulphidic Geologic Materials (MEND, March 1991.)

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Attachment GHC-01e-1 Talc Memo

Introduction

Canada Nickel has documented the presence of localized talc alteration within the Crawford deposit, specifically within dunite, peridotite, pyroxenite and gabbro lithologies. Talc alteration presents challenges for processing due to its "sticky" nature (hydrophobic), and noticeably poorer nickel content, prompting generation of talc sub-domains within the resource model. The presence of talc was documented in the Crawford Nickel Project Impact Statement.

On May 30th, 2025, the Impact Assessment Agency of Canada (IAAC) provided Canada Nickel with comments regarding insufficient geochemical characterization of talc, particularly in relation to its potential to contribute to acid rock drainage and metal leaching. This document is intended to respond to comments and provide further supporting information.

Talc formation and geochemistry

Talc alteration results from the interaction of ultramafic rocks with carbon rich fluids in the ground, particularly in areas with higher initial silica content, such as peridotite, pyroxenite and gabbro. In the case of dunite, talc alteration can occur through interaction with fluids enriched by both carbon and silica. At Crawford, the geochemical signature of these talc zones is close to that of the host rock that it is in (Table 1). The main difference is the Mg/Si ratio change, which is most apparent within dunite (Table1).

Lithology	Count of Geochem	Avg. Al%	Avg. Ca%	Avg. Co%	Avg. Cr%	Avg. Fe%	Avg. Mg%	Avg. Si%	Avg. Ni%	Avg. S%	Avg. Pd ppb	Avg. Pt ppb	Mg/Si
Dunite	51,466	0.39	0.26	0.01	0.63	6.46	24.74	16.32	0.26	0.09	17.88	10.57	1.52
Peridotite	16,877	1.27	1.44	0.01	0.48	7.58	21.47	17.45	0.15	0.04	20.49	21.55	1.23
Talc Zones	2,722	1.09	2.23	0.01	0.48	6.36	19.24	15.58	0.17	0.06	29.77	31.02	1.24
Pyroxenite	3,305	2.91	7.51	0.01	0.30	5.99	13.65	21.81	0.05	0.07	91.11	102.52	0.63
Gabbro	1,515	7.88	9.86	0.00	0.09	4.17	7.84	22.43	0.02	0.03	5.29	6.75	0.35

Table 1. Major element geochemistry of lithological units at Crawford.
Note: Geochemistry is sourced from the Crawford sample database. Major elements were reported from sodium peroxide fusion with ICP-OES analysis. Pd and Pt were reported from fire assay. S was reported from total combustion analysis.

Talc mineralogy

Despite the geochemistry being similar, there are some mineralogical differences (Tables 2 and 3). Talc, magnesite +/-silica (quartz) assemblage of minerals replaces serpentine and brucite. Other differences of the talc unit are:
-Magnetite markedly decreased.
-Chrome-spinel decreased compared to dunite, but similar in peridotite.
-Calcite-dolomite and chlorite increased.
-Nickel minerals: Awaruite and heazlewoodite decreased. Pentlandite similar in dunite.

Lithology	Count of QEMSCAN	Avg. Amph%	Avg. Apa%	Avg. Aw%	Avg. Bruc%	Avg. CalDol%	Avg. Chl%	Avg. Coal%	Avg. Cp%	Avg. Cpx%	Avg. CrSpin%	Avg. Feld%	Avg. FeSerp%
Dunite	2,703	0.02	0.01	0.03	2.09	0.39	0.69	0.88	0.01	0.22	2.87	0.03	15.81
Peridotite	556	0.88	0.02	0.01	0.53	1.20	3.79	0.18	0.00	3.89	2.07	0.23	14.01
Talc Zones	164	1.26	0.04	0.00	3.00	7.24	5.96	1.80	0.01	0.45	2.20	0.12	19.01
Pyroxenite	25	20.70	0.02	0.01	0.08	1.15	10.29	0.00	0.04	24.00	1.43	1.19	9.57
Gabbro	5	15.31	0.10	0.00	0.00	1.38	11.52	0.00	0.05	35.96	0.21	7.79	11.75

Table 2. QEMSCAN of lithological units at Crawford (alphabetical order, A to Fe).

Lithology	Count of QEMSCAN	Avg. Hz%	Avg. Mag%	Avg. Magns%	Avg. Mica%	Avg. Ol%	Avg. Opx%	Avg. Pn%	Avg. Po%	Avg. Qtz%	Avg. Serp%	Avg. Talc%	Avg. TiO%
Dunite	2,703	0.11	5.04	0.91	0.02	7.20	0.12	0.12	0.02	0.01	63.18	0.09	0.00
Peridotite	556	0.08	6.30	0.29	0.10	1.18	0.36	0.03	0.01	0.01	64.15	0.23	0.05
Talc Zones	164	0.04	2.69	13.97	0.14	2.19	0.67	0.12	0.04	0.33	20.34	18.17	0.13
Pyroxenite	25	0.01	2.84	0.02	0.11	0.04	0.56	0.02	0.03	0.26	25.14	2.34	0.10
Gabbro	5	0.00	0.16	0.00	2.20	0.01	3.60	0.05	0.07	0.03	4.85	4.12	0.68

Table 3. QEMSCAN of lithological units at Crawford (alphabetical order, Hz to TiO).

Notes to Tables 2 and 3: Data displayed are averages of mineral abundances reported from QEMSCAN analysis of samples from Crawford. Abbreviations: Amph = Amphibole, Apa = Apatite, Aw = Awaruite, Bruc = Brucite, CalDol = Calcite-Dolomite, Chl = Chlorite, Cp = Chalcopyrite, CrSpin = Chrome-spinel, Feld = Feldspar, FeSerp = Fe-serpentine, Hz = Heazlewoodite, Mag = Magnetite, Magns= Magnesite, Mica = Mica, Ol = Olivine, Opx = Orthopyroxene, Pn = Pentlandite, Po = Pyrrhotite, Qtz = Quartz, Serp = Serpentine, Talc = Talc, TiO = Rutile.

Talc distribution

A total of 3.8% of the logged lithology at Crawford has been classified as talc bearing to date (5,690m out of 149,473m logged, not including overburden). Its presence is marked by localized traceable meter-scale zones within dunite, peridotite, pyroxenite and gabbro.

Conclusion

Talc zones a minor component of the lithology at Crawford. They have similar geochemistry to other lithologies tested. Regardless, some samples were sent for trace element geochemistry and acid-base accounting (ABA) in August of 2025.

O#	Sample #	BHID	Requested Interval		Actual Interval		Length	Litho	Type	Class	Zone	Alt_Int	Sampling Comments
			From	*To*	*From*	*To*							
1	B956751	CR19-05	188.1	264	243	246	3	Per	Tper	ORE	MZ	M-S	
2	B956752	CR19-09	504	524.8	504.4	507	2.6	Per	Tper	Waste	MZ	M	
4	B956753	CR21-187	48.5	147.5	108	111	3	Per	Tper	Waste	EZ	S	
5	B956754	CR21-188	95	258	147	150	3	Per	Tper	ORE	EZ	S	
17	B956755	CR22-GT-06	207	264	217.6	218.3	0.7	Pyx	TUm	Waste	EZ	M	Hole Core HQ
6	B956756	CR22-198	942.5	946.5	444.8	446.5	1.7	Per	Tper	Waste	MZ	M-S	
7	B956757	CR22-199	242.8	266.4	243	246	3	Pyx	TUm	Waste	EZ	M	
9	B956758	CR22-243	168	170	168	170	2	Dun	TUm	ORE	MZ	M-S	
10	B956759	CR22-245A	198.4	216	197.4	199	1.6	Per	Tper	ORE	EZ	S	Extensively sampled previously so had to extend uphole past the 198.4 mark (approx 0.6m past the logged Per/Tau contact, although sample results indicate minimal geochemical variation).
11	B956761	CR22-257	289.5	296.7	292.5	295.5	3	Pyx	TUm	Waste	MZ	M	
8	B956760	CR22-241	52	54	51.6	54	2.4	Pyx	TUm	Waste	MZ	M	
12	B956762	CR22-265	306.1	333	309	312	3	Per	Tper	ORE	EZ	S	
13	B956763	CR22-271	535.6	561	540	542.9	2.9	Dun	TUm	ORE	EZ	M-S	
14	B956764	CR22-275	421	438	423	426	3	Per	Tper	ORE	MZ	S	
15	B956765	CR22-302	266	268.5	265.5	267.3	1.8	Pyx	TUm	Waste	EZ	M-S	
21	B956766	CR23-313B	487	517	493	495.1	2.1	Per	Tper	ORE	EZ	M	
16	B956767	CR22-GT-01C	339	344.8	342	343	1	Per	Tper	Waste	MZ	M	Hole Core HQ
18	B956768	CR22-GT-13	341.7	359	342	342.8	0.8	Per	Tper	Waste	MZ	M-S	Hole Core HQ
19	B956769	CR22-GT-16	120.5	134	125	126	1	Dun	TUm	ORE	MZ	M-S	Hole Core HQ
20	B956770	CR22-GT-17	271.5	339	272.5	273	0.5	Per	Tper	ORE	MZ	M	Hole Core HQ
3	B956771	CR21-115	121.5	154.5	132	135.5	3.5	Dun	TUm	ORE	MZ	M	

Table 1. Summary of Acid Base Accounting Results of Talc Samples in Waste Rock

Sample ID	Type	Lithology	Zone	Paste pH	S_{TOTAL}	$S_{SULPHATE}$	$S_{SULPHIDE}$	Carbonate (HCl) as $\%CO_3$	Total Inorganic Carbon	Carbonate NP	Modified Sobek NP	Sulphide AP	Carbonate NPR	Modified Sobek NPR
				S.U.	wt. %	wt. %	wt. %	wt. %	wt. % as C	kg CaCO3/t	kg CaCO3/t	kg CaCO3/t	unitless	unitless
B956752	Waste	Per	MZ	9.38	0.017	*0.02*	0.01	20.8	4.16	350	126	0.31	1,100	400
B956753	Waste	Per	EZ	9.62	*0.0025*	*0.02*	*0.005*	20.9	4.18	350	178	0.16	2,200	1,100
B956755	Waste	Pyx	EZ	9.85	0.017	*0.02*	*0.005*	0.05	0.01	0.83	50.8	0.16	5.3	330
B956756	Waste	Per	MZ	9.64	0.063	0.04	0.02	11.1	2.22	180	136	0.63	290	220
B956757	Waste	Pyx	EZ	9.45	0.250	0.17	0.09	0.12	0.024	2.0	21.5	2.81	0.71	7.6
B956761	Waste	Pyx	MZ	9.46	0.054	*0.02*	0.02	*0.02*	0.004	0.33	14.3	0.63	0.53	23
B956760	Waste	Pyx	MZ	9.14	0.031	*0.02*	0.01	0.09	0.018	1.5	17.1	0.31	4.8	55
B956765	Waste	Pyx	EZ	9.36	0.180	0.05	0.12	0.12	0.024	2.0	18.5	3.75	0.53	4.9
B956767	Waste	Per	MZ	9.32	0.015	*0.02*	*0.005*	0.12	0.024	2.0	14.6	0.16	13	93
B956768	Waste	Per	MZ	9.07	0.032	*0.02*	*0.005*	12.6	2.52	210	180	0.16	1,300	1,200
Summary Statistics														
Minimum				9.07	*0.0025*	*0.02*	*0.005*	*0.02*	0.004	0.33	14.3	0.16	0.53	4.9
10th Percentile				9.08	0.0038	*0.02*	*0.005*	0.023	0.0046	0.38	14.3	0.16	0.53	5.2
Median				9.42	0.032	*0.02*	0.01	0.12	0.024	2	36.2	0.31	9.2	160
Mean				9.43	0.066	0.04	0.029	6.59	1.32	110	75.7	0.91	490	340
90th Percentile				9.83	0.24	0.16	0.12	20.9	4.18	350	180	3.7	2,100	1,200
Maximum				9.85	0.25	0.17	0.12	20.9	4.18	350	180	3.8	2,200	1,200

NOTES:

non-potentially acid generating (non-PAG)

uncertain acid generating potential

potentially acid generating (PAG)

S_{TOTAL} = total sulphur; $S_{SULPHIDE}$ = sulphide sulphur; $S_{SULPHATE}$ = sulphate sulphur

S.U. = standard unit

wt. % = weight percent; kg $CaCO_3$/t = kilograms of calcium carbonate per tonne

AP = Acid Potential

NP = Neutralization Potential

NPR = Neutralization Potential Ratio

Paste pH values less than 3.5 are bolded

Half detection limit is used for the NPR calculation when values are below the detection limits; Half detection limit values are shown in blue italics.

Table 1. Summary of Acid Base Accounting Results of Talc Samples in Ore

Sample ID	Type	Lithology	Zone	Paste pH	S_{TOTAL}	$S_{SULPHATE}$	$S_{SULPHIDE}$	Carbonate (HCl) as $\%CO_3$	Total Inorganic Carbon	Carbonate NP	Modified Sobek NP	Sulphide AP	Carbonate NPR	Modified Sobek NPR
				S.U.	wt. %	wt. %	wt. %	wt. %	wt. % as C	kg CaCO3/t	kg CaCO3/t	kg CaCO3/t	unitless	unitless
B956751	Ore	Per	MZ	9.42	0.052	*0.02*	0.02	22.1	4.42	370	116	0.63	590	190
B956754	Ore	Per	EZ	9.59	*0.0025*	*0.02*	*0.005*	24.1	4.82	400	69	0.16	2,600	440
B956758	Ore	Dun	MZ	9.72	0.095	*0.02*	0.08	20.3	4.06	340	498	2.50	140	200
B956759	Ore	Per	EZ	9.66	0.068	*0.02*	0.05	8.71	1.74	150	131	1.56	96	84
B956762	Ore	Per	EZ	9.49	0.042	*0.02*	0.01	13.5	2.7	220	172	0.31	700	550
B956763	Ore	Dun	EZ	9.47	0.100	*0.02*	0.07	28.8	5.76	480	118	2.19	220	54
B956764	Ore	Per	MZ	9.28	0.051	*0.02*	0.01	10.3	2.06	170	174	0.31	540	560
B956766	Ore	Per	EZ	9.67	0.046	*0.02*	0.01	13.9	2.78	230	154	0.31	740	490
B956769	Ore	Dun	MZ	9.4	0.150	0.05	0.1	1.23	0.246	20	292	3.13	6.4	93
B956770	Ore	Per	MZ	9.31	0.037	*0.02*	*0.005*	16.3	3.26	270	389	0.16	1,700	2,500
B956771	Ore	Dun	MZ	9.47	0.052	*0.02*	0.01	4.02	0.804	67	225	0.31	210	720
Summary Statistics														
Minimum				9.28	*0.0025*	*0.02*	*0.005*	1.23	0.246	20	69	0.16	6.4	54
10th Percentile				9.29	0.0094	*0.02*	*0.005*	1.79	0.358	29	78.4	0.16	24	60
Median				9.47	0.052	*0.02*	0.01	13.9	2.78	230	172	0.31	540	440
Mean				9.5	0.063	0.023	0.034	14.8	2.97	250	213	1.1	690	530
90th Percentile				9.71	0.14	0.044	0.096	27.9	5.57	460	476	3	2,400	2,100
Maximum				9.72	0.15	0.05	0.1	28.8	5.76	480	498	3.1	2,600	2,500

NOTES:

non-potentially acid generating (non-PAG)

uncertain acid generating potential

potentially acid generating (PAG)

S_{TOTAL} = total sulphur; $S_{SULPHIDE}$ = sulphide sulphur; $S_{SULPHATE}$ = sulphate sulphur

S.U. = standard unit

wt. % = weight percent; kg $CaCO_3$/t = kilograms of calcium carbonate per tonne

AP = Acid Potential

NP = Neutralization Potential

NPR = Neutralization Potential Ratio

Paste pH values less than 3.5 are bolded

Half detection limit is used for the NPR calculation when values are below the detection limits; Half detection limit values are shown in blue italics.

Table 2 Summary of Elemental Concentrations of Talc Samples in Waste Rock

Sample ID	Type	Lithology	Zone	Silver	Aluminum	Arsenic	Barium	Beryllium	Bismuth	Calcium	Cadmium	Cobalt	Chromium	Copper	Iron	Potassium	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Lead	Antimony	Selenium	Tin	Strontium	Titanium	Thallium	Uranium	Vanadium	Yttrium	Zinc
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
10x UCC				0.53	815,122	48	6280	21.0	1.60	256,577	0.90	173	920	280	279,087	232,428	240	149,569	7744	0.50	11	470	170	4.0	0.9	21	3200	38,355	9	27	970	210	670
B956752	Waste	Per	MZ	*0.025*	11,000	1.3	4.7	0.05	*0.045*	15,000	0.06	100	790	13	65,000	130	4.8	180,000	1,200	*0.025*	*0.05*	1,500	1	*0.4*	*0.05*	*1*	36	560	*0.01*	0.017	36	2.1	33
B956753	Waste	Per	EZ	*0.025*	7,700	1	2.1	0.04	*0.045*	1,400	*0.025*	87	920	1.3	49,000	46	4.4	200,000	1,100	*0.025*	*0.05*	1,900	0.6	*0.4*	*0.05*	*1*	1.8	270	*0.01*	0.013	21	1.3	18
B956755	Waste	Pyx	EZ	*0.025*	28,000	0.6	45	0.06	*0.045*	100,000	0.13	52	3,800	200	53,000	590	14	99,000	1,400	*0.025*	0.3	420	4.3	*0.4*	0.4	*1*	16	1,300	*0.01*	0.015	170	5.7	36
B956756	Waste	Per	MZ	*0.025*	3,200	8.8	3.8	*0.01*	*0.045*	7,700	*0.025*	120	1,600	15	70,000	66	*1*	210,000	1,400	*0.025*	*0.05*	1,900	0.7	*0.4*	0.1	*1*	23	160	*0.01*	0.009	17	0.81	33
B956757	Waste	Pyx	EZ	*0.025*	17,000	*0.25*	1.7	0.04	*0.045*	56,000	0.09	86	1,100	530	54,000	140	*1*	140,000	1,000	*0.025*	*0.05*	380	0.7	*0.4*	1	*1*	8.3	670	0.03	0.012	68	2.2	32
B956761	Waste	Pyx	MZ	*0.025*	33,000	3.6	12	*0.01*	*0.045*	82,000	0.34	73	760	120	72,000	270	7.3	120,000	1,500	*0.025*	0.2	700	2.1	*0.4*	0.3	*1*	48	590	*0.01*	0.009	100	2.4	64
B956760	Waste	Pyx	MZ	*0.025*	48,000	*0.25*	1.7	0.04	*0.045*	60,000	0.11	87	270	140	77,000	130	9	140,000	1,900	*0.025*	0.1	260	0.8	*0.4*	0.2	*1*	5.9	640	*0.01*	0.009	100	2.2	68
B956765	Waste	Pyx	EZ	*0.025*	27,000	*0.25*	2	0.07	*0.045*	52,000	0.06	75	810	12	72,000	230	*1*	140,000	1,400	*0.025*	*0.05*	380	0.4	*0.4*	0.3	*1*	11	1,200	*0.01*	0.02	100	4.2	52
B956767	Waste	Per	MZ	*0.025*	70,000	*0.25*	94	0.03	*0.045*	84,000	0.05	45	120	130	44,000	1,700	19	80,000	1,100	*0.025*	0.2	95	0.8	*0.4*	0.1	*1*	81	720	*0.01*	0.007	120	2.9	29
B956768	Waste	Per	MZ	*0.025*	37,000	*0.25*	1.8	*0.01*	*0.045*	41,000	0.1	110	560	190	80,000	63	2	140,000	1,600	*0.025*	*0.05*	830	0.1	*0.4*	0.1	*1*	45	640	*0.01*	0.012	66	2	65
Summary Statistics																																	
Minimum				*0.025*	3,200	*0.25*	1.7	*0.01*	*0.045*	1,400	*0.025*	45	120	1.3	44,000	46	*1*	80,000	1,000	*0.025*	*0.05*	95	0.1	*0.4*	*0.05*	*1*	1.8	160	*0.01*	0.007	17	0.81	18
10th Percentile				*0.025*	3,700	*0.25*	1.7	*0.01*	*0.045*	2,000	*0.025*	46	140	2.4	45,000	48	*1*	82,000	1,000	*0.025*	*0.05*	110	0.13	*0.4*	*0.05*	*1*	2.2	170	*0.01*	0.0072	17	0.86	19
Median				*0.025*	28,000	0.43	3	0.04	*0.045*	54,000	0.075	87	800	130	68,000	140	4.6	140,000	1,400	*0.025*	*0.05*	560	0.75	*0.4*	0.15	*1*	20	640	*0.01*	0.012	84	2.2	35
Mean				*0.025*	28,000	1.7	17	0.036	*0.045*	50,000	0.099	84	1,100	140	64,000	340	6.4	140,000	1,400	*0.025*	0.11	840	1.2	*0.4*	0.26	*1*	28	680	0.012	0.012	80	2.6	43
90th Percentile				*0.025*	68,000	8.3	89	0.069	*0.045*	98,000	0.32	120	3,600	500	80,000	1,600	19	210,000	1,900	*0.025*	0.29	1,900	4.1	*0.4*	0.94	*1*	78	1,300	0.028	0.02	170	5.6	68
Maximum				*0.025*	70,000	8.8	94	0.07	*0.045*	100,000	0.34	120	3,800	530	80,000	1,700	19	210,000	1,900	*0.025*	0.3	1,900	4.3	*0.4*	1	*1*	81	1,300	0.03	0.02	170	5.7	68

NOTES:

Cells highlighted in orange exceed 10x average upper continental crust (UCC) based on Rudnick and Gao (2014)

na = not applicable or not available

UCC = upper continental crust

Half detection limit values are shown in blue italics.

Table 2 Summary of Elemental Concentrations of Talc Samples in Ore

Sample ID	Type	Lithology	Zone	Silver	Aluminum	Arsenic	Barium	Beryllium	Bismuth	Calcium	Cadmium	Cobalt	Chromium	Copper	Iron	Potassium	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Lead	Antimony	Selenium	Tin	Strontium	Titanium	Thallium	Uranium	Vanadium	Yttrium	Zinc
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
10x UCC				0.53	815,122	48	6280	21.0	1.60	256,577	0.90	173	920	280	279,087	232,428	240	149,569	7744	0.50	11	470	170	4.0	0.9	21	3200	38,355	9	27	970	210	670
B956751	Ore	Per	MZ	*0.025*	7,800	1.2	4.1	0.06	*0.045*	24,000	0.06	99	840	6.7	60,000	54	2	180,000	990	*0.025*	*0.05*	1,600	2.1	*0.4*	*0.05*	*1*	14	410	*0.01*	0.021	29	1.6	24
B956754	Ore	Per	EZ	*0.025*	6,100	0.9	27	0.03	*0.045*	1,900	*0.025*	97	1,500	41	60,000	67	4	190,000	1,400	*0.025*	0.1	1,600	0.2	*0.4*	*0.05*	*1*	7	190	*0.01*	0.016	20	0.9	14
B956758	Ore	Dun	MZ	*0.025*	830	14	23	*0.01*	*0.045*	100,000	*0.025*	80	220	15	40,000	52	3.9	160,000	560	*0.025*	*0.05*	2,200	0.3	*0.4*	*0.05*	*1*	140	48	*0.01*	0.002	5	0.18	19
B956759	Ore	Per	EZ	*0.025*	7,200	64	7.5	0.05	*0.045*	18,000	*0.025*	100	820	9.8	60,000	95	*1*	210,000	730	*0.025*	*0.05*	2,200	0.5	*0.4*	0.1	*1*	43	350	*0.01*	0.012	25	1.5	33
B956762	Ore	Per	EZ	*0.025*	13,000	10	10	0.04	*0.045*	24,000	*0.025*	130	470	24	71,000	140	3.3	180,000	1,200	*0.025*	*0.05*	740	0.8	*0.4*	*0.05*	*1*	72	410	*0.01*	0.01	30	1.6	31
B956763	Ore	Dun	EZ	*0.025*	1,400	13	3.7	*0.01*	*0.045*	1,000	*0.025*	92	1,700	29	45,000	73	12	210,000	540	*0.025*	*0.05*	2,800	0.8	*0.4*	0.1	*1*	10	55	*0.01*	0.008	8	0.24	17
B956764	Ore	Per	MZ	*0.025*	33,000	14	14	0.16	*0.045*	86,000	0.15	85	2,200	78	68,000	140	15	120,000	1,300	*0.025*	*0.05*	960	12	*0.4*	0.2	*1*	220	1,700	0.04	0.059	100	6.6	81
B956766	Ore	Per	EZ	*0.025*	1,900	8.5	8.3	0.04	*0.045*	3,400	0.12	110	970	9.7	51,000	58	*1*	220,000	1,000	*0.025*	*0.05*	2,400	1.1	*0.4*	*0.05*	*1*	170	89	*0.01*	0.012	11	0.36	36
B956769	Ore	Dun	MZ	*0.025*	2,400	*0.25*	0.4	*0.01*	*0.045*	130	*0.025*	120	1,700	45	40,000	38	*1*	240,000	850	*0.025*	*0.05*	3,700	0.3	*0.4*	0.3	*1*	0.86	120	*0.01*	*0.001*	16	0.3	57
B956770	Ore	Per	MZ	*0.025*	2,400	25	40	*0.01*	*0.045*	79,000	*0.025*	85	520	11	49,000	66	11	180,000	960	*0.025*	*0.05*	2,000	0.2	*0.4*	*0.05*	*1*	1,200	130	*0.01*	0.011	9	0.53	27
B956771	Ore	Dun	MZ	*0.025*	2,200	*0.25*	1.8	0.06	*0.045*	9,200	*0.025*	110	1,500	7.8	64,000	56	*1*	220,000	960	*0.025*	0.2	2,100	0.8	*0.4*	*0.05*	*1*	4.4	90	*0.01*	0.004	18	0.24	51
Summary Statistics																																	
Minimum				*0.025*	830	*0.25*	0.4	*0.01*	*0.045*	130	*0.025*	80	220	6.7	40,000	38	*1*	120,000	540	*0.025*	*0.05*	740	0.2	*0.4*	*0.05*	*1*	0.86	48	*0.01*	*0.001*	5	0.18	14
10th Percentile				*0.025*	940	*0.25*	0.68	*0.01*	*0.045*	300	*0.025*	81	270	6.9	40,000	41	*1*	130,000	540	*0.025*	*0.05*	780	0.2	*0.4*	*0.05*	*1*	1.6	49	*0.01*	0.0012	5.6	0.19	15
Median				*0.025*	2,400	10	8.3	0.04	*0.045*	18,000	*0.025*	99	970	15	60,000	66	3.3	190,000	960	*0.025*	*0.05*	2,100	0.8	*0.4*	*0.05*	*1*	43	130	*0.01*	0.011	18	0.53	31
Mean				*0.025*	7,100	14	13	0.044	*0.045*	32,000	0.048	100	1,100	25	55,000	76	5	190,000	950	*0.025*	0.068	2,000	1.7	*0.4*	0.095	*1*	170	330	0.013	0.014	25	1.3	35
90th Percentile				*0.025*	29,000	56	37	0.14	*0.045*	97,000	0.14	130	2,100	71	70,000	140	14	240,000	1,400	*0.025*	0.18	3,500	10	*0.4*	0.28	*1*	1,000	1,400	0.034	0.051	86	5.6	76
Maximum				*0.025*	33,000	64	40	0.16	*0.045*	100,000	0.15	130	2,200	78	71,000	140	15	240,000	1,400	*0.025*	0.2	3,700	12	*0.4*	0.3	*1*	1,200	1,700	0.04	0.059	100	6.6	81

NOTES:

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Half detection limit values are shown in blue italics.

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ABA - Modified Sobek

Project : PO#1178

31-October-2025

Canada Nickel Company
Attn : Mathieu Boucher

130 King St., West Suite 1900, First Canadian Place Exchanger Tower
Toronto, ON
M5X 1E3, Canada

Phone: 807-620-2207
Fax:

Date Rec. : 12 August 2025
LR Report: **CA19203-AUG25**
Reference: PO#1178

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: B956751	6: B956752	7: B956753	8: B956754	9: B956755	10: B956756	11: B956757	12: B956758
Paste pH [no unit]	11-Sep-25	07:22	11-Sep-25	16:56	9.42	9.38	9.62	9.59	9.85	9.64	9.45	9.72
Fizz Rate [rating]	10-Sep-25	07:47	11-Sep-25	16:56	4	3	3	3	3	3	3	4
Sample weight [g]	09-Sep-25	13:05	11-Sep-25	16:56	2.01	2.00	1.98	1.99	1.99	2.02	2.02	1.99
HCl Added [mL]	11-Sep-25	06:40	11-Sep-25	16:56	83.60	82.40	38.70	36.60	20.00	89.40	20.00	265.00
HCl [Normality]	10-Sep-25	08:40	11-Sep-25	16:56	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	10-Sep-25	08:40	11-Sep-25	16:56	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH to pH=8.3 [mL]	11-Sep-25	14:30	11-Sep-25	16:56	16.71	32.92	11.07	11.38	16.37	34.59	11.33	66.91
Final pH [no unit]	11-Sep-25	08:42	11-Sep-25	16:56	1.91	1.56	1.68	1.69	1.22	1.55	1.55	1.81
NP [t CaCO3/1000 t]	11-Sep-25	14:30	11-Sep-25	16:56	116	126	178	69.0	50.8	136	21.5	498
AP [t CaCO3/1000 t]	11-Sep-25	14:30	30-Sep-25	10:25	0.53	0.34	0.31	0.31	0.31	0.72	2.75	2.47
Net NP [t CaCO3/1000 t]	11-Sep-25	14:30	30-Sep-25	10:25	116	126	178	68.7	50.5	135	18.8	495
NP/AP [ratio]	11-Sep-25	14:30	30-Sep-25	10:25	219	367	571	221	163	189	7.82	202
Sulphur (total) [%]	17-Sep-25	17:01	29-Sep-25	13:22	0.052	0.017	< 0.005	< 0.005	0.017	0.063	0.254	0.095
Acid Leachable SO4-S [%]	29-Sep-25	11:23	29-Sep-25	13:22	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	0.17	< 0.04
Sulphide [%]	29-Sep-25	11:19	29-Sep-25	13:22	0.02	0.01	< 0.01	< 0.01	< 0.01	0.02	0.09	0.08
Carbon (total) [%]	17-Sep-25	17:01	22-Sep-25	15:43	5.31	4.91	5.33	5.68	0.027	2.32	0.049	4.12
Carbonate (HCl) as %CO3 [%]	22-Sep-25	15:08	22-Sep-25	15:43	22.1	20.8	20.9	24.1	0.05	11.1	0.12	20.3

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ABA - Modified Sobek

Project : PO#1178

LR Report : **CA19203-AUG25**

Analysis	13: B956759	14: B956761	15: B956760	16: B956762	17: B956763	18: B956764	19: B956765	20: B956766	21: B956767	22: B956768	23: B956769	24: B956770	25: B956771
Paste pH [no unit]	9.66	9.46	9.14	9.49	9.47	9.28	9.36	9.67	9.32	9.07	9.40	9.31	9.47
Fizz Rate [rating]	3	2	2	4	3	4	3	3	2	3	3	4	4
Sample weight [g]	2.00	2.04	1.98	1.99	2.01	2.00	2.02	2.02	2.03	2.01	2.03	2.00	2.03
HCl Added [mL]	85.80	20.00	20.00	90.00	67.50	98.80	20.00	94.30	20.00	125.70	193.50	228.40	123.40
HCl [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH to pH=8.3 [mL]	33.49	14.18	13.22	21.43	20.00	29.22	12.54	32.19	14.06	53.15	75.11	72.73	31.87
Final pH [no unit]	1.53	1.50	1.57	1.86	1.67	1.66	1.52	1.58	1.49	1.55	1.56	1.55	1.86
NP [t CaCO3/1000 t]	131	14.3	17.1	172	118	174	18.5	154	14.6	180	292	389	225
AP [t CaCO3/1000 t]	1.44	0.78	0.38	0.38	2.22	0.41	3.84	0.38	0.31	0.31	3.00	0.31	0.44
Net NP [t CaCO3/1000 t]	129	13.5	16.7	172	116	174	14.7	153	14.3	180	289	389	225
NP/AP [ratio]	91.0	18.3	45.6	459	53.3	428	4.81	410	46.7	578	97.2	1245	515
Sulphur (total) [%]	0.068	0.054	0.031	0.042	0.104	0.051	0.175	0.046	0.015	0.032	0.149	0.037	0.052
Acid Leachable SO4-S [%]	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.05	< 0.04	< 0.04	< 0.04	0.05	< 0.04	< 0.04
Sulphide [%]	0.05	0.02	0.01	0.01	0.07	0.01	0.12	0.01	< 0.01	< 0.01	0.10	< 0.01	0.01
Carbon (total) [%]	1.80	0.025	0.041	2.79	6.32	2.10	0.037	2.90	0.093	2.56	0.259	3.30	0.838
Carbonate (HCl) as %CO3 [%]	8.71	< 0.04	0.09	13.5	28.8	10.3	0.12	13.9	0.12	12.6	1.23	16.3	4.02

*NP (Neutralization Potential)

$$= \frac{50 \times (N \text{ of HCL} \times \text{Total HCL added} - N \text{ NaOH} \times \text{NaOH added})}{\text{Weight of Sample}}$$

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.04 will be calculated using a 0.04 value.

OnLine LIMS

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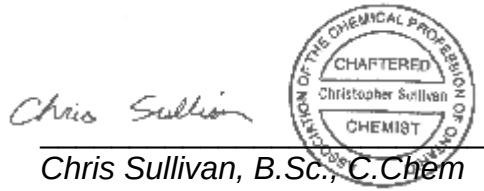
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Lakefield - Ontario - KOL 2HO
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.

Method Descriptions

Parameter	Units	SGS Method Code	Reference Method Code
Acid Potential	t CaCO3/1000 t	ME-CA-[ENV]ARD-LAK-AN-001/003	MEND PROJECT 1.16.1B
Carbon/Sulphur	%	ME-CA-[ENV]ARD-LAK-AN-019	ASTM E1915-07A
Carbon/Sulphur	%	ME-CA-[ENV]ARD-LAK-AN-020	ASTM E1915-07A
Neutralization Potential	t CaCO3/1000 t	ME-CA-[ENV]ARD-LAK-AN-001/003	MEND PROJECT 1.16.1B
Paste pH	no unit	ME-CA-[ENV]ARD-LAK-AN-005	ARD Predicition Manual 2009



Chris Sullivan, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

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ABA - Modified Sobek

Project : PO#1178

LR Report : **CA19203-AUG25**

Quality Control Report

Inorganic Analysis														
Parameter	Reporting Limit	Unit	Method Blank	Duplicate				LCS / Spike Blank			Matrix Spike / Reference Material			
				Result 1	Result 2	RPD	Acceptance Criteria	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)		
							%		Low	High		Low	High	
Carbon/Sulphur - QCBatchID: ECS0064-SEP25														
Carbon (total)	0.005	%	<0.005			0	20				99	70	130	
Sulphur (total)	0.005	%	<0.005			2	20				105	70	130	
Carbon/Sulphur - QCBatchID: ECS0089-SEP25														
Carbonate (HCl) as %CO3	0.04	%	<0.04			2	20	99	80	120				
Carbon/Sulphur - QCBatchID: ECS0103-SEP25														
Sulphide	0.01	%	< 0.01			6	20	91	80	120				

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Phone: 705-652-2000 FAX: 705-652-6365

Trace Metals - Strong Acid Digest, ICP-MS

Project : PO#1178

31-October-2025

Canada Nickel Company
Attn : Mathieu Boucher

130 King St., West Suite 1900, First Canadian Place Exchanger Tower
Toronto, ON
M5X 1E3, Canada

Phone: 807-620-2207
Fax:

Date Rec. : 12 August 2025
LR Report: **CA19204-AUG25**
Reference: PO#1178

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: B956751	6: B956752	7: B956753	8: B956754	9: B956755	10: B956756	11: B956757	12: B956758	13: B956759
Mercury [ug/g]	11-Sep-25	14:56	11-Sep-25	15:10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Silver [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	7800	11000	7700	6100	28000	3200	17000	830	7200
Arsenic [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	1.2	1.3	1.0	0.9	0.6	8.8	< 0.5	14	64
Barium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	4.1	4.7	2.1	27	45	3.8	1.7	23	7.5
Beryllium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	0.06	0.05	0.04	0.03	0.06	< 0.02	0.04	< 0.02	0.05
Bismuth [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09
Calcium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	24000	15000	1400	1900	100000	7700	56000	100000	18000
Cadmium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	0.06	0.06	< 0.05	< 0.05	0.13	< 0.05	0.09	< 0.05	< 0.05
Cobalt [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	99	100	87	97	52	120	86	80	100
Chromium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	840	790	920	1500	3800	1600	1100	220	820
Copper [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	6.7	13	1.3	41	200	15	530	15	9.8
Iron [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	60000	65000	49000	60000	53000	70000	54000	40000	60000
Potassium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	54	130	46	67	590	66	140	52	95
Lithium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	2.0	4.8	4.4	4.0	14	< 2	< 2	3.9	< 2
Magnesium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	180000	180000	200000	190000	99000	210000	140000	160000	210000
Manganese [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	990	1200	1100	1400	1400	1400	1000	560	730
Molybdenum [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	< 0.1	< 0.1	< 0.1	0.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1

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Trace Metals - Strong Acid Digest, ICP-MS

Project : PO#1178

LR Report : **CA19204-AUG25**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: B956751	6: B956752	7: B956753	8: B956754	9: B956755	10: B956756	11: B956757	12: B956758	13: B956759
Nickel [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	1600	1500	1900	1600	420	1900	380	2200	2200
Phosphorus [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	74	45	37	36	45	20	24	14	26
Lead [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	2.1	1.0	0.6	0.2	4.3	0.7	0.7	0.3	0.5
Antimony [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Selenium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	< 0.1	< 0.1	< 0.1	< 0.1	0.4	0.1	1.0	< 0.1	0.1
Tin [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Strontium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	14	36	1.8	7.0	16	23	8.3	140	43
Titanium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	410	560	270	190	1300	160	670	48	350
Thallium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03	< 0.02	< 0.02
Uranium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	0.021	0.017	0.013	0.016	0.015	0.009	0.012	0.002	0.012
Vanadium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	29	36	21	20	170	17	68	5	25
Yttrium [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	1.63	2.11	1.26	0.90	5.69	0.81	2.17	0.18	1.51
Zinc [µg/g]	12-Sep-25	06:29	12-Sep-25	14:47	24	33	18	14	36	33	32	19	33

Analysis	14: B956761	15: B956760	16: B956762	17: B956763	18: B956764	19: B956765	20: B956766	21: B956767	22: B956768	23: B956769	24: B956770	25: B956771
Mercury [ug/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Silver [µg/g]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aluminum [µg/g]	33000	48000	13000	1400	33000	27000	1900	70000	37000	2400	2400	2200
Arsenic [µg/g]	3.6	< 0.5	10	13	14	< 0.5	8.5	< 0.5	< 0.5	< 0.5	25	< 0.5
Barium [µg/g]	12	1.7	10	3.7	14	2.0	8.3	94	1.8	0.4	40	1.8
Beryllium [µg/g]	0.03	0.04	0.04	< 0.02	0.16	0.07	0.04	0.03	< 0.02	< 0.02	< 0.02	0.06
Bismuth [µg/g]	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09
Calcium [µg/g]	82000	60000	24000	1000	86000	52000	3400	84000	41000	130	79000	9200
Cadmium [µg/g]	0.34	0.11	< 0.05	< 0.05	0.15	0.06	0.12	0.05	0.10	< 0.05	< 0.05	< 0.05
Cobalt [µg/g]	73	87	130	92	85	75	110	45	110	120	85	110
Chromium [µg/g]	760	270	470	1700	2200	810	970	120	560	1700	520	1500
Copper [µg/g]	120	140	24	29	78	12	9.7	130	190	45	11	7.8
Iron [µg/g]	72000	77000	71000	45000	68000	72000	51000	44000	80000	40000	49000	64000
Potassium [µg/g]	270	130	140	73	140	230	58	1700	63	38	66	56
Lithium [µg/g]	7.3	9.0	3.3	12	15	< 2	< 2	19	2.0	< 2	11	< 2

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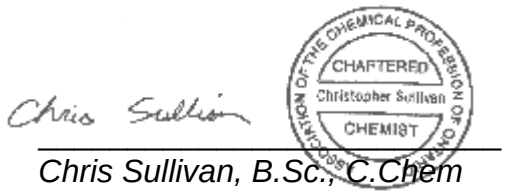
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Trace Metals - Strong Acid Digest, ICP-MS

Project : PO#1178

LR Report : **CA19204-AUG25**

Analysis	14: B956761	15: B956760	16: B956762	17: B956763	18: B956764	19: B956765	20: B956766	21: B956767	22: B956768	23: B956769	24: B956770	25: B956771
Magnesium [µg/g]	120000	140000	180000	210000	120000	140000	220000	80000	140000	240000	180000	220000
Manganese [µg/g]	1500	1900	1200	540	1300	1400	1000	1100	1600	850	960	960
Molybdenum [µg/g]	0.2	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	0.2
Nickel [µg/g]	700	260	740	2800	960	380	2400	95	830	3700	2000	2100
Phosphorus [µg/g]	24	15	48	18	150	49	13	18	25	21	33	15
Lead [µg/g]	2.1	0.8	0.8	0.8	12	0.4	1.1	0.8	0.1	0.3	0.2	0.8
Antimony [µg/g]	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Selenium [µg/g]	0.3	0.2	< 0.1	0.1	0.2	0.3	< 0.1	0.1	0.1	0.3	< 0.1	< 0.1
Tin [µg/g]	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Strontium [µg/g]	48	5.9	72	10	220	11	170	81	45	0.86	1200	4.4
Titanium [µg/g]	590	640	410	55	1700	1200	89	720	640	120	130	90
Thallium [µg/g]	< 0.02	< 0.02	< 0.02	< 0.02	0.04	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Uranium [µg/g]	0.009	0.009	0.010	0.008	0.059	0.020	0.012	0.007	0.012	< 0.002	0.011	0.004
Vanadium [µg/g]	100	100	30	8	100	100	11	120	66	16	9	18
Yttrium [µg/g]	2.41	2.22	1.59	0.24	6.61	4.16	0.36	2.89	2.03	0.30	0.53	0.24
Zinc [µg/g]	64	68	31	17	81	52	36	29	65	57	27	51



Chris Sullivan, B.Sc., C.Chem
Project Specialist,
Environment, Health & Safety

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Method Descriptions

Parameter	Units	SGS Method Code	Reference Method Code
Mercury by CVAAS	ug/g	ME-CA-[ENV]SPE-LAK-AN-004	EPA 7471A/EPA 245
Metals - Microwave/ICP-MS	µg/g	ME-CA-[ENV]SPE-LAK-AN-007	EPA 3052/200.8
Metals - Microwave/ICP-MS	µg/g	ME-CA-[ENV]SPE-LAK-AN-013	EPA 3052/200.8

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Trace Metals - Strong Acid Digest, ICP-MS

Project : PO#1178

LR Report : **CA19204-AUG25**

Quality Control Report

Inorganic Analysis														
Parameter	Reporting Limit	Unit	Method Blank	Duplicate				LCS / Spike Blank			Matrix Spike / Reference Material			
				Result 1	Result 2	RPD	Acceptance Criteria	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)		
							%		Low	High		Low	High	
**QCR_SubCategory* - QCBatchID: EMS0100-SEP25*														
Calcium	3	µg/g	<3			1		97			79			
Phosphorus	3	µg/g	<3			3		98			87			
Potassium	3	µg/g	<3			1		108			96			
Mercury by CVAAS - QCBatchID: EHG0017-SEP25														
Mercury	0.05	ug/g	<0.05			ND	30	95	80	120	116	70	130	
Metals - Microwave/ICP-MS - QCBatchID: EMS0100-SEP25														
Aluminum	1	µg/g	<3			2	20	101	70	130	83	70	130	
Antimony	0.8	µg/g	<0.8			ND	20	97	70	130	102	70	130	
Arsenic	0.5	µg/g	<0.5			9	20	105	70	130	93	70	130	
Barium	0.1	µg/g	<0.01			3	20	101	70	130	109	70	130	
Beryllium	0.02	µg/g	<0.02			13	20	105	70	130	102	70	130	
Bismuth	0.09	µg/g	<0.09			ND	20	99	70	130	NV	70	130	
Cadmium	0.05	µg/g	<0.02			ND	20	99	70	130	NV	70	130	
Chromium	0.5	µg/g	<0.5			19	20	99	70	130	78	70	130	
Cobalt	0.01	µg/g	<0.01			1	20	101	70	130	85	70	130	
Copper	0.1	µg/g	<0.1			1	20	101	70	130	93	70	130	
Iron	3	µg/g	<3			0	20	103	70	130	96	70	130	
Lead	0.1	µg/g	<0.05			ND	20	99	70	130	108	70	130	
Lithium	2	µg/g	<2			ND	20	108	70	130	129	70	130	
Magnesium	1	µg/g	<3			0	20	106	70	130	98	70	130	
Manganese	0.1	µg/g	<0.1			1	20	101	70	130	87	70	130	
Molybdenum	0.1	µg/g	<0.1			ND	20	99	70	130	96	70	130	
Nickel	0.5	µg/g	<0.1			0	20	104	70	130	101	70	130	
Selenium	0.1	µg/g	<0.1			ND	20	101	70	130	NV	70	130	
Silver	0.05	µg/g	<0.5			ND	20	104	70	130	NV	70	130	
Strontium	0.02	µg/g	<0.02			0	20	103	70	130	95	70	130	
Thallium	0.02	µg/g	<0.02			ND	20	91	70	130	NV	70	130	
Tin	2	µg/g	<6			ND	20	102	70	130	NV	70	130	
Titanium	0.1	µg/g	<0.1			2	20	104	70	130	80	70	130	
Uranium	0.002	µg/g	<0.002			ND	20	94	70	130	91	70	130	
Vanadium	1	µg/g	<1			0	20	100	70	130	91	70	130	
Yttrium	0.004	µg/g	<0.004			9	20	101	70	130	NV	70	130	
Zinc	0.7	µg/g	<0.7			8	20	101	70	130	92	70	130	

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Canada Nickel's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project (Received May 30, 2025)
Geochemistry, where Conditions Influence Water Quality and Effects to Fish and Fish Habitat and Indigenous Peoples
December 24, 2025

Attachment GHC-01e-2 Updated ML/ARD Management Plan

CANADA NICKEL COMPANY

Stantec

Crawford Nickel Project – Conceptual Metal Leaching and Acid Rock Drainage Management Plan

December 23, 2025

Prepared for:

Canada Nickel Company



Prepared by:

Stantec Consulting Ltd.



Limitations and Sign-off

This document entitled Crawford Nickel Project –Conceptual Metal Leaching and Acid Rock Drainage Management Plan was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Canada Nickel Company (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

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Acronyms and Abbreviations

ABA	Acid base accounting
ACA	Average crustal abundance
AP	Acid potential
BC MECCS	British Columbia Ministry of Environment and Climate Change Strategy
CCME	Canadian Council of Ministers of the Environment
CWQG-FAL	Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life
HCT	Humidity cell test
ICP-MS	Inductively coupled plasma mass spectrometry
kt/d	kilotonnes per day
MDL	Method detection limit
MDMER	Metal and Diamond Mining Effluent Regulations
ML/ARD	Metal leaching/acid rock drainage
MP	Management plan
NAG	Net acid generation
NPAG	Non-potentially acid generating
NP	Neutralization potential
NPR	Neutralization potential ratio
PA	Project Area
PAG	Potentially acid generating
PWQO	Provincial Water Quality Objectives
QA/QC	Quality assurance/quality control

RPD	Relative percent difference
SFE	Shake flask extraction
TIS Guidelines	Tailored Impact Statement Guidelines
TMF	Tailings Management Facility
tpd	tonnes per day
VC	Valued Component
wt. %	Percent by weight

1 Introduction

Canada Nickel Company (Canada Nickel) proposes to develop, operate, and progressively reclaim the Crawford Nickel Project ('the Project'), a new open pit nickel mine and processing facility approximately 42 kilometres (km) north of Timmins, Ontario along Highway 655. The Project is being assessed in accordance with the *Impact Assessment Act*, 2019 by the Impact Assessment Agency of Canada. Stantec Consulting Ltd. (Stantec) has been retained by Canada Nickel to develop a Conceptual Metal Leaching and Acid Rock Drainage (ML/ARD) Management Plan (MP) to support the preparation of the Impact Statement.

This Conceptual ML/ARD MP was developed in consideration of the Tailored Impact Statement Guidelines: Crawford Nickel Project (TIS Guidelines, Appendix A.1 of the Impact Statement). As per the TIS Guidelines, the objectives of this ML/ARD MP are to:

- outline the conceptual approach to operational testing to identify and manage potentially acid generating and/or metal(loid) leaching mine waste during mine construction and operations
- describe methods for the prevention, monitoring, management and control of acid rock drainage, neutral mine drainage, and/or and metal(loid) leaching during all project phases

1.1 Project Overview

Canada Nickel proposes to develop, construct, operate, and progressively reclaim a new Open Pit nickel mine and processing facility, collectively known as the Project. The Project includes the development of an Open Pit, stockpiles, ore processing plants, and other mine related infrastructure, as well as a new rail spur line and the relocation of Highway 655 and existing 500 kilovolt (kV) transmission line. Ore will be extracted from a single Open Pit that will be divided into an east zone and main zone. The Project has a mineral reserve estimate of 1,715 million tonnes (Mt) and an expected Project life of 41 years.

The Project is located approximately 42 km north of the City of Timmins, Ontario, in the geographic townships of Crawford, Carnegie, Kidd, Lucas, Beck, Nesbitt, Wark, and Prosser (Figure A.1). A small portion of the Project extent within the geographic townships of Kidd and Wark also lies within the municipal boundary of the City of Timmins.

Based on the current Project design, the maximum rate of ore extraction will be up to 240,000 tonnes per day (tpd), with an estimated average rate of 160,000 tpd over the life of mine. The two ore processing plants and associated service facilities will process run of mine ore delivered to primary crushers to produce nickel concentrate, iron concentrate, and tailings at a rate of approximately 60,000 tpd at the start of mine life, ramping up to a maximum of 120,000 tpd. In addition to nickel and iron, other metals such as cobalt, chromium, palladium and platinum are expected to be recovered from two concentrate streams.

Based on the proposed processing rate and current information regarding the ore body, the current life of the proposed Project is expected to be approximately 41 years. Mining would be completed at a faster pace than milling, thus mining of ore would occur for about 30 years, then milling alone for the last 11 years.

Concentrate from the processing plants will be loaded onto rail cars and shipped via the rail spur line for further processing offsite.

1.2 Management Plan Purpose

The purpose of the Conceptual ML/ARD MP is to document the protocols to be employed to reduce and limit the known and potential environment risks of ML/ARD associated with the Project. This Conceptual ML/ARD MP provides guidance to Canada Nickel for the testing and management of materials exposed during the Project. Procedures and test methods are included for the geochemical characterization of the mined, processed and exposed materials and the classification of ML/ARD potential. Criteria for the management of mined materials including overburden, waste rock, ore, and tailings and exposed materials including pit walls, and tailings beaches are defined, including the identification of materials that can be used for construction.

The objectives of the Conceptual ML/ARD MP are as follows:

- Identify the federal and provincial legislation, regulations and standards relevant to the management of exposed materials.
- Characterize the ML/ARD potential of the materials exposed by the Project.
- Outline the procedures to monitor and document geochemical characteristics of the materials, including testing schedules, parameters, and criteria.
- Describe the procedures to monitor contact water quality for early identification of conditions indicative of ML/ARD.
- Document the material management methods to be followed to reduce and limit the risk of ML/ARD generation from each Project component.
- Describe the adaptive management approach to mitigation measures for each Project component.
- Document triggers and procedures for revisions to the ML/ARD MP.

This Conceptual ML/ARD MP is a live document, which will be updated throughout the life of the Project. The Conceptual ML/ARD MP will also need to be updated in consideration of requirements identified through future permitting processes.

1.3 Relevant Documents

The geochemical characterization program conducted to support the Project's Impact Statement and this Conceptual ML/ARD MP considered the recommendations provided in "Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials" (MEND Manual) produced by MEND for ML/ARD prediction (MEND 2009). WSP used this Manual in developing the geochemical study design and establishing ML/ARD classification for the Project (appended as Appendix H of the Impact Statement [Crawford Geochemistry Characterization]). Conceptual ML/ARD MP also considered the federal "Environmental Code of Practice for Metal Mines" prepared by Environment and Climate Change Canada (Environment Canada 2009) and other industry best practices from other provinces.

Several other Project specific management plans and monitoring programs that relate to the management of ML/ARD include the Mine Plan, Mine Development Closure Plan, Construction Environmental Protection Plan, Erosion and Sediment Control Plan, Water Management Plan, Explosives Management Plan, Soil Management and Rehabilitation Plan, and the surface water and groundwater monitoring programs. The scope and relationship of these plans to the ML/ARD MP will be outlined in future iterations of the ML/ARD MP.

1.4 Regulatory Framework

Several provincial and federal Acts and their accompanying regulations apply to advanced mineral exploration and mine development activities in Ontario:

- *Ontario Environmental Assessment Act*
- *Mining Act*
- *Environmental Protection Act*
- *Fisheries Act*

Mine development and closure are regulated under Part VII of the *Mining Act* and O.Reg. 35/24. Under these statutes and regulations, monitoring and certification requirements for evaluating the protection of surface water and groundwater and the success of closure activities are identified, including surface water and groundwater quality parameters to be monitored and monitoring frequency. O.Reg. 35/24 includes requirements for geochemical characterization to assess the potential for ML/ARD and development of prevention, mitigation, and monitoring strategies, if necessary. According to the TIS Guidelines, the Conceptual ML/ARD MP is to be developed following the Mine Environment Neutral Drainage Prediction Manual (MEND 2009) and the Provincial Water Quality Objectives (PWQO) guidelines for the protection of water resources. It is noted that the PWQO are not legally enforceable but are used as a guide for the development of ML/ARD management and mitigation strategies. This Conceptual ML/ARD MP will be reviewed and updated as required during advanced engineering and following receipt of a permit for the development of the Project issued under the *Mining Act*.

1.5 Roles and Responsibilities

Interdisciplinary coordination from several departments is required during mine construction, operations, and decommissioning and closure, including mine engineering and environment teams. The roles and responsibilities require input and actions from various levels of the Project team and will be defined as the Project progresses through the authorization stages. General responsibilities may include:

- implementing the Conceptual ML/ARD MP
- providing training for site personnel in the requirements of the Conceptual ML/ARD MP
- directing sampling and testing activities
- providing the data to a qualified professional for review
- implementing materials tracking
- comparing data against ML/ARD criteria, water quality guidelines and ACA concentrations
- reviewing QA/QC results
- reviewing and updating this plan annually or as required
- reporting

2 Project Area and Mine Planning

The Project comprises approximately 11,785 hectares (ha) (118 square kilometres [km^2]) along Highway 655, approximately 42 km north of the City of Timmins, Ontario in the geographic townships of Crawford, Carnegie, Kidd, Lucas, Beck, Nesbitt, Wark, and Prosser. A small portion of the Project extent within the geographic townships of Kidd and Wark also lies within the municipal boundary of the City of Timmins. The proposed Highway 655 realignment and rail spur line extend into the geographic Townships of Kidd and Wark (which are considered to be part of the City of Timmins). The Project Area (PA) encompasses the project footprint and is the anticipated area of physical disturbance associated with the construction, operations, and decommissioning and closure of the Project. The PA is shown on Figure A.1.

2.1 Geology

The Project site geology is described in Soils and Terrain Baseline Report (Appendix B.1 of the Impact Statement), Crawford Geochemistry Characterization (Appendix H of the Impact Statement), and the Conceptual Closure Plan (Appendix F of the Impact Statement). The geological formations in the area of the Project site are part of the Deloro Assemblage, consisting mainly of mafic to felsic calc-alkaline volcanic rocks with local tholeiitic mafic volcanic units and an iron formation cap which is typically iron poor chert-magnetite (Ayer et al., 2005; Thurston et al., 2008). The Deloro Assemblage is the host to the Crawford Ultramafic Complex at the PA (Crawford and Lucas townships) and several mafic to ultramafic sills in the northern part of the Crawford Township and in the neighbouring Lucas, Mahaffy, and Aubin townships.

The rocks at the Project site have undergone greenschist facies metamorphism with widespread carbonate, chlorite and sericite alteration in volcanic rocks and serpentinization in ultramafic rocks (i.e., dunite, peridotite). Serpentinization of the ultramafic rocks has resulted in the formation of chrysotile within the deposit, primarily in the dunite rock unit (Appendix B.1 of the Impact Statement).

2.2 Surface Water and Topography

Surface water bodies and the topography at the PA are presented in the Surface Water Resources Baseline Report (Appendix B.6 of the Impact Statement) and summarized in this section to provide additional context. The topography at the PA is typically flat to gently rolling, a typical topography of the glaciated Canadian Shield. The PA elevations range from about 265 to 290 metres (m) above sea level, with topographic relief averaging about 15 m. A thin layer of glacial till over bedrock is usually observed at high elevation areas whereas thicker overburden present in the low-lying areas. The overburden is predominantly glacial till consisting of sand, clay, loose gravel and boulders, and varies in thickness from less than 10 m to as much as 85 m, with an average thickness of about 50 m (Appendix B.6 of the Impact Statement).

As with most of northern Ontario, the Project site is crossed by a number of minor waterbodies and tributaries to larger rivers. The Project site is located primarily between the North Driftwood River and the West Buskegau River, both of which drain north into the Abitibi River. Jocko Creek crosses the southern portion of the PA and flows into Mattagami River which confluences with the Missinaibi River, then combines into the Moose River, one of the major rivers draining into James Bay (Appendix B.6 of the Impact Statement).

A Site-Wide Water Management Plan has been developed by Canada Nickel (Appendix J of the Impact Statement) to manage contact water around the Open Pit, Stockpiles, Impoundment Facility, and Tailings Management Facility (TMF) and non-contact water within the PA. The Site-Wide Water Management Plan (Appendix J of the Impact Statement) includes additional details regarding construction of diversion structures, sediment control, and water quality monitoring plan. Water quality assessment was conducted to evaluate regional water quality through reviewing existing monitoring data for seven Provincial Water Quality Monitoring Network stations and local water quality through collection and analysis of approximately 317 surface water samples within the PA. Additional details related to the surface water hydrology and water quality are presented in the Surface Water Resources Baseline Report (Appendix B.6 of the Impact Statement).

2.3 Mine Plan and Lithologies

The Project components include an Open Pit, Stockpiles, TMF, Impoundment Facility, two ore Processing Plants, and other mine related infrastructure (Figure A.2). Excavated and exposed materials at the PA include overburden, waste rock, ore, and tailings. Overburden is sub-classified and segregated into clay, organic, and mineral depending on the composition of the materials, and then stockpiled accordingly. Waste rock and ore are comprised of six major lithologies. The proportions of each lithology in waste rock and ore generated during the LOM are shown in Table 2.1 based on the mine plan presented in the Water Quality Assessment (Appendix K of the Impact Statement) and the description of these lithologies are as follows:

- Dunite: ultramafic rocks containing primarily olivine and serpentine and minor quantities of brucite, wustite, and hematite.
- Pyroxenite: ultramafic igneous rock essentially consisting of pyroxene mineral group including diopside and actinolite and minor amount of chlorite.
- Peridotite: serpentine dominated ultramafic rock with minor quantities of diopside and chlorite.
- Gabbro: intrusive mafic igneous rock with some andesite, primarily comprising of diopside, plagioclase, zoisite, actinolite, and minor amount of chloride.
- Metavolcanic/Basalt: extrusive igneous rocks mainly of basalts and andesite, primarily comprised of quartz and plagioclase and minor quantities of forsterite and diopside.
- Talc: talc rich unit.

Ore materials will be stored at two ore stockpiles: West Stockpile and East Stockpile. The annual balance of the lithology for each ore stockpile is presented in the Water Quality Assessment (Appendix K of the Impact Statement). Lithological composition of tailings will be approximately estimated based on the percentage of ore generated by lithology.

Table 2.1 Proportions of Waste Rock at the Impoundment Facility and Ore Milled by Lithology Over the Life of Mine

Lithology	Waste Rock		Ore	
	Tonnage (Mt)	Percentage of Total Waste Rock (%)	Tonnage (Mt)	Percentage of Total Ore (%)
Dunite	60.6	1.8	1,202	70
Peridotite	225	6.7	375.1	22
Pyroxenite	132	3.9	16.2	1.0
Gabbro	1,990	59	28.7	2.0
Metavolcanic/ Basalt	872	26	-	-
Talc	89.8	2.7	92.4	5.0
Total	3,370	100	1,715	100

Notes:
Mt million tonnes
% percent

3 Project Development

The timing of activities and installation of Project components will occur in sequence to allow for the efficient extraction of materials. Various construction, operations, and decommissioning and closure activities are proposed throughout the life of the mine. The temporal boundary of the assessment includes all Project phases from the start of construction through to the end of closure. Based on the current Project schedule, the Project phases include:

- Construction (Year -3 to Year -1)
- Operations
  - Operations phase 1 (Year 1 to Year 5): 60 kilotonnes per day (kt/d) milling capacity with ore extraction
  - Operations phase 2 (Year 5 to Year 30): 120 kt/d milling capacity with ore extraction
  - Operations phase 3 (Year 30 to Year 41): 120 kt/d milling capacity with no ore extraction
- Decommissioning and closure
  - Active closure (Year 41 to Year 46)
  - Passive closure (Year 46+)

3.1.1 Construction Phase

The construction phase will include the preparation of the site up to the point at which the first process plant has been commissioned and is ready to commence operations. This phase will include site preparation, physical construction, pre-production, and commissioning activities. Construction is anticipated to begin in the Main Zone and East Zone, and rock extracted at this time may be crushed into aggregate using a mobile aggregate crusher for use during the construction of roads and other infrastructure, as necessary.

It is noted that additional construction will occur through the operations phase of the Project, and that this phase is defined by the start of ore processing.

3.1.2 Operations Phase

The operations phase is focused on the active processing of ore and generation of concentrate for delivery to market, specifically operation of the Process Plant(s). Due to the sequential nature of the mine operations, the operations phase of the Project has been divided into 3 sub-phases based on the Open Pit extraction schedule and sequential operation of the two Process Plants.

The three sub-phases of the operations phase are as follows:

- Operations phase 1 – this sub-phase includes the operation of the first of two Process Plants that will be operating at an ore processing capacity of approximately 60 kt/day (or 21.9 Mt/a). IPT carbonation within the process plant may also commence if a CO_2 source is available. Mining operations during this phase will produce more ore than the process plant can process, with surplus material to be stockpiled in the East Stockpile location for future processing. Construction will continue during the phase to expand and construct the second process plant and other supporting mine infrastructure, including the Highway 655 realignment. Material will begin to be stored within the West Stockpile at the end of this sub-phase.
- Operations phase 2 – this sub-phase includes the operation of both Process Plants that will be operating at an ore processing capacity of approximately 120kt/d (or 43.8 Mt/a), including IPT carbonation. Mining operations during this phase will produce approximately 240 kt/day, which is more ore than the process plants can process. Surplus ore will continue to be stockpiled in the East and/or the West ore Stockpiles.
- Operations phase 3 – this sub-phase includes continuation of the operation of both Process Plants at an ore processing capacity of approximately 120kt/d (or 43.8 Mt/a) following completion of mining operations (e.g., no further extraction of ore from the pit). The process plants, including IPT carbonation, will continue to operate by processing the ore stockpiled during operations phase 1 and 2. As mine operations cease, there will be an opportunity for progressive reclamation of the pit, haul routes, and other no longer used areas of the Project site.

3.1.3 Decommissioning and Closure Phase

Following the completion of ore processing, all Project operations will cease, and active closure will commence. Active closure includes the removal of buildings, structures, and other infrastructure, as well as reclamation and site stabilization activities. Once complete, the Project will then enter a passive closure phase as the pit lake fills. During this time, closure monitoring and adaptive mitigation will occur. Following pit lake filling, the Project site will be permanently closed.

Activities completed during the decommissioning and closure phase of the Project are focused on reclaiming the environments, establishing physical, chemical, and biological stability at the site, and to meet desired end land functions and uses. The Closure Plan will be updated throughout the life of the Project as necessary to reflect the environmental requirements in place at the time of closure. The Closure Plan will be prepared, refined, and implemented in accordance with the Ontario *Mining Act* and Ontario Regulation 35/24.

Progressive reclamation throughout the course of the mine life will occur, but the majority of the closure activities will commence at the cessation of mining activities and will be completed five years after ore processing ceases. Ongoing closure monitoring and maintenance activities will be carried out throughout active and passive closure phases until the closure objectives have been satisfied and the Project has been moved to a closed out and abandoned status.

4 Preliminary ML/ARD Assessment Summary

A three-phase geochemical testing program was completed by WSP to characterize the ML/ARD potential for materials that are excavated or brought to the Project area (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]). The characterized materials included ore and mineral wastes from the Project including overburden, waste rock, ore, and tailings (Appendix H of the Impact Statement) in addition to lime that is used to stabilize clay being used for road construction. Results from the geochemical testing program to date are presented in the Crawford Geochemistry Characterization Report (Appendix H of the Impact Statement). The results are summarized in this section to support the preparation of the Conceptual ML/ARD MP.

4.1 Samples and Geochemical Test Methods

A total of 299 waste rock samples, 109 ore samples, four tailings samples, 50 overburden samples, five clay samples, and 15 lime amended clay samples prepared for structural stability testing have been characterized for geochemical characteristics to date (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]). The selected samples were characterized for their ML/ARD potential through static and kinetic geochemical testing. A summary table showing the tests and number of samples completed for each lithology (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]) is provided in Table 4.1 for reference.

Table 4.1 Static and Kinetic Tests Completed to Date

Material Type	Lithology	ABA	NAG	Elemental Analysis	Whole Rock Analysis	Mineralogy	Supernatant Liquid	SFE	HCT
Waste Rock	Dunite	15	-	15	1	1	-	8	-
	Gabbro	85	9	85	4	4	-	44	3
	Pyroxenite	37	1	37	2	2	-	18	1
	Metavolcanic/ Basalt	117	3	117	6	6	-	59	5
	Peridotite	45	6	45	2	2	-	23	2
Ore	Dunite	66	1	66	2	2	-	37	3
	Gabbro	4	-	4	-	-	-	3	-
	Pyroxenite	3	-	3	-	-	-	2	-
	Metavolcanic/ Basalt	4	-	4	-	-	-	3	-
	Peridotite	32	-	32	1	1	-	25	1
Tailings	Dunite	3	-	3	3	3	3	-	3
	Peridotite	1	-	1	1	1	1	1	1
Overburden	Organics	26	-	26	-	-	-	26	-
	Mineral	24	-	24	-	-	-	24	-
Clay and lime amended clay	Clay	5	-	-	-	-	-	5	-
	Lime amended clay	15	-	-	-	-	-	15	-
Total		482	20	462	22	22	4	293	19

Notes:
'-' not analyzed
ABA acid base accounting
NAG net acid generation
SFE shake flask extraction
HCT humidity cell test
Source: Appendix H of the Impact Statement

4.2 Preliminary Results

The following preliminary results are summarized from the Crawford Geochemistry Characterization (Appendix H of the Impact Statement). Waste rock and ore samples at the PA consist of an abundance of serpentine, oxide minerals such as magnetite, brucite, and wustite, and minor quantities of chlorite. Carbonate was below 5 % by weight (wt. %) except for within the basalt lithology. Siderite was below 0.4 wt. % in analyzed lithologies of waste rock and below detection limit in ore samples. The sulphide content in waste rock and ore samples was below 0.2 wt. %.

Samples were considered to have ML/ARD potential if they meet one of the following criteria below:

- Potentially acid generating (PAG) where neutralization potential ratio (NPR) is less than two (MEND 2009).
- Potentially metal leaching if elemental concentrations are elevated relative to normal distribution. The concentrations were compared to a threshold of 10 times (10x) the average crustal abundance (ACA) following the Guidelines for Metal Leaching and Acid Rock Drainage at Mine Sites in British Columbia (Price 1997).
- Potentially metal leaching if SFE leachate concentrations are elevated relative to PWQO and Canadian Council of Ministers of the Environment (CCME) guidelines. It is noted that these guidelines are selected for screening metal leaching potential and constituents with SFE concentrations exceed PWQO or CCME guideline values do not necessarily indicate that water in contact with exposed waste rock and ore lithologies or tailings will exceed the guideline values for these constituents.

Acid generating potential assessment using carbonate neutralization potential (NP) provides a more conservative prediction as non-carbonate NP of mafic minerals such as serpentine, actinolite, and diopside minerals which were abundant within the waste rock, ore, and tailings lithologies. The lack of both carbonate and sulphur containing minerals in these materials resulted in low carbonate NP and also low acid potential (AP). Thus, carbonate NPR values might not be a reliable indicator for the assessment of acid generating potential. Thus, modified Sobek NPR values were used for the ARD assessment. The modified Sobek NP results indicated that the non-carbonate NP of these materials may provide sufficient NP to consume potential acid generation from sulphide minerals (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]). Based on the modified Sobek NPR values, about 98% of analyzed waste rock samples were classified as NPAG which was consistent with NAG results on a subset of 20 samples. Similarly, 100% of analyzed ore, tailings, clay, and lime amended clay samples were classified as NPAG. About 85% of organic rich overburden samples were classified as NPAG whereas 100% of mineral rich overburden samples were NPAG. Overall, excavated materials at the PA do not likely generate acid drainage based on the ABA and NAG results completed to date.

Metal leaching potential was assessed based on both elemental concentrations and SFE leachate concentrations. Based on elemental concentrations, elements with elevated concentrations in comparison to 10x the average abundance of the crustal rocks (Price 1997) for ore samples included arsenic, bismuth, chromium, magnesium, nickel, and selenium. Elements with elevated concentrations for waste rock included antimony and tin in addition to those identified for ore samples (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]). The detection of bismuth (0.09 ppm) was greater than 10x the average crustal abundance for bismuth (0.0085 ppm). Thus, the reported bismuth elemental concentrations (below detection limit) for ore samples cannot be reliably used for screening for metal leaching potential for bismuth for ore materials. Based on SFE leachate concentrations, aluminum, boron, cadmium, copper, iron, lead, tungsten, thallium, uranium, vanadium, and zinc for waste rock, ore, and overburden materials exceeded PWQO guidelines (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]). However, except for aluminum, the percentages of samples with SFE exceedances for any of these elements were low for waste rock (less than 20%) and ore (less than 20%; generally, less than 6%) which are the two major excavated and exposed materials at the PA. There was also no distinct difference in SFE leachate concentrations between waste rock lithologies. In combination with kinetic testing results, metal leaching potential of waste rock and ore was considered low. Elements with leaching potential were aluminum and arsenic for basalt lithology and chromium for dunite lithology in ore materials (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]).

Additionally, elements with leaching potential for tailings were chromium and uranium based on four tailings samples analyzed to date. Analyses of additional tailings samples during the operations phase of the Project will be completed to provide a more refined assessment of metal leaching potential of mined materials.

5 ML/ARD Prevention and Management

Materials with the potential for ML/ARD are those excavated and exposed during the mine development include:

- waste rock generated during Open Pit development
- pit walls
- ore
- tailings, including beaches
- overburden
- roads, pads and infrastructure
- materials used in construction and closure activities

Solid waste generated during Open Pit development are anticipated to have similar characteristics with the materials characterized to date (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]). The pit walls are expected to have similar composition to the waste rock and will not be sampled separately unless indicated by geological observations made during excavation of ore and waste rock from the open pit. Haul roads, pads, and infrastructure will be constructed using excess overburden, clay, sand and aggregates from the mine or from local quarries. Lime may be added to stabilize clay being used for the construction of roads. These materials will be characterized for ML/ARD during the waste rock sampling program prior to construction.

5.1 Sampling, Testing, and ML/ARD Classification

5.1.1 Operational Sampling

During construction and operations, sampling will be conducted to geochemically characterize disturbed and exposed materials at the Project site. Sampling is planned to be conducted at a rate indicated in Table 5.1 following MEND guideline (MEND 2009).

Table 5.1 Summary of Operational Sampling Program

Component	Estimated Total Tonnage Over Life of Mine (Mt)	Sampling Rate	Laboratory Analytical Schedule[3]	
			Year 1 to Year 3	Year 4 to End of Mine Life
Overburden	0.65	1 per 10,000 t	Samples will be tested for ABA, SFE, and elemental concentrations of bulk samples. 10% of collected samples will be subjected to WRA and XRD test methods	TBD
Waste / Construction Rock	3,370	1 per 50,000 t (Year 1 to 3)[1,2] 1 per 10,000 t for rock used in construction within the PA		
Ore	1,715	1 per 100,000 t (Year 1 to 3)[1]		
Tailings (End of Pipe)	1,273	1 per 50,000 t (Year 1 to 3)[1]		
Tailings (Beaches)	TBD	1 per 10,000 m^2 at closure		

Notes:

1	sampling rate may be reduced during operations following results from the confirmatory sampling program
2	per lithology
3	laboratory analytical methods are described in detail in Section 5.1.2
t	tonnes
ABA	Acid-base accounting
Mt	million tonnes
PA	Project Area
SFE	Shake flask extraction
TBD	to be determined
WRA	Whole rock analysis
XRD	X-ray diffraction

5.1.2 Laboratory Analysis

A procedure for collection of confirmatory samples will be developed prior to the start of the Project. The proposed analytical schedule for the samples collected during the operational monitoring program is shown in Table 5.1. Contingent on confirmation of the baseline data, the sampling rate may be reduced after the first three years of the operations phase (for example, reduced to 10% of the sampling rates proposed for the operational monitoring program). Analytical results from the operational sampling program will be reviewed by a qualified professional in Year 4 to develop a monitoring plan including sampling rate and analytical schedule for the remaining years of the LOM.

Confirmatory samples collected following the sampling rate outlined in Table 5.1 will be tested according to analytical schedule (Table 5.1). Methods are proposed to be consistent with MEND (2009) and the baseline geochemical characterization program (Appendix H of the Impact Statement) as follows:

- Acid-base accounting (ABA) package including modified Sobek neutralization potential (NP), carbonate NP calculated from total inorganic carbon by LECO furnace, fizz rating, paste pH, total sulphur by LECO, sulphate sulphur by HCl extraction and acid potential (AP) calculated from difference between total and sulphate sulphur. In addition, net acid generation (NAG) testing will be required for samples with carbonate NP below or near method detection limit.
- Shake flask extraction (SFE) testing method, involving continuous mixing of a crushed sample (85% passing 6.3 mm) with deionized water (1:3) for 24 hours. For fine grained materials, such as overburden, the leachate should be filtered with a 0.2 micron filter. Leachate will be analyzed by inductively coupled plasma mass spectrometry (ICP-MS) for trace elements. In addition, leachates will be analyzed for pH, alkalinity and acidity by titration, and sulphate by colourimetry
- Elemental concentrations using a four-acid digestion method with ICP-MS detection.
- Whole rock analysis using lithium meta-borate fusion method followed by ICP-MS analysis to determine the concentrations of major elements, reported as oxides.
- Mineralogical analysis using X-ray diffraction (XRD) with Rietveld pattern interpretation to quantitatively determine the proportion of crystalline minerals to detection limits of approximately 0.5 to 2 wt. % depending on crystallinity.

Samples will be analyzed at an external laboratory for parameters outlined above unless an onsite laboratory is commissioned and demonstrated the accuracy and precision of results and establish quality assurance and quality control measures.

5.1.3 Quality Assurance and Quality Control

Replicate samples are used to evaluate sample reproducibility and laboratory data accuracy. One replicate sample will be collected for every 10 primary samples collected. Rock samples are inherently heterogeneous, and care must be taken to collect representative samples. Collection of replicate samples follows the same procedure used for the collection of primary samples. A standard operating procedure for rock sample collection will be developed in the future, prior to the start of the Project.

Reproducibility of data is evaluated using relative percent difference (RPD) calculations for samples with concentrations greater than five times the laboratory method detection limit (MDL).

$$\mathrm{RPD} = \frac{\mathrm{Abs}(C_1 - C_2)}{0.5 * (C_1 + C_2)} * 100$$

Where Abs is the absolute value, C_1 is the concentration in the primary sample, and C_2 is the concentration in the replicate sample.

Replicate results for rock samples are considered reproducible if RPD values are less than 50%. For concentrations greater than five times MDL, RPD values greater than 50% may indicate heterogeneity or sample collection or laboratory accuracy issues. Replicate data will be reviewed by a qualified professional to evaluate reproducibility.

5.1.4 ARD Screening Criteria

Samples will be considered to have ARD potential and defined as potentially acid generating (PAG) if they meet one of the following criteria:

- neutralization potential ratio (modified Sobek NPR) is less than two; or
- NAG pH is less than 4.5. NAG testing is required for samples with carbonate NP below or near method detection limit.

5.1.5 ML Assessment

Samples will be tested for metal leaching characteristics which will be compared to the preliminary results from the baseline studies (Appendix H of the Impact Statement) following the evaluation below.

- Potentially metal leaching if elemental concentrations are elevated relative to normal distribution. The elemental concentrations will be compared to a threshold of 10 times the average crustal abundance (ACA) following the Guidelines for Metal Leaching and Acid Rock Drainage at Mine Sites in British Columbia (Price 1997).
- Potentially metal leaching if SFE leachate concentrations are elevated relative to PWQO and Canadian Council of Ministers of the Environment (CCME) guidelines. It is noted that these guidelines are selected for screening metal leaching potential and constituents with SFE concentrations exceed PWQO or CCME guideline values do not necessarily indicate that water in contact with exposed waste rock and ore lithologies or tailings will exceed the guideline values for these constituents.

ML characteristics of samples collected during the operational monitoring program will be assessed in addition to the baseline data to refine the metal leaching characteristics of mined materials. The overall findings will be used to validate and implement the material and water management plans, and adjustments will be made, if needed.

5.2 Material Management

5.2.1 Waste Rock

Waste rock will be stored at the Impoundment Facility during excavation as shown in Figure A.2. Based on preliminary characterization data, waste rock is anticipated to be NPAG and acid rock drainage is not anticipated to occur during the LOM. No waste segregation will be conducted. Confirmatory samples will be collected during the construction phase and the first three years of the operations phase and results will be reviewed by a qualified professional to evaluate potential for ML/ARD.

If confirmatory testing indicates waste rock is PAG, the waste rock will be managed independently, and based on recommendations from a qualified professional. Management options for PAG could include encapsulated by NPAG rock at the Impoundment Facility, blended with NPAG rock, or backfilled in the open pit following completion of mining. The median modified Sobek NPR value for the preliminary waste rock samples ranged from 5.8 for gabbro to 146 for dunite lithology, indicating that there is excess NP

available if more PAG material is encountered compared to what is anticipated (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]).

The humidity cell tests results (Appendix H of the Impact Statement [Crawford Geochemistry Characterization] showed that Cr(VI) is mainly generated from ultramafic ore and tailings samples. In contrast, most waste rock composed primarily of mafic rock types such as gabbro, basalt, and metavolcanic typically has Cr(VI) concentrations below detection limits. Mafic rocks are expected to make up 87% of the waste rock produced. The remaining 13% consists of ultramafic rocks (peridotite, dunite, and pyroxenite), which will be co-disposed with other rock types in the Impoundment Facility. The release of Cr(VI) from ultramafic rocks is expected to be limited by the interaction with mafic rock types through adsorption under alkaline pH (Ajouyed et al., 2010). Thus, ultramafic rock will be co-deposited with mafic rock in the Impoundment Facility to facilitate the attenuation of Cr(VI). In addition to metal leaching from waste rock lithologies, nitrogen species originated from the residues of blasting reagents will be released into site contact water, particularly in source water from the waste rock dumps and the open pit. Monitoring nitrogen species in addition to water chemistry parameters in source water will help identify the sources and speciation of nitrogen species in mine waters and develop appropriate additional water management measures to mitigate the potential leaching of metal/metalloid and nitrogen species from the blasted rock at the waste rock dumps and tailings facility into mine contact water.

5.2.1.1 Waste Rock for Construction Materials

During the construction phase, waste rock generated from the East Zone of the Open Pit will be initially available for use as construction materials for haul roads, tailings dam, and other infrastructure. Construction rock will be crushed using a mobile aggregate crusher to produce aggregate. Additional rock required for construction is assumed to be purchased from local quarries. Excess waste rock will be stored temporarily at laydown areas or stockpiled in the Impoundment Facility.

Confirmatory waste rock samples from the PA or aggregate from local quarries will be used to assess the suitability of waste rock for use as construction material, and the assessment will be conducted by a qualified professional. Confirmatory samples will be screened against the criteria identified in Section 5.1.4 to evaluate the potential of the material to develop ARD. Waste rock may be used for construction material if screening criteria indicate it is NPAG as follows:

- If a minimum of three confirmatory samples from a given lithology are below the screening criteria, the material may be used for construction.
- If a sample from a given lithology exceeds the screening criteria, a minimum of 10 samples will be used to determine the median value. If the median values of either modified Sobek NPR or NAG pH meet the screening criteria, the material may be used for construction. The results will be evaluated before the rock can be used for construction.

5.2.1.2 Waste Rock Piles

Excess waste rock will be stockpiled at the Rock Impoundment within the Impoundment Facility to be constructed north of the Open Pit (Figure A.2). Waste rock storage areas shall be rehabilitated to meet physical and chemical stability criteria as required by O. Reg. 35/24. Based on preliminary characterization data, waste rock is anticipated to be NPAG. Thus, waste rock segregation is not necessary and will not be conducted. Where possible, progressive development and reclamation strategies should be adapted. The waste rock pile at the Impoundment Facility should be built out to minimize the footprint as well as contact water runoff from the pile during construction and operations. This measure will help improve overall site water quality and reduce the water quantity that might require treatment. Waste rock used for the outer surface areas of the waste rock pile will be analyzed to confirm that the waste rock has low potential for ARD and suitable for revegetation when covered by topsoil. Additional mitigation measures can be implemented during mine rehabilitation to reduce the potential for ML/ARD during closure, if necessary.

5.2.2 Ore

During operations phase 1 and 2, ore will be stockpiled for processing at a later stage or when ore extraction is temporarily halted during equipment maintenance. Two ore stockpiles will be developed on the east and west sides of the pit (Figure A.2). Based on preliminary characterization data, ore is anticipated to be NPAG and ARD is not likely to occur during the operations phase when the ore is stockpiled for processing.

5.2.3 Pit Walls

Exposed pit wall lithologies are expected to have similar characteristics with waste rock and ore lithologies. Preliminary characterization data showed that these lithologies are anticipated to be NPAG and acid generation is not expected to occur (Appendix H of the Impact Statement [Crawford Geochemistry Characterization]). Additional mitigation measure will be implemented by flooding the pit during the closure phase. Under saturated conditions (submerged in water), sulphide oxidation is significantly reduced as the oxygen diffusion rate in water is several orders of magnitude lower than the diffusion rate in the atmosphere (MEND 2009).

5.2.4 Tailings

Tailings will be deposited in the TMF starting from Year 1 to the end of Year 17 of operations (Figure A.2). The TMF will be located to the south of the Open Pit and has been designed to hold 495 million cubic metres (Mm^3) of tailings covering an area of 2,300 ha. Preliminary characterization data based on four tailings samples showed that tailings is anticipated to be NPAG and acid generation is not expected to occur (Appendix H of the Impact Statement). Tailings of both dunite and peridotite ore lithologies exhibited metal leaching potential. Confirmatory tailings samples will be collected during the first three years of the operations phase and the results will be reviewed by a qualified professional to evaluate potential for ML/ARD of tailings from dunite and peridotite ore lithologies. Tailings classified as NPAG should be placed at the surface towards the end of deposition in Year 17 of operations. A “thickened

tailings cone" deposition method will be applied at the TMF to increase the TMF storage capacity while limiting the perimeter dam height and to allow a steeper beach slope, minimizing exposed tailings at beach areas (Appendix F of the Impact Statement). The TMF will be rehabilitated within five years after the deposition ceases by placing a 0.15 m layer of overburden and/or organic soil, subsequently vegetated to reduce ML potential from the interactions of tailings and runoff (Appendix F of the Impact Statement). Tailings produced during Year 18 of operations until the end of the operations phase will be deposited in the Open Pit. Over the LOM, about 61% of tailings will be deposited in the Open Pit and ultimately covered by water in closure to reduce the potential for ML/ARD (Appendix J of the Impact Statement).

5.2.5 Overburden and Clay

Overburden and clay will be stockpiled at the Sand and Till Impoundment and Clay Impoundment, respectively. Overburden and clay will be used for future reclamation. In addition, clay will be amended with lime to improve stability for use in construction of roads, laydowns, and the Impoundment Facility. Preliminary ML/ARD results showed that clay and most overburden (92%) are NPAG based on modified Sobek NPR values. ARD is not expected to occur in water in contact with overburden and clay materials. Where possible, mineral soil can be layered with organic rich soil to reduce ML potential and improve overall quality of the soil for vegetation growth.

6 Contact Water Monitoring, Testing, and Screening

A contact water monitoring program will be developed and established to verify the prediction that ML/ARD should not occur at the Project site and identify any potential early-stage ML/ARD. The water quality model results showed that constituents of potential concerns include nitrate, nitrite, sulphate, arsenic, chromium (VI), copper, selenium, uranium, vanadium, and zinc for water at the water management ponds and the TMF Northwest Collection Pond. Of those, chromium (VI), arsenic, and nitrate concentrations exceeded more than ten times of the CCME CWQG-FAL and PWQO guidelines (Appendix K of the Impact Statement [Water Quality Assessment]). Temporal changes in the concentrations of these constituents should be assessed annually during operations to identify trends and apply mitigation measures, if needed, to reduce the leaching potential of these constituents. Details of contact water monitoring will be developed prior to the start of the Project and included in the surface water and ground water management and monitoring plans.

The proposed monitoring programs will likely include surface water monitoring at effluent discharges, downstream receivers, water treatment plant inlets and outlets, and reference sites. Sample frequency will be determined during the development of the management and monitoring plans.

Seepage monitoring locations from overburden, waste rock, ore Stockpiles, and the Open Pit will be identified to trace any potential ML/ARD sources before it appears at a discharge location. The current plan is to complete monthly seepage surveys, however a detailed sampling schedule will be developed and incorporated into future updates of this plan when seepage monitoring locations are established during detailed engineering. Testing and screening criteria from early detection of ML/ARD are provided below.

6.1 Laboratory Analysis

In situ measurements of pH, oxidation reduction potential (ORP), temperature, oxidation-reduction potential, dissolved oxygen, turbidity and conductivity will be collected in the field and samples will be collected for the laboratory analysis of the parameters listed in Table 6.1.

Table 6.1 Laboratory Analyses

Parameters	Sample Container	Preservation	Filtration
Physical parameters (pH, conductivity), total hardness, total dissolved solids, total suspended solids, turbidity, alkalinity, acidity and select anions (chloride, fluoride, bromide, and sulphate)	500 mL HDPE plastic	None	None
Nitrate/nitrite/total ammonia/un-ionized ammonia/total nitrogen	100 mL amber glass bottle	Sulfuric acid	Field (0.45 µm filter
Dissolved organic carbon	120 mL amber glass	Sulphuric acid	Field (0.45 µm filter)
Total metals	60 mL HDPE plastic	Nitric acid	None
Dissolved metals	60 mL HDPE plastic	Nitric acid	Field (0.45 µm filter)
Notes: HDPE = high-density polyethylene			

This parameter list will cover the Metal and Diamond Mining Effluent Regulations (MDMER; ECCC 2024) requirements for effluent testing (Appendix B; Table B.1) and a set of relevant parameters with Canadian Water Quality guidelines for Protection of Freshwater Aquatic Life (CWQG-FAL; CCME 2024), PWQO (MOEE 1994), and British Columbia Ministry of Environment and Climate Change Strategy (BC MECCS 2023) for the protection of aquatic life guideline for sulphate (Appendix B; Table B.2) including input values for calculations of site-specific guidelines (pH, temperature, hardness and dissolved organic carbon [DOC]) for linkage with the future surface water and groundwater monitoring plans.

6.2 Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) samples are used to evaluate the effects of sample contamination and/or heterogeneity. One field blank and one replicate sample will be collected for every 10 water quality samples collected. A standard operating procedure for the collection of contact water samples will be developed in the future prior to the start of the Project.

Replicate results for water samples are considered reproducible if RPD values are less than 20%. For concentrations greater than five times MDL, RPD values greater than 20% indicate potential data collection issues and values greater than 50% indicate definite issues. Sample contamination and heterogeneity are the most likely causes of poor reproducibility (Environment Canada 2005).

Field blanks are used to evaluate potential sample contamination. Concentrations in field blanks should be less than MDL. Common sources of sample contamination include sample collection equipment (e.g., filtration equipment), blowing dust, and PPE (e.g., nitrile gloves).

6.3 Water Quality Screening Criteria

Screening Criteria proposed for contact water samples is presented in Appendix B (Table B.1). Contact water sample results from the laboratory analyses described above will be screened against a value that is 75% of the maximum authorized monthly mean concentration for parameters included in Schedule 4 of the MDMER. In addition to the screening criteria presented in Appendix B (Table B.1), effluent samples from each final discharge point will be tested for acute lethality in accordance with the MDMER.

7 Records and Reporting

7.1 Inventory and Materials Tracking

A materials inventory and tracking system is required for the control of ML/ARD. Excavated material will be tracked using truck counts and an annual summary will be maintained. An example of data to be included in the annual summary is presented in Table 7.1. Detailed inventory and tracking procedures will be developed during detailed engineering and included in future iterations of the plan.

Table 7.1 Materials Inventory Tracking

Pit Phase ID	Bench ID	Blast ID	Blasted to Elevation (m)	Blasted Depth (m)	Blasted Volume (m^3)	Lithology	Sample ID	Sample Collection Date	Material Type (m^3)		Destination (m^3) Notes				Notes
									WRCS	WRST	Haul Roads	TMF	Impoundment	Other	

Notes:
WRCS = Waste rock that is suitable for construction
WRST = Waste rock that does not meet criteria for use as construction materials as indicated in Section 5.2.1 and will be stored at Impoundment Facility

7.2 Reporting

Reporting procedures and documents associated with the ML/ARD MP will be developed to comply with the conditions of release from the provincial and federal environmental assessment processes and permitting requirements (e.g., annual reports requirements).

7.3 Plan Revisions

This Conceptual ML/ARD MP is a living document and will be reviewed and updated by a qualified professional as follows:

- following detailed engineering
- at a minimum, annually during construction and operations
- following changes in the mine plan that may influence ML/ARD prediction
- as required, based on additional laboratory and/or field data that could potentially change the ML/ARD predictions or management protocols provided in this MP.
- results of monitoring programs that require a change or adaptation of the management approach(es) that are described in this document.

Updates or proposed changes to this plan will be submitted to the applicable regulatory authorities for approval, as necessary. Initiation of revisions and revision tracking (e.g., revision history log) will be developed in future iterations of the document.

All ML/ARD MP holders may initiate revisions by forwarding proposed revisions to the Environmental Department. The following information will be provided on the Revision Request Form for all revision requests:

- section to be revised
- nature of the revision
- rationale for the revision (e.g., environment/worker safety)
- name of the revision requestor

Approval for revisions will be required from Canada Nickel. When the Environmental Department approves a revision request, details of the revision will be distributed to all ML/ARD MP holders and will be documented in a revision history log. Each revision will be accompanied by:

- revision instructions
- list of sections being superseded
- an updated Table of Contents indicating the status of each section in the ML/ARD MP
- when ML/ARD MP holders receive a revision, they will, in a timely manner:
  - read the text of the revision

- check the control sheet to confirm that all the listed pages have been received
- remove and destroy the superseded pages from their copy of the ML/ARD MP
- insert the revised pages in the proper place in their copy of the ML/ARD MP
- page check the ML/ARD MP, using the updated table of contents to confirm the ML/ARD MP is complete and current
- enter the revision number and date entered on the revision history log
- incorporate the revision into the area of responsibility, as applicable
- confirm that personnel in their purview are informed of and familiar with the revisions

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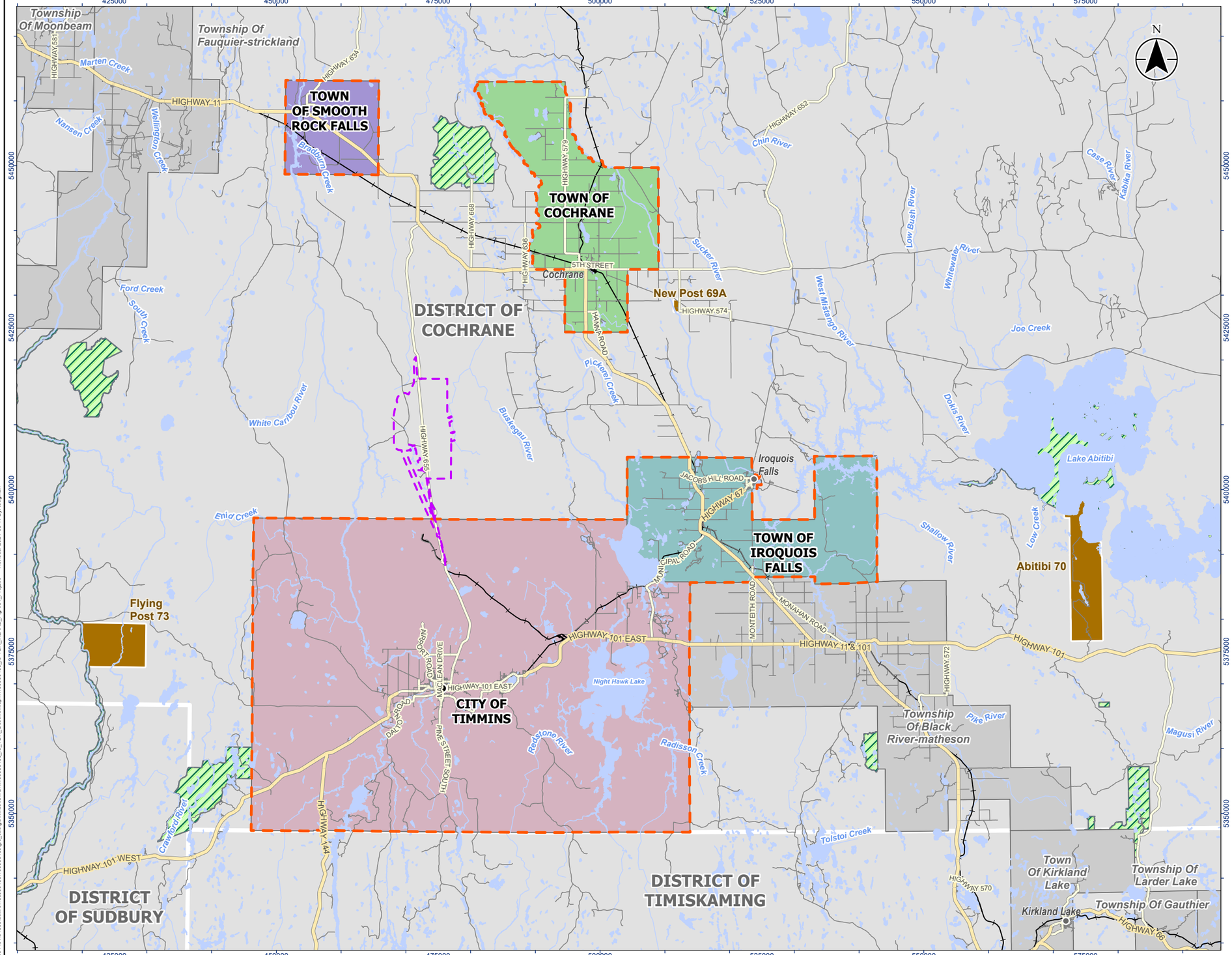
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Appendices

Appendix A Figures



Stantec

Legend

- Project Area
- Local/Regional Study Area
- Railway
- Expressway / Highway
- Major Road
- Minor Road
- Watercourse
- First Nation Reserve
- Provincial Park
- Waterbody

0 10 20 km

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Notes

1. Coordinate System:NAD 1983 UTM Zone 17N
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Project Location
Timmins, Ontario

160930456 REVA
Prepared by tcoghlan on 2024-09-11

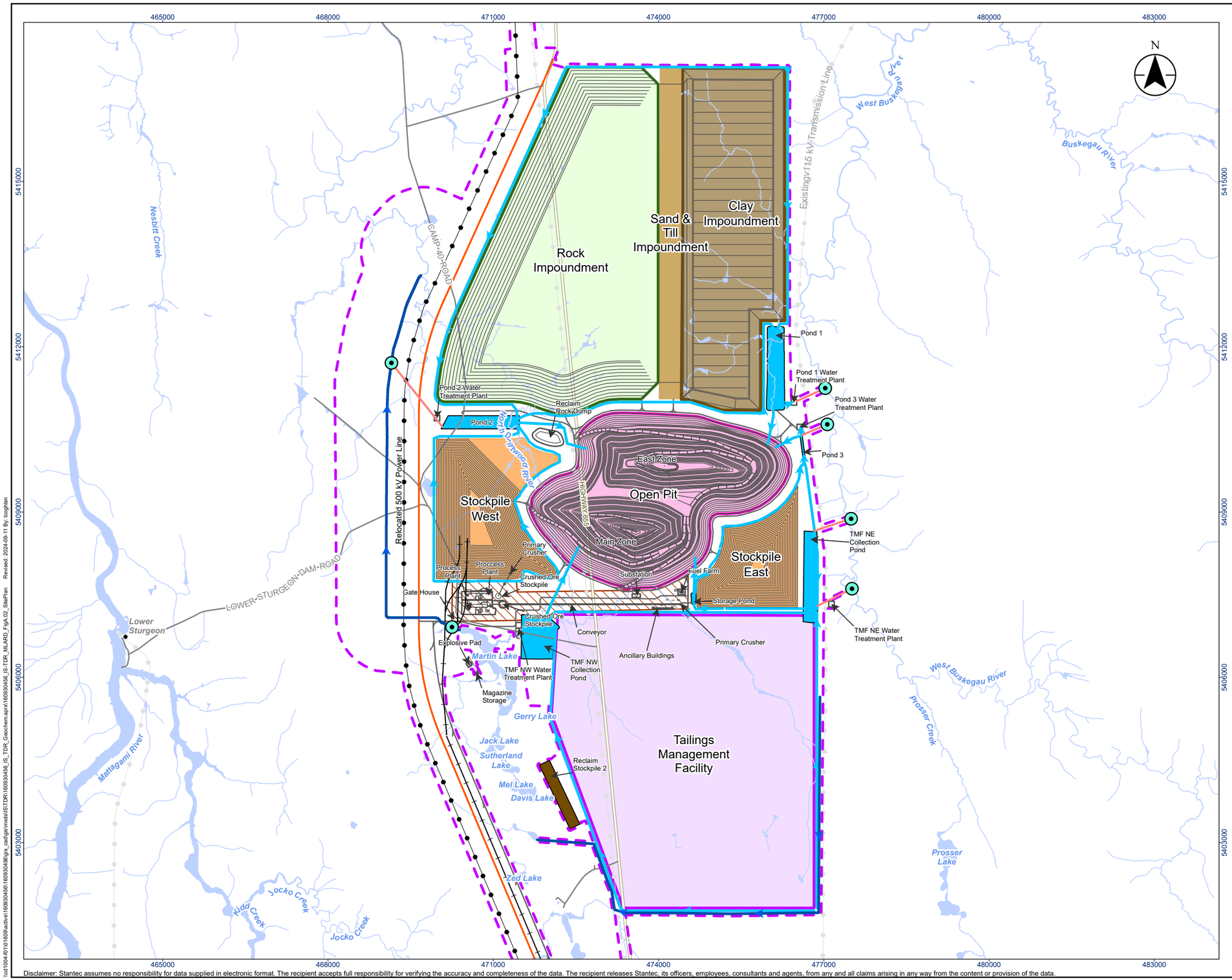
Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
A.1

Title
Project Area

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Stantec

CANADA NICKEL COMPANY

Legend

- Project Area

Base Features

- Major Road
- Minor Road
- Existing Transmission Line
- Watercourse
- Waterbody

Ancillary Infrastructure

- Relocated Hwy 655
- Rail Spur Line
- Transmission Line

Proposed Project Components

- Discharge Route
- Non-Contact Water Channel
- Contact Water Channel
- Site Road
- Discharge Location
- Ore Stockpile
- Open Pit
- Clay Impoundment
- Pond
- Tailings Management Facility
- Rock Impoundment
- Reclaim Stockpile
- Sand & Till Impoundment
- Process Plant Area

0 1 2 km

1:70,000 (At original document size of 11x17)

Notes

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Project Location
Timmins, Ontario

160930456 REVA
Prepared by tcoghlan on 2024-09-11

Client/Project
Canada Nickel Company (CNC)
Crawford Nickel Project

Figure No.
A.2

Title
Project Site Plan - Mine Site

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Appendix B Surface Water and Contact Water Screening Guidelines

Table B.1 MDMER Discharge Limits and Screening Criteria (75% of MDMER) for Contact Water

Parameters	Unit	Maximum Authorized Concentration in a Grab Sample	Screening Criteria (75% of MDMER)
Un-ionized Ammonia (as N)	mg/L	1	0.75
Arsenic (Total)	mg/L	0.2	0.15
Copper (Total)	mg/L	0.2	0.15
Nickel (Total)	mg/L	0.5	0.375
Lead (Total)	mg/L	0.16	0.12
Zinc (Total)	mg/L	0.8	0.6
Radium 226	Bq/L	1.11	0.83
Suspended Solids	mg/L	30	22.5
Notes: Cyanide is not included as one of the screening criteria because cyanide is not used at the Project site.			

Table B.2 Surface Water Quality Screening Criteria

Parameter	Units	Reportable Detection Limit (RDL)	CCME CWQG-FAL Guidelines		Provincial Water Quality Objectives
			Short-term	Long-term	
Field pH	-	0	-	6.5 – 9	6.5 – 8.5
Field Temperature	°C	-5	-	-	-
Field Dissolved Oxygen (DO)	mg/L	0	-	Narrative [l]	Table [u]
Field conductivity	µS/cm	0	-	-	-
Alkalinity	mg/L as $CaCO_3$	2	-	-	-
Colour	TCU	5	-	-	-
Dissolved organic carbon	mg/L	1	-	-	-
Total Hardness (as $CaCO_3$)	mg/L	0.1	-	-	-
Ammonia (as N)	mg/L	0.005	-	Table [d]	
Calculated un-ionized ammonia (as N)	mg/L	NA		0.016	0.0165
Nitrate (as N)	mg/L	0.02	124	3	-
Nitrite (as N)	mg/L	0.01	-	0.06	-
Total Nitrogen (as N)	mg/L	1	-	-	-
Total Phosphorus (as P)	mg/L	0.002	-	Guidance Framework [k]	Guidance [w]
Sulphate	mg/L	0.3	-	Table [m] (BC MECCS guideline)	
Chloride	mg/L	0.2	640	120	-

Parameter		Units	Reportable Detection Limit (RDL)	CCME CWQG-FAL Guidelines		Provincial Water Quality Objectives
				Short-term	Long-term	
Oil and Grease, Total		mg/L	1	-	-	-
Total Suspended Solids		mg/L	0.67	-	Narrative [c]	
Total Dissolved Solids		mg/L	10	-	-	-
Radium 226		Bq/L	0.005	-	-	1
Chrysotile Asbestos		MFL	0.20	-	-	-
Fluoride		mg/L	0.06	-	0.12	-
Dissolved Phosphorus		mg/L	0.05	-	-	-
Cyanide	Free	mg/L	0.001		0.005	0.005
	Total	mg/L	0.002	-	-	-
	Weak Acid Dissociable Cyanide	mg/L	0.001	-	-	-
Methyl Mercury	D	ng/L	0.02	-	-	-
	T	ng/L	0.02	-	4	
Mercury	D	ng/L	0.01	-	-	200
	T	ng/L	0.01	-	26	-
Aluminum	D	µg/L	1		Narrative [e]	Narrative [p]
	T	µg/L	1	-	-	-
Antimony	D	µg/L	0.1	-	-	-
	T	µg/L	0.1	-	-	20
Arsenic	D	µg/L	0.1	-	-	-
	T	µg/L	0.1	-	5	5
Barium	D	µg/L	0.1	-	-	-
	T	µg/L	0.1	-	-	-
Beryllium	D	µg/L	0.02	-	-	-
	T	µg/L	0.02	-	-	Table [r]
Bismuth	D	µg/L	0.05	-	-	-
	T	µg/L	0.05	-	-	-
Boron	D	µg/L	2	-	-	-
	T	µg/L	2	29000	1500	200
Cadmium	D	µg/L	0.005	-	-	-
	T	µg/L	0.005	Equation [f]	Equation [g]	Table [s]
Calcium	D	µg/L	50	-	-	-
	T	µg/L	50	-	-	-
Cerium	D	µg/L	1	-	-	-
	T	µg/L	1	-	-	-

Parameter		Units	Reportable Detection Limit (RDL)	CCME CWQG-FAL Guidelines		Provincial Water Quality Objectives
				Short-term	Long-term	
Cesium	D	µg/L	0.01	-	-	-
	T	µg/L	0.01	-	-	-
Chromium	D	µg/L	0.1	-	-	-
	T	µg/L	0.1	-	-	-
	Chromium III	µg/L	0.1		(III) – 8.9;	8.9
	Chromium VI	µg/L	0.1		(VI) – 1 [h]	1
Cobalt	D	µg/L	0.1	-	-	-
	T	µg/L	0.1	-	-	0.9
Copper	D	µg/L	0.2	-	-	-
	T	µg/L	0.2		Equation [n]	Table [t]
Europium	D	µg/L	1	-	-	-
	T	µg/L	1	-	-	-
Gallium	D	µg/L	1	-	-	-
	T	µg/L	1	-	-	-
Iron	D	µg/L	10	-	-	-
	T	µg/L	10	-	300	300
Lanthanum	D	µg/L	1	-	-	-
	T	µg/L	1	-	-	-
Lead	D	µg/L	0.05	-	-	-
	T	µg/L	0.05		Equation [o]	Narrative [v]
Lithium	D	µg/L	1	-	-	-
	T	µg/L	1	-	-	-
Magnesium	D	µg/L	4	-	-	-
	T	µg/L	4	-	-	-
Manganese	D	µg/L	0.1	Equation [i]	Variable [j]	-
	T	µg/L	0.1	-	-	-
Molybdenum	D	µg/L	0.05	-	-	-
	T	µg/L	0.05	-	-	-
Nickel	D	µg/L	0.5	-	-	-
	T	µg/L	0.5	-	Equation [a]	25
Niobium	D	µg/L	1	-	-	-
	T	µg/L	1	-	-	-
Potassium	D	µg/L	50	-	-	-
	T	µg/L	50	-	-	-
Rhodium	D	µg/L	1	-	-	-
	T	µg/L	1	-	-	-

Parameter		Units	Reportable Detection Limit (RDL)	CCME CWQG-FAL Guidelines		Provincial Water Quality Objectives
				Short-term	Long-term	
Rubidium	D	µg/L	0.2	-	-	-
	T	µg/L	0.2	-	-	-
Scandium	D	µg/L	1	-	-	-
	T	µg/L	1	-	-	-
Selenium	D	µg/L	0.05	-	-	-
	T	µg/L	0.05	-	1	100
Silicon	D	µg/L	50	-	-	-
	T	µg/L	50	-	-	-
Silver	D	µg/L	0.01	-	-	-
	T	µg/L	0.01	-	0.25	0.1
Sodium	D	µg/L	50	-	-	-
	T	µg/L	50	-	-	-
Strontium	D	µg/L	0.2	-	-	-
	T	µg/L	0.2	-	-	-
Sulphur	D	µg/L	500	-	-	-
	T	µg/L	500	-	-	-
Tellurium	D	µg/L	0.2	-	-	-
	T	µg/L	0.2	-	-	-
Thallium	D	µg/L	0.01	-	-	-
	T	µg/L	0.01	-	0.8	0.3
Thorium	D	µg/L	0.1	-	-	-
	T	µg/L	0.1	-	-	-
Tin	D	µg/L	0.1	-	-	-
	T	µg/L	0.1	-	-	-
Titanium	D	µg/L	0.3	-	-	-
	T	µg/L	0.3	-	-	-
Tungsten	D	µg/L	0.1	-	-	-
	T	µg/L	0.1	-	-	30
Uranium	D	µg/L	0.01	-	-	-
	T	µg/L	0.01	33	15	5
Vanadium	D	µg/L	0.5	-	-	-
	T	µg/L	0.5	-	-	6
Yttrium	T	µg/L	1	-	-	-
	D	µg/L	1	-	-	-
Zinc	D	µg/L	1	Narrative [b]	Narrative [b]	-
	T	µg/L	1	-	-	20

Parameter		Units	Reportable Detection Limit (RDL)	CCME CWQG-FAL Guidelines		Provincial Water Quality Objectives
				Short-term	Long-term	
Zirconium	D	µg/L	0.2	-	-	-
	T	µg/L	0.2	-	-	4

Notes:

NA - not applicable, T – total, D - dissolved

a) Ni equation: Hardness ≤60 mg calcium carbonate ($CaCO_3$)·L^{-1}, CWQG-FAL is 0.025 mg/L, Hardness >60 to ≤180 mg $CaCO_3$·L^{-1} use equation $e^{\{0.76[\ln(\text{hardness})]+1.06\}}$, Hardness >180 mg $CaCO_3$·L^{-1}, CWQG-FAL is 0.15 mg/L

b) Zn (dissolved) equation: short-term = exp(0.833[ln(hardness mg·L^{-1})] + 0.240[ln(DOC mg·L^{-1})] + 0.526 for hardness 13.8 and 250.5 mg $CaCO_3$·L^{-1} & DOC 0.3 and 17.3 mg·L−1, long-term = exp(0.947[ln(hardness mg·L^{-1})] - 0.815[pH] + 0.398[ln(DOC mg·L^{-1})] + 4.625) for hardness 23.4 and 399 mg $CaCO_3$·L−1, pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg·L−1

c) TSS narrative “clear flow: Maximum increase of 25 mg/L from background levels for any short-term exposure (e.g., 24-h period). Maximum average increase of 5 mg/L from background levels for longer term exposures (e.g., inputs lasting between 24 h and 30 d).”

d) Total Ammonia as N table is temperature and pH dependent. Measurements of total ammonia in the aquatic environment are often expressed as mg/L total ammonia-N. The present guideline values (mg/L NH_3) can be converted to mg/L total ammonia-N by multiplying the corresponding guideline value by 0.8224. Consult the CWQG-FAL factsheet for specific table.

e) Al CWQG = 5 µg/L if pH <6.5, 100 µg/L if pH ≥6.5

f) Cd short-term: 0.11 µg/L if hardness 0 to <5.3 mg $CaCO_3$·L^{-1}, 10{1.016(log[hardness]) – 1.71 } if hardness ≥5.3 mg $CaCO_3$·L^{-1} to ≤360 mg $CaCO_3$·L-1, 7.7 µg/L if hardness >360 mg $CaCO_3$·L^{-1}

g) Cd long-term: 0.04 µg/L if hardness 0 to <17 mg $CaCO_3$·L^{-1}, 10{0.83(log[hardness]) – 2.46} if hardness ≥17 to ≤280 mg $CaCO_3$·L^{-1}, 0.37 µg/L if hardness >280 mg $CaCO_3$·L^{-1}

h) Chromium, trivalent (Cr(III)) = 8.9 µg/L; Chromium, hexavalent (Cr(VI)) = 1 ug/L; Chromium, total = no guideline

i) Mn (dissolved) short-term: benchmark calculator in Appendix B of Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese

j) Mn (dissolved) long-term: CWQG calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese.

k) TP narrative = Trigger Ranges for Total Phosphorus (mg/L) (see Guidance Framework for Phosphorus factsheet): ultra-oligotrophic <0.004, oligotrophic 0.004-0.01, mesotrophic 0.01-0.02, meso-eutrophic 0.02-0.035, eutrophic 0.035-0.1, hyper-eutrophic >0.1.

l) DO Narrative = Lowest acceptable DO concentrations for the protection of freshwater organisms; 6 mg/L or greater for early life stages of warmwater species, 5.5 mg/L or greater for other life stages of warmwater species, 9.5 mg/L or greater for early life stages of cold-water species, and 6.5 mg/L or greater for other life stages of cold-water species

m) Sulphate guideline value is from British Columbia Ministry of Environment and Climate Change Strategy for the protection of aquatic life (Guideline: 128 mg/L for hardness 0 to 30 mg $CaCO_3$·L^{-1}; 218 mg/L for hardness 31 to 75 mg $CaCO_3$·L^{-1}, 309 mg/L for hardness 76 to 180 mg $CaCO_3$·L^{-1}, 429 mg/L for hardness 181 to 250 mg $CaCO_3$·L^{-1}) (Meays and Nordin 2013)

n) Cu long-term: 2 µg/L if hardness 0 to <82 mg $CaCO_3$·L^{-1}, 0.2*e{0.8545[ln(hardness)]-1.465} if hardness ≥82 to ≤180 mg $CaCO_3$·L^{-1}, 4 µg/L if hardness >180 mg $CaCO_3$·L^{-1}

Notes cont.

o) Pb long-term: 1 µg/L if hardness 0 to <60 mg $CaCO_3 \cdot L^{-1}$, e{1.273[ln(hardness)]-4.705} if hardness ≥60 to ≤180 mg $CaCO_3 \cdot L^{-1}$, 7 µg/L if hardness >180 mg $CaCO_3 \cdot L^{-1}$

p) At pH 4.5 to 5.5 the Interim PWQO is 15 µg/L based on inorganic monomeric aluminum measured in clay-free samples, at pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters representative of that geological area of the Province that are unaffected by man-made inputs and at pH >6.5 to 9.0, the Interim PWQO is 75 µg/L based on total aluminum measured in clay-free samples

q) Beryllium: 0.011 mg/L if hardness is <75 mg $CaCO_3$ L^{-1}, 1.1 mg/L if hardness >75 mg $CaCO_3$ L^{-1}

r) Cadmium: 0.0001 mg/L if hardness is 0 to 100 mg $CaCO_3$ L^{-1}, 0.0005 if hardness is >100 mg $CaCO_3$ L^{-1}

s) Copper: 0.001 mg/L if hardness is 0 to 20 mg $CaCO_3$ L^{-1}, 0.005 mg/L if hardness is .20 mg $CaCO_3$ L^{-1}

t) Dissolved oxygen: Consult PWQO table depending on cold water or warm water fish species present https://www.ontario.ca/page/water-management-policies-guidelines-provincial-water-quality-objectives

u) Lead: 0.001 mg/L if hardness is <30 mg $CaCO_3$ L^{-1}, 0.003 mg/L if hardness is 30 to 80 mg $CaCO_3$ L^{-1}, 0.005 mg/L if hardness is > 80 mg $CaCO_3$ L^{-1}

v) Phosphorus, total (TP): To avoid nuisance concentrations of algae in lakes, average TP concentrations for the ice-free period should not exceed 0.02 mg/L, A high level of protection against aesthetic deterioration will be provided by a TP concentration for the ice-free period of 0.01 mg/L or less. This should apply to all lakes naturally below this value, and excessive plant growth in rivers and streams should be eliminated at a TP concentration below 0.03 mg/L

Attachment GHC-02b-1 Lorax Environmental - IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d

TECHNICAL MEMORANDUM

To:	**Grahame Sterling and Jonathan Cooper (Ausenco)**
From:	**John Dockrey (Lorax)**
Date:	**November 21, 2025**
Subject:	**IACC Comment Responses for SW Qual-04, GCH-02b, GCH-02c, GCH-02d**

1. Introduction

This memorandum has been generated by Lorax Environmental Services Ltd. (Lorax) for Canada Nickel Company (CNC) to support responses to IACC comments on the Crawford Nickel Project Impact Statement. Responses to comments SW-Qual-04, GCH-02b, GCH-02c (partial response) and GCH-02d are provided in the following sections.

2. SW Qual-04 – Sediment Contamination

2.1 Comment

The required information to resolve this comment is stated as follows:

1. *Provide the partition coefficients used for each element presented in Table 3.6 (the Suspended Solid Composition and Contributions to Total Concentrations) and justify their conservativeness. Explain why Cr(VI) is not included in Table 3.6 or provide the information for Cr(VI).*
2. *Clarify water quality predictions by confirming whether the predictions presented in the tables and figures of Section 4 represent total concentrations or dissolved concentrations. If the predictions are dissolved concentrations, explain how the consideration of particulate metal settling ensures a conservative approach. If they are not conservative estimates, update the water quality predictions using total concentration and the comparison against the criteria.*

2.2 Response

Part 1

Suspended solids in collection ponds are expected to originate from disturbance of overburden and blasted rock excavated from the mine pit. The composition of total suspended solids will reflect the elemental composition of this parent material. The relative contribution of overburden versus waste rock and ore will depend on the stage of mine life and material handling practices. However, a significant majority of the material being handled consists of waste rock. Geochemical characterization results show that waste rock and ore tends to have higher trace metal content than overburden (WSP, 2024). Therefore, as a conservative assumption, the average composition of

waste rock and ore was used to infer the metal content of suspended solids in the water quality model.

The partition coefficient (Kd) is a useful parameter for estimating the sorption of dissolved metals onto suspended solids. However, its effect on the overall composition of total suspended solids (TSS) is minimal because the amount of metal sorbed is negligible compared to the bulk mass of solids. As a result, Kd typically does not significantly change the chemical makeup of TSS (U.S. EPA, 2005).

Using Ni as an example, the sorbed concentration (C_s) can be calculated by multiplying the sorption coefficient (Kd) by the dissolved concentration (C_d):

$$C_s = Kd \times C_d$$

For a dissolved Ni concentration of 0.026 mg/L (maximum upper case pond concentration) and the upper-end Kd for Ni of 500 L/kg (ranges from 50 to 500 L/kg as reported in USEPA, 1999), the sorbed concentration would be 13 mg/kg. Considering that the solids component of TSS form mine rock contains approximately 851 mg/kg (Table 3.6 of Appendix K of Project Impact Statement), the influence of sorbed metals calculated using a partition coefficient is negligible. While Kd can estimate sorption to solids, its effect on overall TSS composition is minimal and is not tracked in the water quality model.

Hexavalent chromium is not expected to be an appreciable component of TSS. In geologic material chromium occurs primarily in the trivalent form [Cr(III)] (CCME, 1999), solid-phase Cr(VI) minerals are known to exist but are rare (Motzer, 2004). Any Cr(VI) generated from mine rock oxidation would speciate as an oxyanion (e.g., $HCrO_4^-$ or CrO_4^{2-}) and would be relatively soluble in the alkaline-pH conditions expected in collection ponds (Ajouyed et al., 2010). Partition coefficient (Kd) values for Cr(VI) range from 0.1 to 1 L/kg (USEPA, 1999), much lower than most metal cations (e.g., Ni), reflecting the high mobility and weak sorption potential under alkaline conditions. Using the equation above with the maximum Cr(VI) dissolved concentration (C_d) in pond water quality (0.027 mg/L) and a Kd of 1 L/kg, would result in a sorbed concentration (C_s) of 0.027 mg/kg. Assuming a maximum TSS of 30 mg/L, this sorbed mass of Cr(VI) would contribute 0.00081 µg/L to the total concentrations. This contribution is negligible compared to dissolved concentrations and the CCME guideline concentration of 1 µg/L.

Part 2

The results of the water quality model are discussed in terms of dissolved concentrations in section 4 of Appendix K of the Project Impact Statement. The predicted total concentrations assuming 10ppm, 15ppm and 30ppm TSS are provided for each water management pond in Appendix D.3.

These concentrations are calculated by adding the total concentrations presented in Table 3.6 to the dissolved concentrations predicted at each water management pond.

3. GCH-02b - Geochemical Characterization of Tailings

3.1 Comment

The required information to resolve this comment is as follows:

1. Provide detailed descriptions of the methods used to generate tailings samples for geochemical characterization, including the representativeness of the ore samples used and any treatments applied (including IPT carbonation).
2. Clarify whether additional tailings samples are available to expand the geochemical characterization program. If samples are available, expand the geochemical characterization program to include these samples. Provide a revised water quality model using worst case scenario source terms. Demonstrate how this revised model will inform protective monitoring and water treatment plans.
3. Provide updated assessments of changes to water quality, and effects to fish and fish habitat based on the worst-case scenario model predictions, as appropriate, recognizing the uncertainty associated with limited tailings samples available.

3.2 Response

3.2.1 Part 1 and 2:

In 2021 four samples of tailings were generated using the metallurgical process that CNC expected to be used for ore refinement. These samples include three dunite samples, and one peridotite sample. Two of the dunite samples (CBS-003, CANA-13) and the peridotite sample (CBS-001) were sourced from material in the main zone of the pit, and the third dunite sample (CDS-003) was sourced from the east zone of the pit (WSP, 2024). These samples were used to initiate four humidity cell tests which provided the geochemical loading rates used in source term prediction.

The number of tailings samples available during the assessment of a proposed mine are typically limited due to the resources and effort required for metallurgical testing. However, the variability of the ore body itself can be characterized by examining drill core of ore samples that will form the mill feed. This dataset can then be used to assess the representativeness of tailings. The ABA and metals composition of tailings kinetic test samples are compared to static testing results on ore in Table 1 and Table 2, respectively. In general, the tailings show elevated values of total S and Cr, and notably lower concentrations of Co, Fe, Ni, K and Zn. These differences can partially be accounted for by metallurgical processing which targets the extraction of Co, Fe, Ni and elements associated with their mineral phases (e.g., penlandite [$(Fe, Ni)_9S_8$], hazelwoodite [Ni_3S_2], awaruite

[Ni_3Fe]). Overall, the primary metal leaching mechanism for most metals is oxidation of sulphide minerals. Therefore, owing to their elevated S content the tailings kinetic tests are expected to provide a conservative estimate of geochemical loading rates for source term derivation.

One limitation of the tailings kinetic tests is that the in-process tailings (IPT) carbonation process that is currently being proposed at CNC to capture CO_2 was not incorporated into 2021 metallurgical testing. The IPT carbonation enhances a natural geochemical process where CO_2 reacts with ultramafic magnesium and calcium-bearing silicate or hydroxide minerals to store carbon dioxide in stable mineral forms.

The key reaction in IPT Carbonation involves the highly reactive mineral brucite [$Mg(OH)_2$], which reacts rapidly with aqueous carbonate species (produced through injecting gaseous CO_2 into the tailings slurry) to precipitate carbonate minerals that store CO_2 ($MgCO_3 \cdot xH_2O$). This reaction can be summarized as: $Mg(OH)2+CO2 \rightarrow MgCO3 \cdot xH2O$. The resultant mineral is a hydrated magnesium carbonate called nesquehonite. This transformation effectively locks the greenhouse gas into a solid, environmentally benign mineral form. This is often referred to as mineral carbonation or in-situ mineral sequestration. The tailings at Crawford are rich in brucite which allows for them to store CO_2.

In 2024 additional tailings metallurgical testing was completed at SGS-Lakefield which incorporated the IPT process. These samples were completed in parallel with non-carbonated samples (baseline samples), which provide a point of comparison to demonstrate the influence of the IPT process. The influence of CO_2 injection on process water chemistry was assessed by comparing duplicate samples processed with and without IPT carbonation (Table 1). The results show that the impact on metal concentrations in process water was variable. Parameters which showed a consistent increase of >50% in both tests resulting from IPT treatment included TDS, alkalinity, Ba, Co, Mg, Mo, Ni, Sn and Tl. The increase in alkalinity and Mg concentrations is consistent with the IPT approach of adding CO_2 and dissolving reactive Mg minerals (e.g., brucite) to reprecipitate nesquehonite and other Mg-carbonates. This process may liberate any trace elements associated with brucite and other minerals that could be dissolved by elevated CO_2 concentrations, and precipitate elements that co-precipitate with Mg-carbonates (e.g., Mn). Note that the increased concentration of these parameters did not result in exceedance of PWQO/CCME or MDMER guidelines. In terms of source term predictions, the average of post-IPT process water chemistry shown in this table was incorporated into the mill source term predictions for Base Case and Upper Case scenarios (Section 3.4 of Appendix K). Therefore, the potential for the IPT process to impact process water chemistry is captured by the current water quality model.

Four new tailings samples that have recently been produced and will be analyzed for ABA, elemental analysis, SFE, supernatant water and HCTs, but are not available now as the samples have just been produced and IPT carbonation has not yet been completed.

3.2.2 Part 3:

Water quality model results using Upper Case source terms are provided in response to comment GCH-02d. These source terms incorporate 90th percentile loadings from the existing tailings HCTs and the post-IPT metallurgical supernatant to predict tailings runoff and mill water, respectively.

Table 1:
Acid base accounting and metals analysis for dunite tailings samples compared to statistics on dunite ore samples.

		Dunite Tailings			Dunite Ore Samples (n = 62)				
		CANA-13	**CBS-003**	**CDS-003**	**Max**	**P90**	**P50**	**P10**	**Min**
ABA									
Paste pH	no unit	9.7	9.68	9.82	9.84	9.729	9.52	9.251	8.98
Mod. NP	t CaCO3/1000 t	285	212	251	342	254.7	186	132.8	9.2
Sulphur (total)	%	0.125	0.105	0.091	1.64	0.11	0.04	0.013	0.006
Acid Leachable SO4-S	%	<0.04	0.08	0.1	0.72	0.078	<0.04	<0.04	<0.04
Sulphide	%	0.09	<0.04	<0.04	0.99	0.079	0.04	0.04	0.04
Carbon (total)	%	0.154	0.197	0.142	2.24	0.3417	0.135	0.0971	0.024
Metals									
Arsenic	µg/g	<0.5	<0.5	<0.5	4.9	0.7	<0.5	<0.5	<0.5
Barium	µg/g	0.3	0.45	0.49	110	4	0.955	0.311	0.22
Beryllium	µg/g	<0.02	<0.02	<0.02	0.24	0.039	<0.02	<0.02	<0.02
Cadmium	µg/g	<0.02	<0.02	<0.02	0.07	0.04	<0.02	<0.02	<0.02
Calcium	µg/g	530	380	670	100000	5760	1200	218	71
Chromium	µg/g	1100	1600	2300	4700	2990	1050	376	250
Cobalt	µg/g	70	80	83	200	140	130	110	39
Iron	µg/g	34000	45000	30000	87000	77000	65000	50000	38000
Lead	µg/g	0.17	0.1	0.77	7	0.487	0.24	0.051	0.05
Magnesium	µg/g	280000	250000	260000	280000	250000	240000	210000	63000
Manganese	µg/g	660	910	820	1400	1100	960	716	540
Molybdenum	µg/g	0.2	0.2	0.1	0.4	0.2	0.1	0.1	0.1
Nickel	µg/g	1900	1500	980	3700	3190	2500	2010	120
Potassium	µg/g	39	28	34	13000	177	77.5	35.1	26
Selenium	µg/g	<0.7	<0.7	<0.7	0.7	<0.7	<0.7	<0.1	<0.1
Sodium	µg/g	79	79	62	140	120	63	40	33
Strontium	µg/g	1.2	1.5	1.7	480	22.7	1	0.515	0.26
Thallium	µg/g	<0.02	<0.02	<0.02	0.23	0.03	<0.02	<0.02	<0.02
Uranium	µg/g	0.009	0.004	0.009	0.11	0.0306	0.0105	0.002	0.002
Vanadium	µg/g	11	14	15	100	22	13	6.24	5.6
Yttrium	µg/g	0.56	0.46	0.71	3.8	1.29	0.6	0.24	0.13
Zinc	µg/g	18	20	18	63	56.9	43	30	9.7

Note: values shaded orange are greater than 90th percentile statistics. Value shaded blue are lower than 10th percentile.

Table 2:
Acid base accounting and metals analysis for the peridotite tailings sample compared to statistics on peridotite ore samples.

		Peridotite Tailings	Peridotite Ore (n=33)				
		CBS-001	Max	P90	P50	P10	Min
ABA							
Paste pH	no unit	9.58	9.93	9.788	9.39	9.094	8.9
Mod. NP	t CaCO3/1000 t	99.9	266	147	84	43	12
Sulphur (total)	%	0.025	0.227	0.0744	0.023	0.0074	0.006
Acid Leachable SO4-S	%	<0.04	0.13	0.066	<0.04	<0.04	<0.04
Sulphide	%	<0.04	0.1	0.04	0.04	0.04	0.04
Carbon (total)	%	0.279	5.81	2.982	0.277	0.0602	0.019
Metals							
Arsenic	µg/g	<0.5	27	11.6	<0.5	<0.5	<0.5
Barium	µg/g	2	160	9.8	2.5	0.756	0.51
Beryllium	µg/g	0.048	0.14	0.078	0.03	<0.02	<0.02
Cadmium	µg/g	<0.02	0.07	0.05	<0.02	<0.02	<0.02
Calcium	µg/g	6900	170000	36200	15000	5500	3300
Chromium	µg/g	2000	3700	2820	1500	496	370
Cobalt	µg/g	44	170	140	120	100	43
Iron	µg/g	27000	98000	85800	72000	58000	36000
Lead	µg/g	0.51	0.73	0.514	0.27	0.058	0.05
Magnesium	µg/g	170000	250000	228000	200000	134000	84000
Manganese	µg/g	640	1800	1300	1100	970	770
Molybdenum	µg/g	2.4	1.9	0.1	0.1	0.1	0.1
Nickel	µg/g	520	3300	1980	1300	624	290
Potassium	µg/g	71	1500	402	100	51.8	21
Selenium	µg/g	<0.7	0.8	<0.7	<0.7	<0.1	<0.1
Sodium	µg/g	24	1900	556	110	30	23
Strontium	µg/g	2	850	114	2.7	1	0.69
Thallium	µg/g	<0.02	0.05	0.028	<0.02	<0.02	<0.02
Uranium	µg/g	0.015	0.2	0.038	0.013	0.0026	0.002
Vanadium	µg/g	23	150	57.8	33	18.2	17
Yttrium	µg/g	1.9	14	3.37	2.22	1.375	0.7
Zinc	µg/g	13	76	49.8	35	20.2	14

Note: values shaded orange are greater than 90th percentile statistics. Value shaded blue are lower than 10th percentile.

Table 3:
Comparison of tailings supernatant decant from sample IPT-1 and IPT-2 from before (baseline tailings) and after (IPT tailings) the IPT carbonation process.

Parameter	Unit	CCME/PWQO*	MDMER	IPT 1 Baseline Tailings		IPT 1 IPT Tailings		IPT 2 Baseline Tailings		IPT 2 IPT Tailings	
LIMS				14510-MAY24		14510-MAY24		14510-MAY24		14510-MAY24	
Temp Upon Receipt	°C	-	-	19	---	19	---	19	---	19	---
TSS	mg/L	-	-	14	---	14	---	21	---	17	---
TDS	mg/L	-	-	540	---	1040	---	603	---	1010	---
pH	No unit	6.0-9.0	6.0-9.5	**9.91**	---	**9.74**	---	**9.33**	---	**9.02**	---
Alkalinity	mg/L as $CaCO_3$	-	-	364	---	762	---	519	---	874	---
Conductivity	µS/cm	-	-	798	---	1220	---	945	---	1410	---
Acidity	mg/L as $CaCO_3$	-	-	<2	---	<2	---	<2	---	<2	---
F	mg/L	0.12	-	<0.06	---	<0.06	---	<0.06	---	<0.06	---
Cl	mg/L	120	-	85	---	88	---	67	---	63	---
SO_4	mg/L	218	-	61	---	100	---	36	---	51	---
NO_2	as N mg/L	0.06	-	<0.03	---	<0.03	---	<0.03	---	<0.03	---
NO_3	as N mg/L	2.94	-	0.69	---	<0.06	---	0.08	---	0.52	---
NO_2+NO_3	as N mg/L	-	-	0.69	---	<0.06	---	0.08	---	0.52	---
NH_3+NH_4	as N mg/L	2.7	76	<0.1	---	<0.1	---	<0.1	---	<0.1	---
Thiosalts	as S_2O_3 mg/L	-	-	<10	---	<10	---	<10	---	<10	---
Metals		-	-	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**
Hg	mg/L	0.000026	0.0001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Hardness	mg/L as $CaCO_3$	-	-	507	468	936	919	624	589	1040	1000
Ag	mg/L	0.00025	-	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Al	mg/L	variable**	-	0.029	<0.001	0.028	<0.001	0.093	<0.001	0.069	<0.001
As	mg/L	0.005	0.1	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0003	0.0005	0.0004
Ba	mg/L	-	-	0.00057	0.00058	0.00097	0.00101	0.00234	0.00223	0.0037	0.00365
Bi	mg/L	-	-	0.00003	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Ca	mg/L	-	-	1.36	1.28	1.24	1.24	2.53	1.66	3.32	2.48
Cd	mg/L	0.0001	-	0.000004	<3E-06	0.000003	0.000004	0.000004	0.000007	0.000009	0.000015
Co	mg/L	0.0009	-	0.000786	0.000074	0.00273	0.00169	0.000713	0.00007	0.000624	0.000144
Cr	mg/L	0.001	-	0.0187	0.00173	0.0195	0.0013	0.0323	0.00009	0.0242	0.00041
Cu	mg/L	0.005	0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fe	mg/L	0.3	-	0.158	<0.007	0.159	<0.007	0.328	<0.007	0.246	<0.007
K	mg/L	-	-	3.81	3.72	3.55	3.59	4.69	4.62	4.02	3.88
Li	mg/L	-	-	0.0048	0.0044	0.0097	0.0096	0.0134	0.0128	0.0109	0.011
Mg	mg/L	-	-	122	113	227	222	150	142	251	241
Mn	mg/L	0.29	-	0.00833	0.00007	0.00829	0.00016	0.0884	0.064	0.0371	0.0209
Mo	mg/L	0.073	-	0.0031	0.0026	0.0048	0.0046	0.0073	0.0067	0.011	0.0106
Na	mg/L	-	-	32.2	30.5	35.2	36.2	33	32.2	31.6	31.3
Ni	mg/L	0.025	0.25	0.0181	0.0014	0.0182	0.0023	0.0236	0.0043	0.0219	0.0069
P	mg/L	-	-	0.015	0.012	0.019	0.019	0.017	0.015	0.023	0.02
Pb	mg/L	0.003	0.08	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009	<0.00009
Sb	mg/L	-	-	0.0009	0.001	0.001	0.0011	<0.0009	0.0009	0.0009	0.001
Se	mg/L	0.001	0.005	0.00028	0.00055	0.00043	0.0007	0.0005	0.00058	0.00072	0.00087
Si	mg/L	-	-	1.72	0.21	2.48	0.92	2.62	0.39	2.23	0.56
Sn	mg/L	-	-	0.00009	0.00009	0.00176	0.00182	0.00008	0.00011	0.00088	0.00089
Sr	mg/L	-	-	0.00114	0.00126	0.0014	0.00141	0.00315	0.00265	0.00444	0.00372
Th	mg/L	-	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Ti	mg/L	-	-	0.0015	<0.0001	0.0015	<0.0001	0.0047	<0.0001	0.0036	<0.0001
Tl	mg/L	0.0008	-	0.00001	0.00001	0.000057	0.000056	0.000017	0.000014	0.000062	0.000059
U	mg/L	0.005	-	0.000017	0.000004	0.000003	0.000002	0.000002	0.000006	<2E-06	0.000003
V	mg/L	-	-	0.0002	0.00008	0.00019	0.00007	0.00048	0.00012	0.00035	0.0001
W	mg/L	-	-	0.00041	0.00028	0.00214	0.00205	0.00148	0.00142	0.00205	0.00198
Y	mg/L	-	-	<0.00002	<0.00002	<0.00002	<0.00002	0.00002	<0.00002	0.00002	<0.00002
Zn	mg/L	0.02	0.4	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.

IPT tailings that exceed are 1.5x greater than IPT baseline samples are shaded orange, while IPT tailings that are 0.5x IPT baseline samples are shaded blue.

4. GCH-02c – Geochemical Characterization – ARD/ML Assessment

4.1 Comment

1. Discuss the discrepancy between the modified Sobek NP and CO_3-NP results for overburden and provide a rationale for why these results represent an accurate assessment of the potential for acid rock drainage from overburden.
2. Revise the water quality models (see also GCH-02d) and the ML/ARD management plan to reflect:
    a. The most conservative estimate of NP (CO_3-NP) to manage the waste rock generated at the site. Management of waste rock may include segregation and/or blending of the PAG and NPAG materials to enhance buffering of potential acid drainage that may be produced from the PAG materials.
    b. Contingency measures in relation to the results of ongoing geochemical testing at the site.
3. Develop a comprehensive plan to continue geochemical testing of mine materials for a more accurate assessment of ARD/ML potential and discuss how gaps in the geochemical sampling program will be addressed and results will be incorporated into the ongoing refinements to the water quality model and ML/ARD management plan during provincial permitting relative to project timelines.

4.2 Response

Part 1: Response to be provided by Stantec.

Part 2 (partial response): An Upper Case water quality prediction has been developed as part of response to GCH-02d. The model maintains the assumption that all mine rock and tailings are non-PAG, consistent with the conclusions of WSP, (2024). The Upper Case model does not incorporate any blending or waste management measures that could reduce geochemical loadings.

Part 3: Response to be provided by Stantec.

5. GCH-02d – Water quality model – geochemical characterization inputs

5.1 Comment

1. Revise the water quality model to ensure that all source term inputs are fully supported by the results of the geochemical characterization program. This revision should:
    a. Address the identified discrepancies in the representation of overburden and waste rock, particularly in relation to metal leaching potential and Cr(VI) exceedances.

b. Align the updated model with TISG requirements by presenting base, worst-case, and sensitivity scenarios, alongside a detailed description of all input parameters and assumptions used.

2. Provide a plan to:

   a. Update the Water Quality Model to include kinetic testing data for overburden materials and incorporate realistic Cr(VI) concentrations based on observed exceedances in waste rock and overburden, to inform ongoing refinements to optimize the ARD/ML management plan and inform provincial permitting.

3. Conduct and include a sensitivity analysis to account for imperfect segregation of mine rock types (namely waste rock, overburden, clay), considering the variability in metal leaching potential across different material types. These updates will improve the reliability of the Water Quality Model and ensure it adequately supports the ML/ARD management plan, reducing uncertainties in mine site effluent water quality predictions and enabling more effective mitigation of potential risks to water quality, and fish and fish habitat

5.2 Response

5.2.1 Part 1

Waste Rock

In geologic material chromium occurs primarily in the trivalent form [Cr(III)] (CCME, 1999). Chromium(III) is relatively insoluble at neutral pH and is not affectively oxidized by atmospheric oxygen alone due to kinetic limitations (Stanin, 2004). The primary natural oxidant of Cr(III) is Mn(IV/III)-oxides such as birnessite (CCME, 1999; Oze et al., 2007). Rates of Cr(VI) production are controlled by the solubility and dissolution rates of Cr(III) host minerals, the solution pH, and the accessibility of aqueous Cr(III) to mixed valence Mn(IV/III)-oxides (Oze *et al.,* 2007). Owing to the specific conditions required for natural Cr(VI) formation, its natural occurrence remains uncommon despite the general abundance of Cr(III) in the earth's crust. While not a comprehensive compilation, Oze et al., (2007) provides a brief summary of seven occurrences where geogenic Cr(VI) has been investigated:

1) Spring waters from ultramafic rocks near Cazadero, Ca.
2) Pore waters of serpentine soils in Tehama County, Ca.
3) Groundwaters at ophiolite complex in the La Spezia Province of Italy;
4) Groundwater in the Leon Valley, Mexico, attributed to ultramafic rocks of the Sierra de Guanajuato.

5) Groundwater from mafic alluvial deposits in the Majove Desert, originating from the San Gabriel Mountains which host mafic and ultramafic rocks.
6) Ground water from Aromas Red Sands aquifer associated with an ophiolite complex;
7) Phosphorous amended soils derived from ultramafic rocks in New Caledonia,

The examples summarized in this paper illustrate the link of geogenic Cr(VI) occurrences with ultramafic rock exposures. This observation is consistent with Project humidity cell test results, which found that Cr(VI) generation to be primarily associated with ultramafic ore and tailings samples, while mafic rock types (gabbro, basalt and metavolcanic) composing most waste rock typically show concentrations below the detection limits (Table). These mafic rock types are expected to dominate waste rock production (87%). The remaining 13% of waste rock is composed of ultramafics (peridotite, dunite and pyroxenite) that will be co-disposed with other rock types in the impoundment facility. The release of Cr(VI) from ultramafic rock types will be limited by interaction of pore water with mafic rock types which can attenuate Cr(VI) through sorption owing to the less alkaline pH (Ajouyed et al., 2010). Specific requirements for ultramafic waste rock handling will be defined in the ML/ARD Mine Waste Management Plan. Therefore, the Base Case source term applied the maximum concentration observed in mafic HCT tests (gabbro, basalt, metavolcanic) to the waste impoundment source term of 0.6 ug/L. A sensitivity which considers conservative upscaling of Cr(VI) loading from ultramafic rock types in the impoundment is completed using 90th percentile HCT rates in the Upper Case sensitivity.

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Table 4:
Hexavalent chromium concentration statistics from humidity cell tests (HCTs).

Lithology		Basalt				Gabbro			Metavolcanic
HCT		CR21-GT-03 300-310	CR21-GT-07 510-520	CR21-GT-09B 490-500	CR22-GT-11 300-310	P1-Gab-EZ-1	CR20-41 365-375	CR21-GT-04B 350-360	P1-MetV-MZ-4
Material Type	Units	Waste Rock	Waste Rock	Waste Rock	Waste Rock	Waste Rock	Waste Rock	Waste Rock	Waste Rock
Max	µg/L	0.3	0.6	<0.2	<0.2	0.4	0.5	0.5	0.4
p90	µg/L	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	0.3	0.3
p75	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2
Median	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p25	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p10	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
min	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Measurements	n	28	28	28	28	10	28	28	10
Lithology		Dunite			Peridotite		Pyroxenite		
HCT		P1-Dun-MZ-7	CR21-146 510-520	CR22-193A 200-210	P1-Per-EZ-2	CR20-34 555-565	CR20-78 100-110	P1-Pyr-MZ-1	
Material Type	Units	Ore	Ore	Ore	Waste Rock	Waste Rock	Waste Rock	Waste Rock	
Max	µg/L	0.3	1.6	7.1	1.0	2.1	1.0	0.9	
p90	µg/L	0.2	0.7	3.9	0.4	0.9	0.2	0.7	
p75	µg/L	<0.2	0.5	2.9	0.3	0.4	<0.2	0.4	
Median	µg/L	<0.2	0.2	2.4	<0.2	<0.2	<0.2	0.3	
p25	µg/L	<0.2	<0.2	1.2	<0.2	<0.2	<0.2	<0.2	
p10	µg/L	<0.2	<0.2	0.9	<0.2	<0.2	<0.2	<0.2	
min	µg/L	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	
Measurements	n	10	28	28	29	28	28	29	
Lithology		Dunite	Dunite	Dunite	Peridotite				
HCT		CANA-13	CBS-003	CDS-003	CBS-001				
Material Type	Units	Tailings	Tailings	Tailings	Tailings				
Max	µg/L	11	3.9	5.8	8				
p90	µg/L	7.2	3.2	3.9	1.9				
p75	µg/L	5.1	2.4	2.3	1.6				
Median	µg/L	2.5	1.7	1.1	1.0				
p25	µg/L	1.2	0.6	0.7	0.7				
p10	µg/L	0.4	<0.2	0.5	0.6				
min	µg/L	<0.2	<0.2	0.4	0.5				
Measurements	n	41	41	41	42				

Values that are above CCME guideline for hexavalent chromium of 1 µg/L are highlighted red.

Overburden

Overburden at the project is composed of glacial till containing a heterogenous mix of clay, silt, sand, gravel and boulders deposited by glacial action (Ausenco, 2021). Geochemical testing shows that the overburden ranges from alkaline to mildly-acidic (paste pH of 8.4 to 5.4), and is deplete in Cr content (max = 83 ppm, median = 35.5 ppm, min = 13ppm) relative to average continental abundance (100 ppm) (WSP, 2024). The metal leaching potential of overburden was assessed using shake flask extractions, which included 24 tests on clay and silt samples and 26 tests on organic peat and topsoil material. These samples showed a number of exceedances, notably for Cr(VI) which was above 1 µg/L in most samples. However, these test results are considered unreliable for several reasons:

- The filter integrity was likely compromised by the high clay/fines content of overburden samples. This is a common feature of SFE tests on fine grained overburden samples, and is evidenced by high concentrations of Al and Fe (average of 0.28 and 0.23 mg/L, respectively) which are relatively insoluble under the neutral-pH and aerobic test conditions of the SFEs.
- Elevated concentrations of Al and Fe are known interferences with Cr(VI) analysis by the ion chromatography method (EPA2.18.6/EPA306-A) utilized at SGS (Lee and Kim, 2022).
- The observed behavior of Cr(VI) in SFE leachate were inconsistent with first principles governing metal oxyanion mobility. Specifically, mildly acidic SFE tests yielded Cr(VI) concentrations in comparable concentrations as alkaline SFE tests. Although this outcome is not impossible, it contrasts with the expected Cr(VI) behavior which speciates as an oxyanion and is relatively insoluble under mildly acidic conditions (Fenti *et al.,* 2020).

Due to these concerns a subsequent round of testing on overburden was completed to determine if improved filtering techniques using a 0.2 um high-capacity filter would eliminate the TSS and analytical interference inferred from the first round of test results. The re-analysis results and sample IDs are shown in Table 5, and show that that Cr(VI) concentrations were reduced by 79% to 94% in all samples except test 58211. Sample 58211 is notable as it showed the highest Al and Fe concentrations (1.21 and 0.96 mg/L) which are higher than the first round of testing. Overall, the re-analysis showed a significantly reduced Cr(VI) leaching potential for overburden, and demonstrated that the overburden SFE test Cr(VI) results reported in WSP (2024) overestimate dissolved concentrations. The laboratory report on the SFE re-analysis is provided in Appendix A.

Owing to the low confidence in 2024 overburden SFE tests, Base Case source terms used waste rock HCT loading rates to represent overburden in the waste impoundment. This approach was modified in the Upper Case source terms to incorporate 90th percentile SFE test data from WSP (2024) which is known to be conservative, as per the IACC comment GCH-02d request.

Table 5:
Shake flask extraction results for hexavalent chromium in duplicate overburden samples using 0.45 and 0.2 µm filter.

Sample ID	Overburden Type	Mineral/ Organic	Cr(VI) µg/L	Cr(VI) µg/L	% Diff
			2024 Baseline Study 0.45 um filter	2025 Re-analysis 0.2 um filter	
58215	Clay	Mineral	1.4	0.3	-79%
58212	Clay	Mineral	3.6	<0.2	-94%
167367	Clay	Mineral	4.7	0.4	-91%
58217	Clay	Mineral	1.8	0.2	-89%
167730	Clay	Mineral	4.5	0.4	-91%
167731	Clay	Mineral	2.8	<0.2	-93%
58201	Clay	Mineral	2.5	0.2	-92%
58221	Clay	Mineral	3.3	0.8	-76%
167739	Clay	Mineral	2.1	0.8	-62%
167378	Silt	Mineral	1.7	0.3	-82%
58211	Organic	Organics	1.5	2.8	87%
167729	Organic	Organics	1.6	<0.2	-88%

Humidity Cell Cycles

The humidity cell test cycles used in Base Case source term derivation are shown in Table 3-3 of Appendix K of the Project Impact Statement.

5.2.2 Part 2 and 3

An updated water quality model with upper case source terms has been developed and is provided as an Addendum (Lorax, 2025). The model incorporates the following modifications:

- Humidity cell tests used 90th percentile loading rates calculated from the latest test results.
- Incorporation of hexavalent chromium loading from ultramafic rock types in the impoundment facility using 90th percentile humidity cell loading rates.
- Overburden stored in impoundment facility is represented using shake flask extraction results reported in WSP (2024).
- Mineral solubility controls applied using the 10th percentile pH observed in HCT tests.
- Nitrogen source terms using analogue mine data apply 75th percentile nitrogen loss rates.

A description of model inputs and results is provided in an Lorax (2025).

6. Closure

Please contact the undersigned if you require further information or clarification.

Regards,

LORAX ENVIRONMENTAL SERVICES LTD.

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Attachment GCH-02b-2 Lorax Environmental - Lorax Environmental - Crawford Nickel Project Upper-Case Source Term Sensitivity

TECHNICAL MEMORANDUM

To:	**Mathieu Boucher (Canada Nickel Company), Grahame Sterling and Jonathan Cooper (Ausenco)**	**Date: 23 December 2025**
From:	**John Dockrey and Okan Aygun (Lorax)**	**Project #: A724-1**
Subject:	**Crawford Nickel Project Upper-Case Source Term Sensitivity**	

1. Introduction

The Crawford Nickel Project (The Project), owned by Canadian Nickel Company (CNC), proposes to develop an open pit mine located 42 km north of Timmins, Ontario. The deposit is a greenfield site with no prior history of mining activity. The Project consists of an open pit, two low grade ore stockpiles, two ore processing plants, a waste impoundment, and a tailings management facility (TMF). The current life of mine is 41 years. Mining of the pit would be complete after 30 years, with ore stockpiles milled for the final 11 years of mine life. Economic recovery of value minerals notably Ni as well as Co, Fe and Cr will occur using a combination of flotation and magnetic separation processes followed by in-process tailings carbonation to mineralize CO_2 within the tailings waste stream. Ore will initially be processed at a rate of 60,000 tpd, with a single mill expansion to increase the milling rate to 120,000 tpd in Year 4.5 of operations. The mine waste facilities will be progressively reclaimed during operations, and the pit will be allowed to passively flood with groundwater and surface runoff from the surrounding catchment following the cessation of mining operations.

Lorax Environmental Services Ltd. (Lorax) was retained by CNC to develop a mine site water quality model (WQM) supported by geochemical source terms developed for key mine site components of the Project. The model used Base-Case source terms meant to represent a best estimate of Project water quality for contact and non-contact water and was submitted as Appendix K of 2024 Crawford Nickel Project Environmental Impact Statement (Lorax, 2024).

Review comments from the Impact Assessment Agency of Canada (IACC) requested a water quality model sensitivity with Upper-Case source terms be developed using 90th or 75th percentile geochemical loading rates (Comment GCH-02d). This technical memorandum provides Upper-Case source terms and water quality results in response to this request, which incorporate the following modifications:

- Humidity cell tests used 90th percentile loading rates calculated from the most recent test results.
- Incorporation hexavalent chromium loading from ultramafic rock types in the impoundment facility using 90th percentile humidity cell loading rates.

- Overburden stored in impoundment facility is represented using shake flask extraction results reported in WSP (2024).
- Mineral solubility controls applied using the 10th percentile pH observed in HCT tests
- Nitrogen source terms using analogue mine data apply 75th percentile nitrogen loss rates from blasting residues.

An overview of the water quality model inputs, approach and data sources used in the Upper-Case and Base-Case source terms is provided in Table 1. Other source term assumptions and the overall modelling approach remain unchanged from what was described in Lorax (2024).

Table 1:
Overview of Water Quality Inputs, Approach and Data Sources

Source Term	Approach	Base-Case	Upper-Case
Waste Rock in Impoundment	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
Pit Walls	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
Ore Stockpile	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
Process Area	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
TMF Beach	Mass-based upscaling	Median Humidity Cell Loadings	90th Percentile Humidity Cell Loadings
Overburden	Base-Case – mass base loading Upper-Case- SFE concentrations	Median waste rock HCT Loadings	90th Percentile overburden SFE test results
Process Water	Upscale metallurgical process water using mill water balance	IPT Process Water	IPT Process Water (same as Base-Case)
Background groundwater	Direct application	Baseline monitoring data	Baseline monitoring data (same as Base-Case)
Background surface water	Direct application	Baseline monitoring data	Baseline monitoring data (same as Base-Case)
Nitrogen Species	Nitrogen loss estimate	Median Nitrogen loss estimate from analogue mine	75th Percentile Nitrogen loss estimate from analogue mine

2. Source Term Updates

2.1 Humidity Cell Loading Rates

Geochemical loading rates for ore, tailings and waste rock are calculated from humidity cell tests (HCT). The humidity cell testing program completed for the Crawford Project includes samples

of ore (n=3) waste rock (n=12) and tailings (n=4) (WSP, 2024). At the time of Base-Case model development, there were 19 to 91 cycles (weeks) of test data available. Many of these tests are ongoing, and there are currently 79 to 152 cycles (*i.e.*, weeks) of data are available (**Error! Reference source not found.**).

Humidity cell tests are grouped by material type and lithology, and 90th percentile loading rates are used to calculate Upper-Case loading rates for different mine rock types and tailings (Table 3). These loading rates incorporate all humidity cell test cycles that are currently available. Humidity cell leachate concentrations reported below the method detection limit (DL) are assumed to be 0.5xDL when calculating loading rates. The talc lithology composes 3.8% of the logged lithology at Crawford and has not been characterized by kinetic testing. This is an ultramafic rock type, and is assigned the same HCT loading rate as dunite (the dominant ultramafic rock type) for the purpose of source term calculations.

Table 2:
Humidity Cell Testing Program

Lithology	HCT ID	Material	Date Initiated	Cycles Available
Dunite	CR21-146 510-520	Ore	1-Sep-23	79
	CR22-193A 200-210	Ore	1-Sep-23	79
	P1-Dun-MZ-7	Ore	2-Nov-21	91
	CANA-13	Tailings	5-Apr-22	152
	CBS-003	Tailings	5-Apr-22	152
	CDS-003	Tailings	22-Jun-22	152
Gabbro	CR21-GT-04B 350-360	Waste Rock	1-Sep-23	79
	CR20-41 365-375	Waste Rock	1-Sep-23	79
	P1-Gab-EZ-1	Waste Rock	2-Nov-21	91
Basalt/Metavolcanic	CR21-GT-07 510-520	Waste Rock	1-Sep-23	79
	CR22-GT-11 300-310	Waste Rock	1-Sep-23	79
	CR21-GT-03 300-310	Waste Rock	1-Sep-23	79
	CR21-GT-09B 490-500	Waste Rock	1-Sep-23	79
	P1-MetV-MZ-4	Waste Rock	2-Nov-21	91
Peridotite	CR20-34 555-565	Waste Rock	1-Sep-23	79
	CR20-78 100-110	Waste Rock	1-Sep-23	79
	P1-Per-EZ-2	Waste Rock	2-Nov-21	91
	CBS-001	Tailings	22-Jun-22	141
Pyroxenite	P1-Pyr-MZ-1	Waste Rock	2-Nov-21	91

Table 3:
Humidity cell loading rates applied to Upper-Case source term calculations

Parameter	Dunite Ore	Pyroxenite Waste Rock	Peridotite Waste Rock	Basalt/Metavolcanic Waste Rock	Gabbro Waste Rock	Dunite Tailings	Peridotite Tailings
	mg/kg/month	mg/kg/month	mg/kg/month	mg/kg/month	mg/kg/month	mg/kg/month	mg/kg/month
Sulphate	4.72	1.0	1.62	2.22	1.0	29.2	2.53
Silver	0.0000251	0.000025	0.0000249	0.0000251	0.000025	0.0000247	0.0000228
Aluminum	0.00297	0.0094	0.0059	0.115	0.0308	0.00437	0.000915
Arsenic	0.000465	0.00394	0.000303	0.00523	0.000433	0.000231	0.0000915
Barium	0.00214	0.000672	0.000896	0.00256	0.000307	0.0011	0.0014
Beryllium	0.00000351	0.0000035	0.00000348	0.00000352	0.00000351	0.00000503	0.0000032
Calcium	2.03	3.96	0.989	3.88	1.91	0.374	1.12
Cadmium	0.00000711	0.0000082	0.00000679	0.00000789	0.00000478	0.00000302	0.00000139
Cobalt	0.0000544	0.000041	0.000126	0.000157	0.0000258	0.0000987	0.0000226
Chromium	0.00171	0.00116	0.000407	0.000105	0.000198	0.00422	0.000951
Chromium (VI)	0.00157	0.0007	0.000483	0.000153	0.000228	0.00408	0.000892
Copper	0.000545	0.00073	0.000519	0.000631	0.000533	0.000464	0.000368
Iron	0.00634	0.022	0.00636	0.00605	0.011	0.00919	0.0032
Mercury	0.00000639	0.000005	0.000005	0.00000502	0.00000501	0.00000497	0.00000456
Potassium	0.153	0.307	0.32	2.39	0.692	0.104	0.194
Lithium	0.00609	0.00022	0.000286	0.000306	0.000266	0.000118	0.0000461
Magnesium	39	2.28	11.1	1.42	0.723	37.2	6.68
Manganese	0.000754	0.00188	0.000612	0.00521	0.000807	0.00083	0.000493
Molybdenum	0.00152	0.00169	0.000904	0.0019	0.00123	0.00104	0.000423
Sodium	0.358	0.602	0.269	1.7	0.94	0.747	0.0303
Nickel	0.00118	0.00043	0.00147	0.000327	0.000273	0.00186	0.000472
Lead	0.0000452	0.000045	0.0000448	0.0000464	0.0000466	0.000045	0.0000411
Antimony	0.000451	0.00045	0.000449	0.000907	0.000451	0.000445	0.000411
Selenium	0.000142	0.00009	0.0000596	0.0000998	0.0000567	0.000451	0.0000191
Strontium	0.00648	0.00651	0.00309	0.0194	0.00481	0.00121	0.00149
Thallium	0.00000252	0.0000025	0.0000025	0.00000416	0.00000251	0.00000732	0.00000228
Uranium	0.00232	0.00129	0.00141	0.000723	0.000491	0.00173	0.0000527
Vanadium	0.000041	0.000886	0.0000768	0.00108	0.000754	0.0000298	0.00000974
Zinc	0.001	0.001	0.00133	0.0015	0.001	0.000991	0.000913

2.2 Overburden

Overburden at the project is composed of glacial till containing a heterogenous mix of clay, silt, sand gravel and boulders deposited by glacial action (Ausenco, 2021). No kinetic tests have been completed on overburden samples as part of the baseline characterization program. The metal leaching potential of overburden was assessed through shake flask extractions (SFE), which included 24 tests on non-organic clay and silt material representing overburden that will be stored within the waste impoundment (WSP, 2024).

The Upper-Case source term uses the 90th percentile SFE concentrations to represent water that contacts overburden in the impoundment facility (

Table 4). It is assumed that the amount of infiltration that interacts with overburden is equivalent to the overall proportion of overburden in the impoundment facility (approx. 16%). That is, the concentrations shown in Table 4 are added to 16% of drainage infiltrating the overburden in addition to the load generated from waste rock oxidation represented by HCT tests. In this way, the oxidation of waste rock (as represented by HCT tests) and the influence of overburden is incorporated into the overall impoundment source term.

Recent re-analysis of overburden samples has found that the tests completed in the initial baseline studies likely overestimated water soluble Al, Fe and Cr(VI) owing to the high fines content and associated analytical interference (see comment GCH-02D response). Re-analysis of these tests showed considerably lower Cr(VI) concentrations with median and 90th percentile values of 0.8 µg/L. The Upper-Case source term uses the first round of SFE tests reported in WSP (2024) which showed a much higher 90th percentile Cr(VI) of 3.6 µg/L and is therefore considered highly conservative.

2.3 Nitrogen Losses

Explosives are typically the dominant source of nitrogen (N) compounds (*i.e.,* total ammonia, nitrate and nitrite) in contact waters at mines that use ammonium nitrate (AN) explosives (Pommen, 1983). Source terms for N compounds in Impoundment Facility and Stockpile drainage, and in process water are derived from operational data obtained from an analogue surface mine site described in Lorax (2024). The N loading rate for ore and waste is calculated from median and 75th percentile quality values to be 4.2 and 6.7 g N/t, respectively, and these values are used to calculate the Base-Case and Upper-Case source terms for N species.

Table 4:
90th percentile shake flask extraction results for mineral overburden sample results from WSP (2024)

Parameter	90th Percentile (mg/L)	Parameter	90th Percentile (mg/L)
Sulphate	68	Lithium	0.00824
Silver	<0.00005	Magnesium	6.08
Aluminum	0.267	Manganese	0.00669
Arsenic	0.00586	Molybdenum	0.0161
Barium	0.0291	Sodium	26.4
Beryllium	0.0000205	Nickel	0.00188
Calcium	42.7	Lead	0.000272
Cadmium	0.0000157	Antimony	0.00117
Cobalt	0.000182	Selenium	0.00331
Chromium	0.00418	Strontium	0.331
Chromium (VI)	0.0036	Thallium	0.0000057
Copper	0.01031	Uranium	0.00311
Iron	0.234	Vanadium	0.0114
Mercury	0.000017	Zinc	0.0027
Potassium	5.1		

2.4 Solubility Limits

The Base-Case source term applies the maximum Cr(VI) concentration observed in mafic HCT tests (gabbro, basalt, metavolcanic) to the waste rock term of 0.6 µg/L. The Upper-Case source term assumes conservative upscaling of Cr(VI) loading from ultramafic rock types using 90th percentile HCT rates in the Upper-Case sensitivity. This results in a maximum Cr(VI) impoundment seepage concentration of 7.5 µg/L.

Thermodynamic solubility limits are developed using the United States Geological Survey numerical modelling program PHREEQC coupled to the minteq.v4 database (Parkhurst and Appello, 1999). The speciation pH was decreased from pH 8.3 (median of HCT tests) used in Base-Case source terms, to pH 7.8 (10th percentile of HCT tests) in the Upper-Case scenario to provide conservatism the PHREEQC speciation results.

2.5 Source Term Results

Resulting source term concentrations are presented in Appendix A. Trends for Cr(VI), As and NO_3 in surface runoff are illustrated in Figure 1, and trends for Cr(VI) and As in seepage are shown in Figure 2.

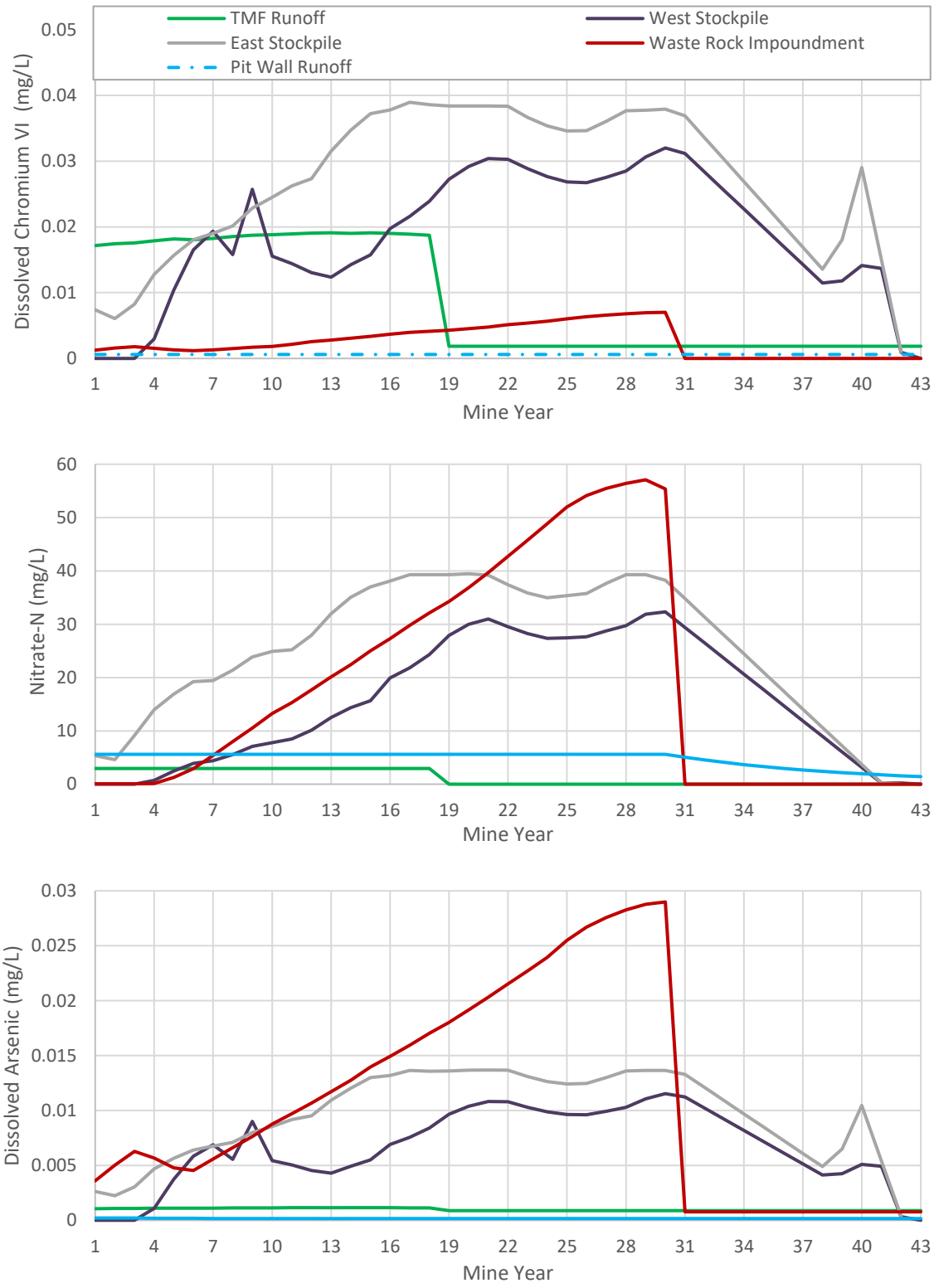


Figure 1: Source term results for dissolved chromium VI (top), nitrate (middle) and arsenic (bottom) in surface runoff from mine facilities.

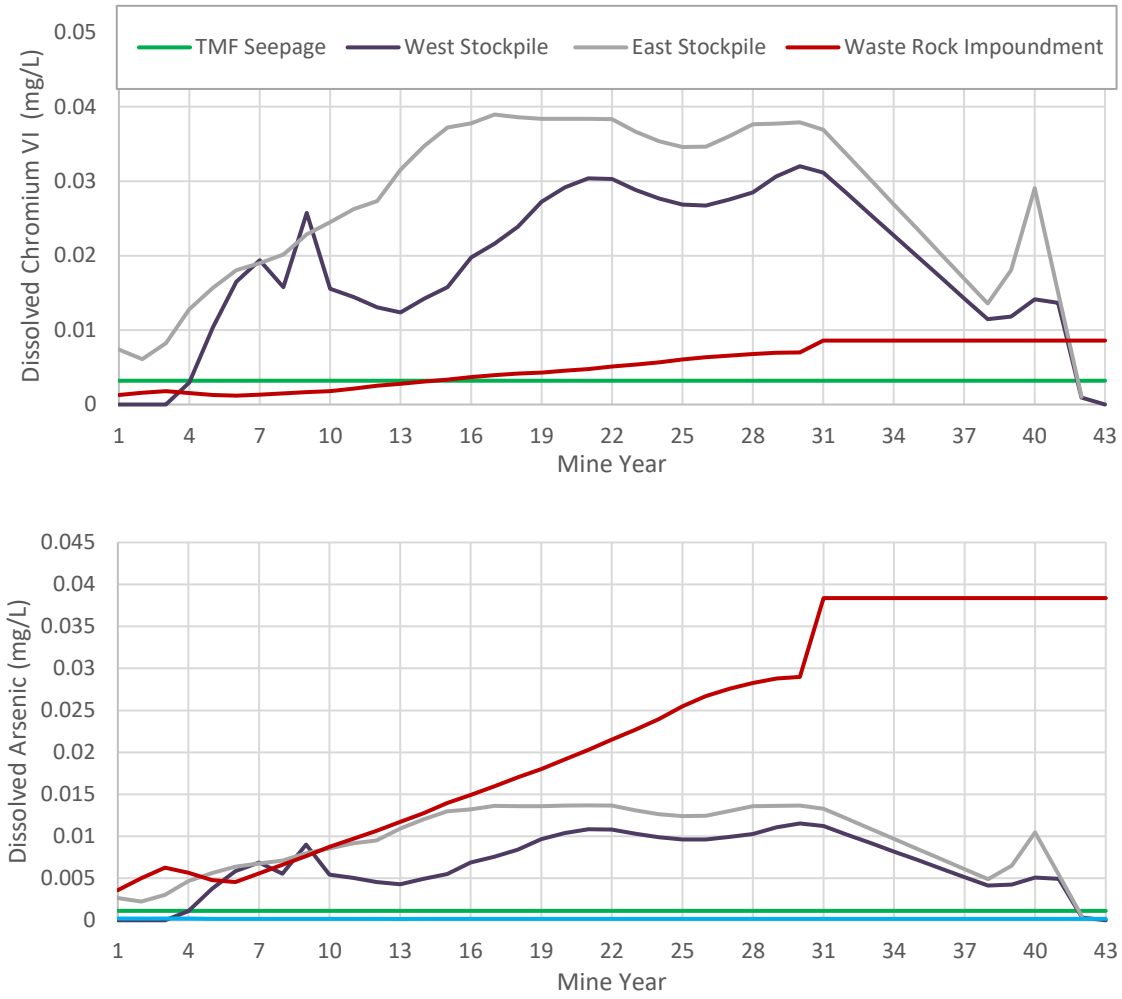


Figure 2: Source term results for dissolved chromium VI (top) and arsenic (bottom) in seepage from mine facilities.

3. Water Quality Model Results

Water quality model results for collection ponds and the mine pit are presented in this section. Model predictions represent monthly mean values, and all constituents are presented as dissolved concentrations in this section. Results for dissolved concentrations are provided in Appendix B along with statistics on total concentrations calculated using a TSS of 10 mg/L, 15 mg/L and 30 mg/L.

Collection Pond and Pit Lake predictions are screened against both end-of-pipe requirements and receiving water quality requirements in this section. The end of pipe requirements are defined by the maximum monthly mean concentrations under Schedule 4 of Metal and Diamond Mining Effluent Regulations (MDMER). The receiving environment criteria are defined using the Ontario Provincial Water Quality Objectives (PWQOs)) or Canadian Council of Ministers of the

Environment's Canadian Water Quality Guidelines for Protection of Freshwater Aquatic Life (CCME CWQG-FAL) when no PWQO exists or the CCME-CWQG-FAL guideline is newer (MOEE 1994; CCME, 2024). Results are only screened against receiving environment water quality for reference, as these criteria do not apply to mine-site water or end-of-pipe discharge. Concentration trends for As, Cr(VI), and NO_3 are plotted in Figure 3 and 4.

3.1 Collection Ponds

Collection Pond water quality model results for dissolved concentrations are screened against guidelines in Table 5 to Table 10 for the Upper-Case scenario. No exceedances of maximum monthly average MDMER end-of-pipe criteria are identified. Parameters are found to exceed CCME/PWQO criteria in all collection ponds. Parameters which are predicted to be in concentrations above receiving environment criteria in Pond 1 (NO_3, NO_2, Cl, SO_4, As, Cd, Co, Cr(VI), Cu, Se, V and Zn), Pond 2 (NO_3, NO_2, Cl, SO4, As, Cd, Co, Cr(VI), Cu, Se, U, V, Zn), Pond 3 (NO_3, NO_2, Cr(VI), Cu, U, Zn), TMF NE Pond (NO_3, NO_2, As, Cd, Co, Cr(VI), Cu, Se, U, V and Zn); and the TMF NW Pond (NO_3, NO_2, As, Cd, Co, Cr(VI), Cu, Se, U, V and Zn). Parameters exceeding 5x are NO_3, NO_2, As, Cr(VI), Cu, U and V. The greatest magnitude exceedances are for NO_3 and Cr(VI), with NO_3 reaching 18x screening guidelines in Pond 1, and Cr(VI) reaching 27x screening guidelines in Pond 3.

Collection Pond water quality model results for total concentrations assuming a TSS of 30 mg/L are screened against guidelines in for the Upper-Case scenario in Table 11 to Table 16. The total concentrations associated with 10, 15 and 30 mg/L TSS are shown in Table 3-6 of Appendix K of the Project Environmental Impact Statement (Lorax, 2024). This elevated TSS level will contribute sufficient Co (0.00219 mg/L), Fe, (1.73 mg/L), Ni (0.0255 mg/L) and Cr(III) (0.026 mg/L) to exceed guidelines in all ponds for total concentrations. Elevated TSS will also meaningfully increase concentrations of Cu (0.00218 mg/L) and V (0.00251 mg/L) relative to there CCME/PWQO screening guidelines of 0.005 mg/L and 0.006 mg/L, respectively. However, this does not result in additional exceedances beyond what was identified by screening dissolved concentrations.

3.2 Pit Lake

Pit lake water quality model results during the flooding period and after the pit is fully flooded are screened against guidelines in Table 17 and Table 18 respectively. During both periods, there are no exceedances of the maximum monthly average MDMER end-of-pipe criteria. Although some parameters are found to exceed CCME/PWQO criteria during the flooding period (Table 17), no exceedances are predicted for the period after the pit is fully flooded (Table 18). The parameters that exceed the receiving environment criteria during the flooding period included NO_3, NO_2, Cl, SO_4, Co, Cr(VI) and Se. These exceedances are limited to <5x CCME/SWQO guidelines. Owing

to the low energy environment and reduced mining disturbances during the active flooding and post-closure period, the dissolved and total concentrations are assumed to be identical (e.g., low to negligible suspended solids).

3.3 Comparison of Base-Case to Upper-Case Results

Upper-Case and Base-Case results are compared in Figure 3 and Figure 4 for collection ponds and the Pit lake, respectively. In general, the water quality trends are similar between the Upper-Case and Base-Case, as both are driven by the mine schedule and water management. The largest increase between Upper-Case and Base-Case predictions is for Cr(VI), where peak concentrations increase from 0.01 to 0.027 mg/L in collection ponds. This is driven by the 90th percentile HCT rates and changes in Cr(VI) loading assumptions in the waste impoundment. A more muted response is observed for As concentrations due to the 90th percentile loading showing a more modest increase over median loading rates compared to Cr(VI) (Figure 3). A number of dissolved concentrations exceeded screening criteria in the Upper-Case but not the Base-Case in Pond 1 (Cl, SO_4, Cd, Cr(VI)), Pond 2 (Cl, SO_4), Pond 3 (Cl, SO_4, Co, As, Co, Cu, Zn), TMF NE Pond (Co, Zn), and the TMF NW Pond (Cd, Co, Cu, Zn,).

The Pit Lakes receive tailings process water at the end of operations that will form the initial pond water. Filling will be completed with groundwater seepage, surface catchment runoff, direct precipitation, and pit wall runoff. The process water source term was based on IPT tailings metallurgical testing, which was applied to both the Base-Case and Upper-Case source terms. Given that this is a dominant source of the initial load in the pit lake, the concentrations trends are generally similar in Base-Case and Upper-Case scenarios. The flooded pit lake did not exceed screening guidelines in the Base-Case and Upper-Case scenario.

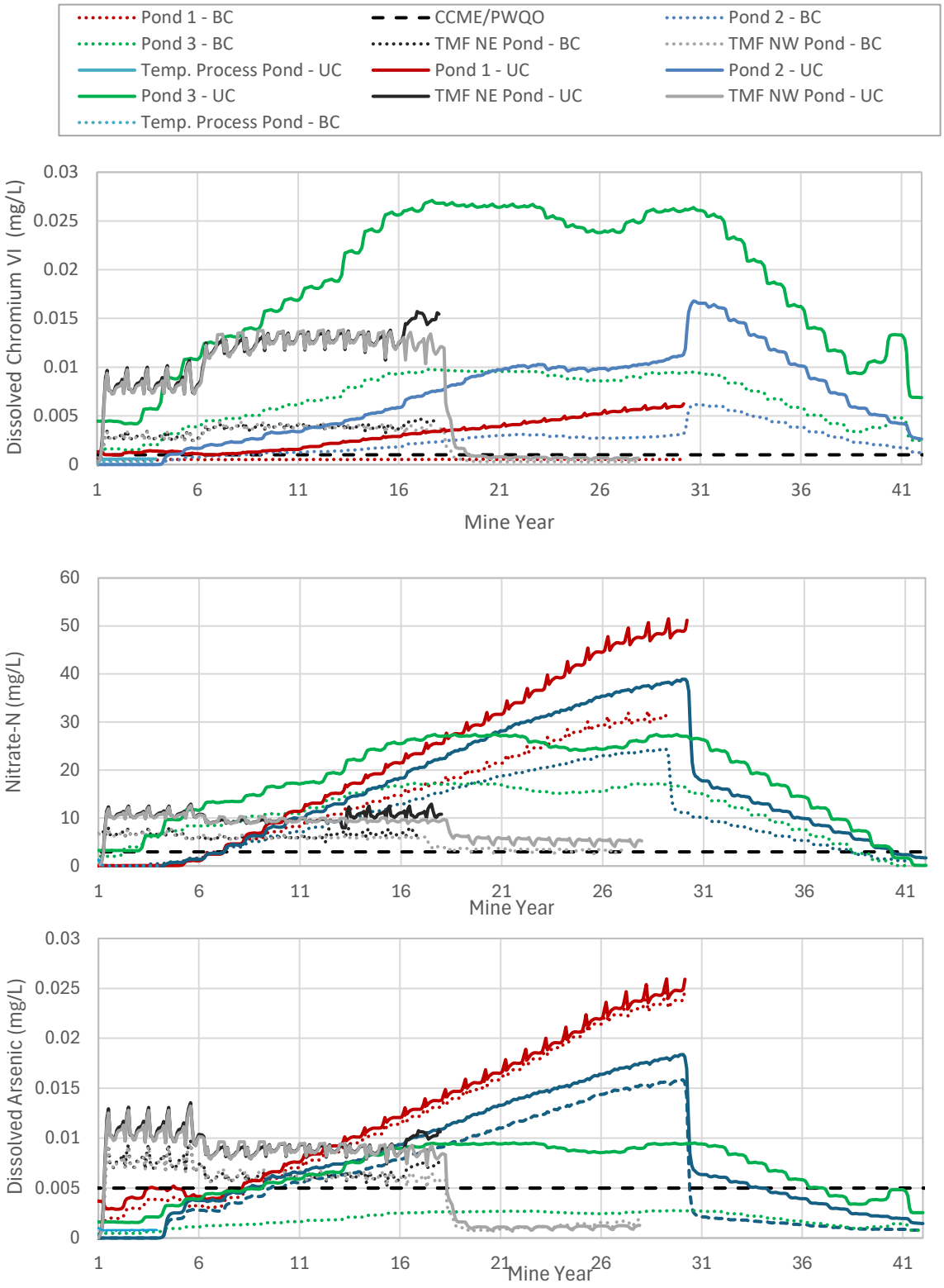


Figure 3: **Water quality model results for Upper-Case (UC) and Base-Case (BC) dissolved chromium VI (top), nitrate (middle) and dissolved arsenic (bottom) in mine water collection ponds compared against receiving environment guidelines (CCME/PWQO).**

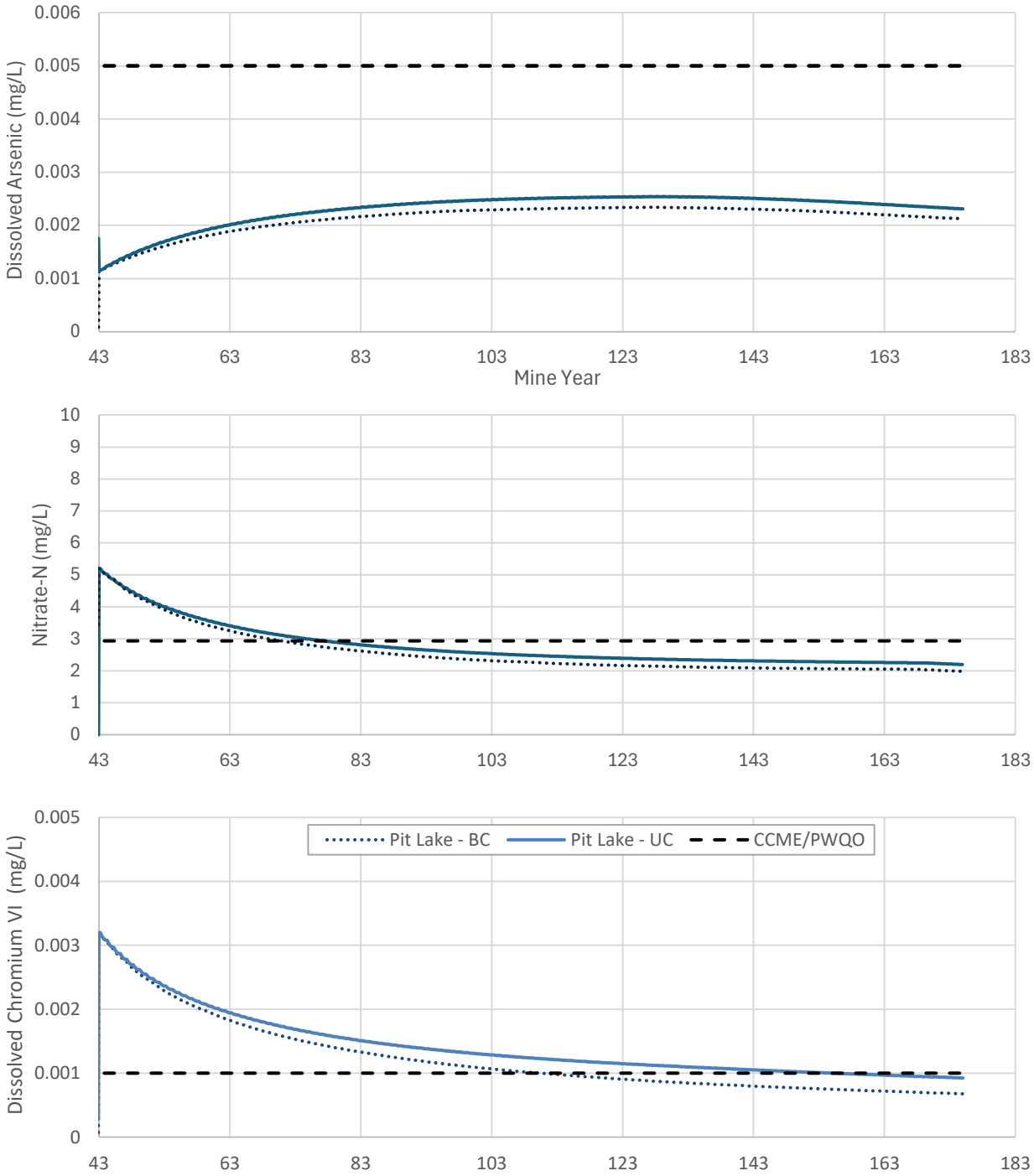


Figure 4: Water quality model results for Upper-Case (UC) and Base-Case (BC) dissolved chromium VI (top), dissolved arsenic (middle) and nitrate (bottom) in closure pit lake compared against receiving environment guidelines (CCME/PWQO).

Table 5:
Water quality results for dissolved concentrations at Collection Pond 1 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.000562	0.00803	0.157	0.338	0.371	2.7	76
Nitrate	mg/L-N	0.0592	0.0768	21.4	46.9	51.5	2.94	-
Nitrite	mg/L-N	0.000419	0.000544	0.151	0.332	0.364	0.06	-
Chloride	mg/L	39.9	52.9	149	155	159	120	-
Sulphate	mg/L	27.4	38.2	132	255	280	218	-
Aluminum	mg/L	0.0485	0.0505	0.0522	0.0543	0.0555	variable**	-
Arsenic	mg/L	0.00287	0.00404	0.0121	0.0235	0.0259	0.005	0.1
Barium	mg/L	0.00502	0.00609	0.0128	0.0206	0.0222	-	-
Calcium	mg/L	20.5	27.1	50	61.7	65.9	-	-
Cadmium	mg/L	0.0000227	0.0000323	0.000112	0.000216	0.000237	0.0001	-
Cobalt	mg/L	0.00017	0.000232	0.000752	0.00144	0.00159	0.0009	-
Chromium III	mg/L	0.000304	0.000447	0.000465	0.000486	0.000499	0.0089	-
Chromium VI	mg/L	0.000982	0.00112	0.00288	0.00558	0.00623	0.001	-
Copper	mg/L	0.00314	0.00437	0.0128	0.0237	0.0259	0.005	0.2
Iron	mg/L	0.0419	0.106	0.11	0.116	0.129	0.3	-
Potassium	mg/L	5.23	7.33	15.2	19	20.2	-	-
Magnesium	mg/L	25.9	30.6	68.5	90.7	98.3	-	-
Manganese	mg/L	0.0228	0.0263	0.0931	0.151	0.16	0.29	-
Molybdenum	mg/L	0.00597	0.00874	0.028	0.0533	0.0582	0.073	-
Sodium	mg/L	9.57	12.6	23.4	28.5	30.3	-	-
Nickel	mg/L	0.00165	0.00236	0.00841	0.0165	0.0182	0.025	0.25
Lead	mg/L	0.000227	0.000317	0.00104	0.00198	0.00217	0.003	0.08
Selenium	mg/L	0.000619	0.00078	0.00174	0.00301	0.00328	0.001	-
Uranium	mg/L	0.00255	0.00369	0.0138	0.0274	0.0301	0.005	-
Vanadium	mg/L	0.00349	0.00521	0.0159	0.0298	0.0324	0.006	-
Zinc	mg/L	0.00425	0.00628	0.0222	0.0429	0.047	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 6:
Water quality results for dissolved concentrations at Collection Pond 2 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.00245	0.194	0.386	0.521	0.742	2.7	76
Nitrate	mg/L-N	0.00685	2.46	14.6	35.7	38.9	2.94	-
Nitrite	mg/L-N	0.000229	0.0421	0.0987	0.246	0.267	0.06	-
Chloride	mg/L	0.566	56.3	125	145	148	120	-
Sulphate	mg/L	0.277	50.9	161	257	280	218	-
Aluminum	mg/L	0.000325	0.013	0.0344	0.0408	0.0432	variable**	-
Arsenic	mg/L	0.0000252	0.00242	0.00691	0.0166	0.0184	0.005	0.1
Barium	mg/L	0.0000358	0.00626	0.0107	0.0166	0.0173	-	-
Calcium	mg/L	0.169	11	35.8	43.7	44.9	-	-
Cadmium	mg/L	0.000000235	0.0000313	0.0000814	0.000168	0.000182	0.0001	-
Cobalt	mg/L	0.0000018	0.00025	0.000675	0.00123	0.00136	0.0009	-
Chromium III	mg/L	0.00000437	0.000324	0.000338	0.000363	0.000438	0.0089	-
Chromium VI	mg/L	0.0000107	0.00229	0.00793	0.013	0.0168	0.001	-
Copper	mg/L	0.0000262	0.00267	0.00764	0.0173	0.0187	0.005	0.2
Iron	mg/L	0.00111	0.0568	0.0583	0.073	0.111	0.3	-
Potassium	mg/L	0.0458	2.43	10.5	12.9	13.2	-	-
Magnesium	mg/L	0.328	36	88.3	107	115	-	-
Manganese	mg/L	0.000178	0.01	0.0515	0.1	0.102	0.29	-
Molybdenum	mg/L	0.0000528	0.0061	0.0179	0.0398	0.0429	0.073	-
Sodium	mg/L	0.0745	3.57	16.3	19.4	19.8	-	-
Nickel	mg/L	0.0000186	0.0031	0.0101	0.0163	0.018	0.025	0.25
Lead	mg/L	0.00000223	0.000235	0.000625	0.00144	0.00156	0.003	0.08
Selenium	mg/L	0.00000436	0.000514	0.00134	0.00246	0.00266	0.001	-
Uranium	mg/L	0.0000285	0.00509	0.0169	0.0274	0.0301	0.005	-
Vanadium	mg/L	0.0000278	0.000687	0.00825	0.0187	0.0199	0.006	-
Zinc	mg/L	0.0000439	0.00522	0.0141	0.0318	0.0344	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 7:
Water quality results for dissolved concentrations at Collection Pond 3 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.00413	0.0533	0.156	0.193	0.195	2.7	76
Nitrate	mg/L-N	0.117	7.37	21.8	27.1	27.5	2.94	-
Nitrite	mg/L-N	0.000826	0.0522	0.154	0.192	0.194	0.06	-
Chloride	mg/L	88.1	132	133	133	134	120	-
Sulphate	mg/L	86.5	161	338	402	412	218	-
Aluminum	mg/L	0.00701	0.0071	0.0072	0.00727	0.00866	variable**	-
Arsenic	mg/L	0.0021	0.00384	0.00788	0.00944	0.00954	0.005	0.1
Barium	mg/L	0.00686	0.00854	0.00922	0.0141	0.0156	-	-
Calcium	mg/L	3.87	5.58	8.32	9.27	9.37	-	-
Cadmium	mg/L	0.0000328	0.000059	0.00012	0.000145	0.000147	0.0001	-
Cobalt	mg/L	0.000342	0.000589	0.0012	0.00145	0.00147	0.0009	-
Chromium III	mg/L	0.000182	0.000185	0.000189	0.000191	0.000214	0.0089	-
Chromium VI	mg/L	0.00568	0.0106	0.0222	0.0265	0.0271	0.001	-
Copper	mg/L	0.00252	0.00453	0.00925	0.0112	0.0113	0.005	0.2
Iron	mg/L	0.0158	0.0158	0.0159	0.016	0.043	0.3	-
Potassium	mg/L	0.437	0.634	0.917	1.04	1.06	-	-
Magnesium	mg/L	67.5	96.5	147	163	165	-	-
Manganese	mg/L	0.00678	0.012	0.0229	0.0275	0.0278	0.29	-
Molybdenum	mg/L	0.00624	0.0114	0.0236	0.0284	0.0289	0.073	-
Sodium	mg/L	0.755	1.09	1.62	1.8	1.82	-	-
Nickel	mg/L	0.00571	0.0101	0.0209	0.0252	0.0256	0.025	0.25
Lead	mg/L	0.000215	0.000386	0.000777	0.000938	0.00095	0.003	0.08
Selenium	mg/L	0.000542	0.001	0.00209	0.0025	0.00255	0.001	-
Uranium	mg/L	0.00933	0.0171	0.0354	0.0427	0.0434	0.005	-
Vanadium	mg/L	0.000344	0.000609	0.00118	0.00145	0.00147	0.006	-
Zinc	mg/L	0.00515	0.00912	0.0185	0.0223	0.0227	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 8:
Water quality results for dissolved concentrations at TMF NE Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0203	0.646	0.902	0.991	1.09	2.7	76
Nitrate	mg/L-N	0.108	9.09	10.1	11.5	12.9	2.94	-
Nitrite	mg/L-N	0.00313	0.0913	0.113	0.126	0.138	0.06	-
Chloride	mg/L	1.71	43.5	48.5	55.3	66.3	120	-
Sulphate	mg/L	5.29	152	172	198	212	218	-
Aluminum	mg/L	0.00061	0.0177	0.0191	0.0289	0.0319	variable**	-
Arsenic	mg/L	0.00035	0.00826	0.00923	0.0111	0.0135	0.005	0.1
Barium	mg/L	0.000311	0.00924	0.0101	0.0111	0.012	-	-
Calcium	mg/L	0.987	24	25.8	32.5	38.2	-	-
Cadmium	mg/L	0.00000324	0.0000792	0.0000872	0.000106	0.000126	0.0001	-
Cobalt	mg/L	0.0000265	0.00075	0.000821	0.000922	0.00104	0.0009	-
Chromium III	mg/L	0.00000701	0.000237	0.000295	0.000522	0.000615	0.0089	-
Chromium VI	mg/L	0.000262	0.00771	0.0124	0.0142	0.0157	0.001	-
Copper	mg/L	0.000366	0.00907	0.0101	0.0117	0.0142	0.005	0.2
Iron	mg/L	0.000852	0.013	0.0396	0.132	0.169	0.3	-
Potassium	mg/L	0.305	7.04	7.82	9.68	11.8	-	-
Magnesium	mg/L	2.4	72.2	80.5	90.6	97.3	-	-
Manganese	mg/L	0.000149	0.00626	0.00773	0.0122	0.0135	0.29	-
Molybdenum	mg/L	0.000813	0.02	0.0223	0.026	0.0316	0.073	-
Sodium	mg/L	0.453	11.3	12.2	14.9	17.6	-	-
Nickel	mg/L	0.000353	0.0104	0.0116	0.0132	0.014	0.025	0.25
Lead	mg/L	0.0000313	0.000796	0.000876	0.00103	0.00121	0.003	0.08
Selenium	mg/L	0.0000663	0.00195	0.00226	0.00257	0.0028	0.001	-
Uranium	mg/L	0.000487	0.0132	0.0146	0.0168	0.0191	0.005	-
Vanadium	mg/L	0.000412	0.00937	0.0105	0.013	0.0159	0.006	-
Zinc	mg/L	0.000685	0.0174	0.0191	0.0222	0.0265	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 9:
Water quality results for dissolved concentrations at TMF NW Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0164	0.366	0.678	0.959	1	2.7	76
Nitrate	mg/L-N	0.26	5.18	9.24	10.5	12.6	2.94	-
Nitrite	mg/L-N	0.00252	0.0171	0.0975	0.12	0.125	0.06	-
Chloride	mg/L	1.38	18.1	45.5	51	64.7	120	-
Sulphate	mg/L	4.26	24.9	158	184	204	218	-
Aluminum	mg/L	0.000491	0.0134	0.0183	0.0276	0.0313	variable**	-
Arsenic	mg/L	0.000282	0.00103	0.00844	0.0103	0.0132	0.005	0.1
Barium	mg/L	0.00025	0.00505	0.00949	0.0105	0.0117	-	-
Calcium	mg/L	0.795	11	24.3	30.6	37.3	-	-
Cadmium	mg/L	0.00000261	0.0000121	0.0000806	0.0001	0.000123	0.0001	-
Cobalt	mg/L	0.0000213	0.000208	0.00078	0.00086	0.00101	0.0009	-
Chromium III	mg/L	0.00000565	0.000269	0.000392	0.000623	0.000677	0.0089	-
Chromium VI	mg/L	0.000211	0.000661	0.00841	0.0135	0.0138	0.001	-
Copper	mg/L	0.000295	0.00103	0.00926	0.0109	0.0138	0.005	0.2
Iron	mg/L	0.000686	0.0262	0.0784	0.127	0.163	0.3	-
Potassium	mg/L	0.246	1.32	7.23	8.98	11.5	-	-
Magnesium	mg/L	1.94	26.1	74.6	86	92.1	-	-
Manganese	mg/L	0.00012	0.00707	0.011	0.022	0.0254	0.29	-
Molybdenum	mg/L	0.000655	0.00378	0.0207	0.0241	0.0308	0.073	-
Sodium	mg/L	0.365	5.73	11.5	14.1	17.2	-	-
Nickel	mg/L	0.000285	0.00396	0.0108	0.0124	0.0136	0.025	0.25
Lead	mg/L	0.0000252	0.000114	0.000812	0.000973	0.00118	0.003	0.08
Selenium	mg/L	0.0000534	0.000234	0.00204	0.00243	0.00257	0.001	-
Uranium	mg/L	0.000392	0.00113	0.0135	0.0154	0.0186	0.005	-
Vanadium	mg/L	0.000332	0.0011	0.00959	0.0121	0.0156	0.006	-
Zinc	mg/L	0.000552	0.00225	0.0177	0.0209	0.0259	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 10:
Water quality results for dissolved concentrations at Temporary Process Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.000439	0.0004425	0.000451	0.003204	1.03	2.7	76
Nitrate	mg/L-N	0.0707	0.07145	0.07285	0.0778	1.96	2.94	-
Nitrite	mg/L-N	0.000438	0.0004425	0.000451	0.0005345	0.0317	0.06	-
Chloride	mg/L	3.76	3.78	3.835	5.435	22.2	120	-
Sulphate	mg/L	4.76	4.805	4.89	4.965	15.7	218	-
Aluminum	mg/L	0.00679	0.006865	0.00699	0.00709	0.0097	variable**	-
Arsenic	mg/L	0.000345	0.000776	0.0007955	0.0008055	0.00081	0.005	0.1
Barium	mg/L	0.000343	0.000347	0.0003535	0.0003585	0.00241	-	-
Calcium	mg/L	13.7	18	18.5	18.7	18.8	-	-
Cadmium	mg/L	0.00000473	0.000004775	0.000004865	0.000004965	0.000044	0.0001	-
Cobalt	mg/L	0.0000257	0.000026	0.0000265	0.00002685	0.000157	0.0009	-
Chromium III	mg/L	0.000181	0.000183	0.0001865	0.0001895	0.00133	0.0089	-
Chromium VI	mg/L	0.000042	0.0002765	0.000283	0.000287	0.000288	0.001	-
Copper	mg/L	0.000502	0.000507	0.0005165	0.000524	0.00147	0.005	0.2
Iron	mg/L	0.00289	0.00292	0.00297	0.00554	0.03	0.3	-
Potassium	mg/L	1.69	5.295	5.43	5.495	5.53	-	-
Magnesium	mg/L	12.6	12.75	13	13.2	53.4	-	-
Manganese	mg/L	0.00149	0.001505	0.00153	0.00158	0.0197	0.29	-
Molybdenum	mg/L	0.00116	0.00118	0.0012	0.001215	0.0033	0.073	-
Sodium	mg/L	7.38	7.45	7.585	7.7	9.8	-	-
Nickel	mg/L	0.000279	0.000282	0.0002875	0.000296	0.0036	0.025	0.25
Lead	mg/L	0.0000418	0.0000422	0.00004295	0.0000436	0.000151	0.003	0.08
Selenium	mg/L	0.0000558	0.0000564	0.0000574	0.0000583	0.000106	0.001	-
Uranium	mg/L	0.0000609	0.00056	0.000574	0.000581	0.000585	0.005	-
Vanadium	mg/L	0.000502	0.000682	0.0006995	0.0007085	0.000712	0.006	-
Zinc	mg/L	0.000904	0.000913	0.0009295	0.0009435	0.00322	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 11:
Water quality results assuming 30ppm total suspended solids at Collection Pond 1 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.000562	0.00803	0.157	0.338	0.371	2.7	76
Nitrate	mg/L-N	0.0592	0.0768	21.4	46.9	51.5	2.94	-
Nitrite	mg/L-N	0.000419	0.000544	0.151	0.332	0.364	0.06	-
Chloride	mg/L	39.9	52.9	149	155	159	120	-
Sulphate	mg/L	27.4	38.2	132	255	280	218	-
Aluminum	mg/L	1.42	1.42	1.42	1.42	1.43	variable**	-
Arsenic	mg/L	0.00298	0.00415	0.0122	0.0236	0.0261	0.005	0.1
Barium	mg/L	0.00807	0.00914	0.0159	0.0237	0.0252	-	-
Calcium	mg/L	21.9	28.4	51.3	63	67.2	-	-
Cadmium	mg/L	0.0000246	0.0000342	0.000114	0.000218	0.000239	0.0001	-
Cobalt	mg/L	0.00236	0.00242	0.00294	0.00363	0.00378	0.0009	-
Chromium III	mg/L	0.0264	0.0265	0.0266	0.0266	0.0266	0.0089	-
Chromium VI	mg/L	0.000982	0.00112	0.00288	0.00558	0.00623	0.001	-
Copper	mg/L	0.00532	0.00655	0.0149	0.0259	0.0281	0.005	0.2
Iron	mg/L	1.77	1.84	1.84	1.85	1.86	0.3	-
Potassium	mg/L	5.33	7.44	15.3	19.1	20.3	-	-
Magnesium	mg/L	29.4	34	71.9	94.1	102	-	-
Manganese	mg/L	0.0532	0.0567	0.124	0.181	0.19	0.29	-
Molybdenum	mg/L	0.00599	0.00876	0.0281	0.0533	0.0583	0.073	-
Sodium	mg/L	9.77	12.8	23.6	28.7	30.5	-	-
Nickel	mg/L	0.0271	0.0279	0.0339	0.042	0.0437	0.025	0.25
Lead	mg/L	0.00027	0.00036	0.00109	0.00203	0.00221	0.003	0.08
Selenium	mg/L	0.000634	0.000795	0.00176	0.00303	0.00329	0.001	-
Uranium	mg/L	0.00255	0.0037	0.0138	0.0274	0.0302	0.005	-
Vanadium	mg/L	0.006	0.00772	0.0184	0.0323	0.0349	0.006	-
Zinc	mg/L	0.00581	0.00784	0.0238	0.0444	0.0486	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 12:
Water quality results assuming 30ppm total suspended solids at for Collection Pond 2 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.00245	0.194	0.386	0.521	0.742	2.7	76
Nitrate	mg/L-N	0.00685	2.46	14.6	35.7	38.9	2.94	-
Nitrite	mg/L-N	0.000229	0.0421	0.0987	0.246	0.267	0.06	-
Chloride	mg/L	0.566	56.3	125	145	148	120	-
Sulphate	mg/L	0.277	50.9	161	257	280	218	-
Aluminum	mg/L	1.37	1.38	1.4	1.41	1.41	variable**	-
Arsenic	mg/L	0.000136	0.00253	0.00702	0.0167	0.0185	0.005	0.1
Barium	mg/L	0.00309	0.00931	0.0138	0.0196	0.0203	-	-
Calcium	mg/L	1.49	12.3	37.1	45	46.2	-	-
Cadmium	mg/L	0.00000218	0.0000332	0.0000833	0.00017	0.000184	0.0001	-
Cobalt	mg/L	0.00219	0.00244	0.00287	0.00342	0.00355	0.0009	-
Chromium III	mg/L	0.0261	0.0264	0.0264	0.0265	0.0265	0.0089	-
Chromium VI	mg/L	0.0000107	0.00229	0.00793	0.013	0.0168	0.001	-
Copper	mg/L	0.00221	0.00485	0.00982	0.0195	0.0209	0.005	0.2
Iron	mg/L	1.73	1.79	1.79	1.8	1.84	0.3	-
Potassium	mg/L	0.15	2.53	10.6	13	13.3	-	-
Magnesium	mg/L	3.74	39.4	91.7	110	119	-	-
Manganese	mg/L	0.0306	0.0404	0.0819	0.131	0.132	0.29	-
Molybdenum	mg/L	0.0000681	0.00612	0.0179	0.0398	0.0429	0.073	-
Sodium	mg/L	0.279	3.77	16.5	19.6	20	-	-
Nickel	mg/L	0.0255	0.0286	0.0356	0.0418	0.0435	0.025	0.25
Lead	mg/L	0.0000453	0.000278	0.000669	0.00149	0.0016	0.003	0.08
Selenium	mg/L	0.0000199	0.000529	0.00135	0.00248	0.00268	0.001	-
Uranium	mg/L	0.000033	0.00509	0.0169	0.0274	0.0301	0.005	-
Vanadium	mg/L	0.00254	0.0032	0.0108	0.0212	0.0224	0.006	-
Zinc	mg/L	0.0016	0.00678	0.0157	0.0334	0.036	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 13:
Water quality results assuming 30ppm total suspended solids at Pond 3 screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.00413	0.0533	0.156	0.193	0.195	2.7	76
Nitrate	mg/L-N	0.117	7.37	21.8	27.1	27.5	2.94	-
Nitrite	mg/L-N	0.000826	0.0522	0.154	0.192	0.194	0.06	-
Chloride	mg/L	88.1	132	133	133	134	120	-
Sulphate	mg/L	86.5	161	338	402	412	218	-
Aluminum	mg/L	1.38	1.38	1.38	1.38	1.38	variable**	-
Arsenic	mg/L	0.00221	0.00395	0.00799	0.00955	0.00965	0.005	0.1
Barium	mg/L	0.00991	0.0116	0.0123	0.0172	0.0187	-	-
Calcium	mg/L	5.19	6.9	9.64	10.6	10.7	-	-
Cadmium	mg/L	0.0000348	0.000061	0.000122	0.000147	0.000149	0.0001	-
Cobalt	mg/L	0.00253	0.00278	0.00339	0.00364	0.00366	0.0009	-
Chromium III	mg/L	0.0263	0.0263	0.0263	0.0263	0.0263	0.0089	-
Chromium VI	mg/L	0.00568	0.0106	0.0222	0.0265	0.0271	0.001	-
Copper	mg/L	0.0047	0.00671	0.0114	0.0134	0.0135	0.005	0.2
Iron	mg/L	1.75	1.75	1.75	1.75	1.77	0.3	-
Potassium	mg/L	0.541	0.738	1.02	1.15	1.16	-	-
Magnesium	mg/L	70.9	99.9	150	166	169	-	-
Manganese	mg/L	0.0372	0.0424	0.0533	0.0579	0.0582	0.29	-
Molybdenum	mg/L	0.00625	0.0114	0.0236	0.0284	0.0289	0.073	-
Sodium	mg/L	0.96	1.3	1.82	2.01	2.03	-	-
Nickel	mg/L	0.0312	0.0356	0.0464	0.0507	0.0511	0.025	0.25
Lead	mg/L	0.000259	0.000429	0.00082	0.000981	0.000993	0.003	0.08
Selenium	mg/L	0.000557	0.00102	0.0021	0.00251	0.00256	0.001	-
Uranium	mg/L	0.00933	0.0171	0.0355	0.0427	0.0434	0.005	-
Vanadium	mg/L	0.00285	0.00312	0.00369	0.00396	0.00398	0.006	-
Zinc	mg/L	0.00671	0.0107	0.0201	0.0239	0.0242	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 14:
Water quality results for assuming 30ppm total suspended solids at for TMF NE Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0203	0.646	0.902	0.991	1.09	2.7	76
Nitrate	mg/L-N	0.108	9.09	10.1	11.5	12.9	2.94	-
Nitrite	mg/L-N	0.00313	0.0913	0.113	0.126	0.138	0.06	-
Chloride	mg/L	1.71	43.5	48.5	55.3	66.3	120	-
Sulphate	mg/L	5.29	152	172	198	212	218	-
Aluminum	mg/L	1.37	1.39	1.39	1.4	1.4	variable**	-
Arsenic	mg/L	0.000461	0.00837	0.00934	0.0112	0.0137	0.005	0.1
Barium	mg/L	0.00336	0.0123	0.0131	0.0142	0.015	-	-
Calcium	mg/L	2.31	25.3	27.1	33.8	39.5	-	-
Cadmium	mg/L	0.00000518	0.0000811	0.0000892	0.000108	0.000128	0.0001	-
Cobalt	mg/L	0.00222	0.00294	0.00301	0.00311	0.00323	0.0009	-
Chromium III	mg/L	0.0261	0.0263	0.0264	0.0266	0.0267	0.0089	-
Chromium VI	mg/L	0.000262	0.00771	0.0124	0.0142	0.0157	0.001	-
Copper	mg/L	0.00255	0.0113	0.0122	0.0139	0.0164	0.005	0.2
Iron	mg/L	1.73	1.74	1.77	1.86	1.9	0.3	-
Potassium	mg/L	0.409	7.15	7.93	9.78	11.9	-	-
Magnesium	mg/L	5.81	75.6	83.9	94	101	-	-
Manganese	mg/L	0.0305	0.0367	0.0381	0.0426	0.0439	0.29	-
Molybdenum	mg/L	0.000829	0.02	0.0223	0.026	0.0316	0.073	-
Sodium	mg/L	0.658	11.5	12.4	15.1	17.8	-	-
Nickel	mg/L	0.0259	0.0359	0.0371	0.0387	0.0395	0.025	0.25
Lead	mg/L	0.0000744	0.000839	0.000919	0.00107	0.00126	0.003	0.08
Selenium	mg/L	0.0000818	0.00196	0.00228	0.00259	0.00282	0.001	-
Uranium	mg/L	0.000491	0.0132	0.0146	0.0168	0.0191	0.005	-
Vanadium	mg/L	0.00292	0.0119	0.013	0.0156	0.0185	0.006	-
Zinc	mg/L	0.00224	0.0189	0.0207	0.0238	0.0281	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 15:
Water quality results assuming 30ppm total suspended solids at TMF NW Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0164	0.366	0.678	0.959	1	2.7	76
Nitrate	mg/L-N	0.26	5.18	9.24	10.5	12.6	2.94	-
Nitrite	mg/L-N	0.00252	0.0171	0.0975	0.12	0.125	0.06	-
Chloride	mg/L	1.38	18.1	45.5	51	64.7	120	-
Sulphate	mg/L	4.26	24.9	158	184	204	218	-
Aluminum	mg/L	1.37	1.38	1.39	1.4	1.4	variable**	-
Arsenic	mg/L	0.000393	0.00114	0.00855	0.0104	0.0133	0.005	0.1
Barium	mg/L	0.0033	0.0081	0.0125	0.0135	0.0148	-	-
Calcium	mg/L	2.11	12.3	25.6	31.9	38.6	-	-
Cadmium	mg/L	0.00000455	0.000014	0.0000825	0.000102	0.000125	0.0001	-
Cobalt	mg/L	0.00221	0.0024	0.00297	0.00305	0.0032	0.0009	-
Chromium III	mg/L	0.0261	0.0264	0.0265	0.0267	0.0268	0.0089	-
Chromium VI	mg/L	0.000211	0.000661	0.00841	0.0135	0.0138	0.001	-
Copper	mg/L	0.00247	0.00321	0.0114	0.0131	0.016	0.005	0.2
Iron	mg/L	1.73	1.76	1.81	1.86	1.89	0.3	-
Potassium	mg/L	0.35	1.42	7.33	9.09	11.6	-	-
Magnesium	mg/L	5.35	29.5	78	89.4	95.6	-	-
Manganese	mg/L	0.0305	0.0375	0.0414	0.0524	0.0558	0.29	-
Molybdenum	mg/L	0.000671	0.0038	0.0207	0.0241	0.0308	0.073	-
Sodium	mg/L	0.57	5.94	11.8	14.3	17.4	-	-
Nickel	mg/L	0.0258	0.0295	0.0363	0.0379	0.0391	0.025	0.25
Lead	mg/L	0.0000683	0.000157	0.000855	0.00102	0.00123	0.003	0.08
Selenium	mg/L	0.0000689	0.00025	0.00206	0.00244	0.00259	0.001	-
Uranium	mg/L	0.000397	0.00114	0.0135	0.0154	0.0186	0.005	-
Vanadium	mg/L	0.00284	0.00361	0.0121	0.0147	0.0181	0.006	-
Zinc	mg/L	0.00211	0.00381	0.0192	0.0224	0.0274	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 16:
Water quality results assuming 30ppm total suspended solids at Temporary Process Pond screened against end-of-pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.000439	0.000443	0.000451	0.0032	1.03	2.7	76
Nitrate	mg/L-N	0.0707	0.0715	0.0729	0.0778	1.96	2.94	-
Nitrite	mg/L-N	0.000438	0.000443	0.000451	0.000535	0.0317	0.06	-
Chloride	mg/L	3.76	3.78	3.84	5.44	22.2	120	-
Sulphate	mg/L	4.76	4.81	4.89	4.97	15.7	218	-
Aluminum	mg/L	1.38	1.38	1.38	1.38	1.38	variable**	-
Arsenic	mg/L	0.000456	0.000887	0.000907	0.000917	0.000921	0.005	0.1
Barium	mg/L	0.00339	0.0034	0.0034	0.00341	0.00546	-	-
Calcium	mg/L	15	19.3	19.8	20	20.1	-	-
Cadmium	mg/L	0.00000667	0.00000672	0.00000681	0.00000691	0.0000459	0.0001	-
Cobalt	mg/L	0.00222	0.00222	0.00222	0.00222	0.00235	0.0009	-
Chromium III	mg/L	0.0263	0.0263	0.0263	0.0263	0.0274	0.0089	-
Chromium VI	mg/L	0.000042	0.000277	0.000283	0.000287	0.000288	0.001	-
Copper	mg/L	0.00268	0.00269	0.0027	0.0027	0.00365	0.005	0.2
Iron	mg/L	1.73	1.73	1.73	1.74	1.76	0.3	-
Potassium	mg/L	1.79	5.4	5.53	5.6	5.63	-	-
Magnesium	mg/L	16	16.2	16.4	16.6	56.8	-	-
Manganese	mg/L	0.0319	0.0319	0.0319	0.032	0.0501	0.29	-
Molybdenum	mg/L	0.00118	0.0012	0.00122	0.00123	0.00332	0.073	-
Sodium	mg/L	7.59	7.66	7.79	7.91	10	-	-
Nickel	mg/L	0.0258	0.0258	0.0258	0.0258	0.0291	0.025	0.25
Lead	mg/L	0.0000849	0.0000853	0.0000861	0.0000867	0.000194	0.003	0.08
Selenium	mg/L	0.0000713	0.0000719	0.0000729	0.0000738	0.000122	0.001	-
Uranium	mg/L	0.0000654	0.000565	0.000579	0.000586	0.00059	0.005	-
Vanadium	mg/L	0.00301	0.00319	0.00321	0.00322	0.00322	0.006	-
Zinc	mg/L	0.00246	0.00247	0.00249	0.0025	0.00478	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)

**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 17:
Water quality results for dissolved concentrations in the Pit Lake during the flooding period (Year 43 to Year 158) screened against end of pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0824	0.176	0.594	1.54	2.28	2.7	76
Nitrate	mg/L-N	2.4	2.43	2.69	3.94	5.2	2.94	-
Nitrite	mg/L-N	0.00000568	0.000161	0.000665	0.0723	0.217	0.06	-
Chloride	mg/L	77.7	82.1	111	224	329	120	-
Sulphate	mg/L	94.8	100	133	257	374	218	-
Aluminum	mg/L	0.012	0.0123	0.014	0.0198	0.0256	variable**	-
Arsenic	mg/L	0.00188	0.00225	0.00264	0.00271	0.00272	0.005	0.1
Barium	mg/L	0.0103	0.0106	0.0111	0.0123	0.0139	-	-
Calcium	mg/L	2.93	7.21	12.3	13.2	13.3	-	-
Cadmium	mg/L	0.00000907	0.0000122	0.0000181	0.0000201	0.0000202	0.0001	-
Cobalt	mg/L	0.000705	0.000743	0.00098	0.00188	0.00273	0.0009	-
Chromium III	mg/L	0.000103	0.000304	0.000534	0.000564	0.000565	0.0089	-
Chromium VI	mg/L	0.000985	0.00103	0.0013	0.00228	0.0032	0.001	-
Copper	mg/L	0.00101	0.0012	0.00152	0.00158	0.00158	0.005	0.2
Iron	mg/L	0.00377	0.0522	0.145	0.186	0.188	0.3	-
Potassium	mg/L	2.13	2.2	2.34	2.62	2.95	-	-
Magnesium	mg/L	54	56.8	73	130	182	-	-
Manganese	mg/L	0.0307	0.0317	0.0355	0.052	0.0696	0.29	-
Molybdenum	mg/L	0.00926	0.00969	0.0119	0.0203	0.0285	0.073	-
Sodium	mg/L	11.1	11.5	13.3	19.9	26.5	-	-
Nickel	mg/L	0.00495	0.0052	0.0067	0.0121	0.0172	0.025	0.25
Lead	mg/L	0.0000906	0.000109	0.000138	0.000144	0.000144	0.003	0.08
Selenium	mg/L	0.00082	0.000861	0.00111	0.00204	0.00294	0.001	-
Uranium	mg/L	0.0000173	0.000683	0.00148	0.00162	0.00162	0.005	-
Vanadium	mg/L	0.000325	0.000836	0.00152	0.00166	0.00167	0.006	-
Zinc	mg/L	0.00201	0.00238	0.00296	0.00306	0.00306	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters. For the purpose of the present analysis, the results are screened against the P75th concentration of D-Al (0.2um) in the North Driftwood River of 0.086 mg/L.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

Table 18:
Water quality results for dissolved concentrations in the Pit Lake after fully flooded (Year 159 to 174) screened against end of pipe (MDMER) and receiving environment (CCME and PWQO) criteria.

Parameter	Units	Minimum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO*	MDMER
Total Ammonia	mg/L-N	0.0000634	0.000425	0.0205	0.0706	0.0826	2.7	76
Nitrate	mg/L-N	2.32	2.33	2.37	2.39	2.4	2.94	-
Nitrite	mg/L-N	0.000144	0.000229	0.000502	0.000735	0.000791	0.06	-
Chloride	mg/L	72.5	73.1	75	77.1	77.7	120	-
Sulphate	mg/L	88.7	89.4	91.6	94.1	94.8	218	-
Aluminum	mg/L	0.0116	0.0116	0.0118	0.0119	0.012	variable**	-
Arsenic	mg/L	0.00244	0.00245	0.0025	0.00255	0.00256	0.005	0.1
Barium	mg/L	0.00877	0.00881	0.00897	0.00913	0.00918	-	-
Calcium	mg/L	12	12.1	12.3	12.5	12.6	-	-
Cadmium	mg/L	0.0000194	0.0000195	0.0000197	0.0000199	0.00002	0.0001	-
Cobalt	mg/L	0.000297	0.000299	0.000305	0.000312	0.000314	0.0009	-
Chromium III	mg/L	0.000554	0.000556	0.000564	0.000573	0.000575	0.0089	-
Chromium VI	mg/L	0.000925	0.000932	0.000954	0.000978	0.000985	0.001	-
Copper	mg/L	0.00147	0.00148	0.0015	0.00152	0.00153	0.005	0.2
Iron	mg/L	0.185	0.186	0.187	0.187	0.188	0.3	-
Potassium	mg/L	2.02	2.04	2.08	2.12	2.13	-	-
Magnesium	mg/L	50.4	50.8	52.1	53.6	54	-	-
Manganese	mg/L	0.0293	0.0295	0.03	0.0305	0.0307	0.29	-
Molybdenum	mg/L	0.00873	0.00879	0.00899	0.0092	0.00926	0.073	-
Sodium	mg/L	10.5	10.5	10.8	11	11.1	-	-
Nickel	mg/L	0.00464	0.00467	0.00479	0.00491	0.00495	0.025	0.25
Lead	mg/L	0.000136	0.000136	0.000138	0.00014	0.000141	0.003	0.08
Selenium	mg/L	0.00077	0.000775	0.000794	0.000814	0.00082	0.001	-
Uranium	mg/L	0.00151	0.00152	0.00155	0.00157	0.00158	0.005	-
Vanadium	mg/L	0.00157	0.00158	0.0016	0.00162	0.00163	0.006	-
Zinc	mg/L	0.00286	0.00287	0.00291	0.00296	0.00297	0.02	0.4

*Variable guidelines assume mean baseline water quality reported in Stantec (2024) for water courses (pH = 5.98; hardness = 42.7 mg/L; DOC = 31.1 mg/L; Cl = 11.3 mg/L; Temp = 8.91C), with the exception of ammonia guideline, which assumes 95th percentile pH for conversion from free ammonia guideline (pH = 7.59)
**At pH >5.5 to 6.5, no condition should be permitted which would increase the acid soluble inorganic aluminum concentration in clay-free samples to more than 10% above natural background concentrations for waters.
Values which exceed CCME/PWQO by >1x and >5x are shaded light blue and dark blue, respectively. Values which exceed MDMER are shaded grey.

4. Closure

Please contact the undersigned if you require further information or clarification.

Regards,

LORAX ENVIRONMENTAL SERVICES LTD.

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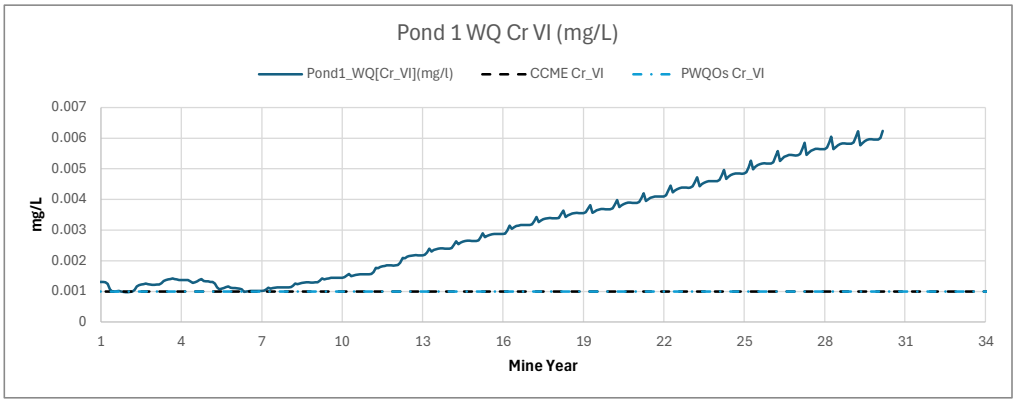
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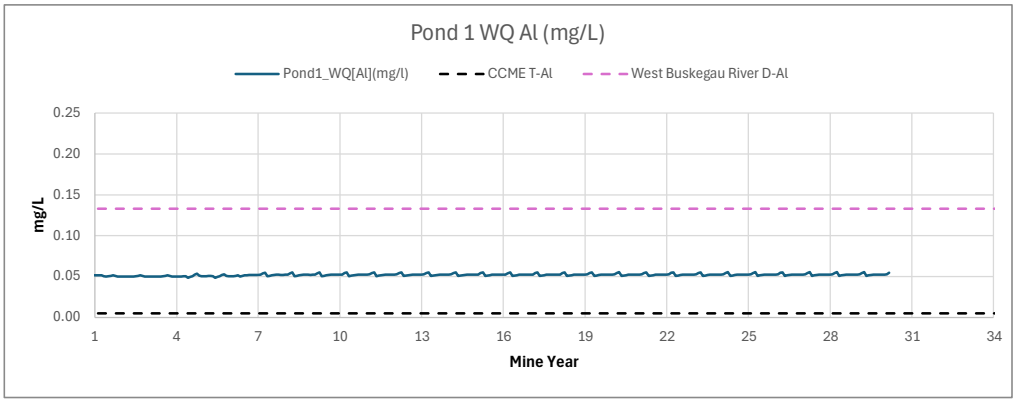
Canada Nickel's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project (Received May 30, 2025)
Geochemistry, where Conditions Influence Water Quality and Effects to Fish and Fish Habitat and Indigenous Peoples
December 24, 2025

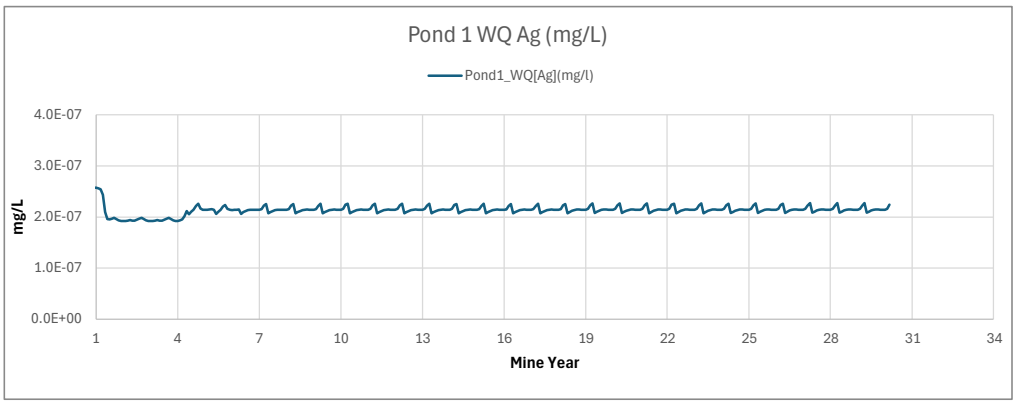
Attachment GHC-02d Revised Water Quality Model Results

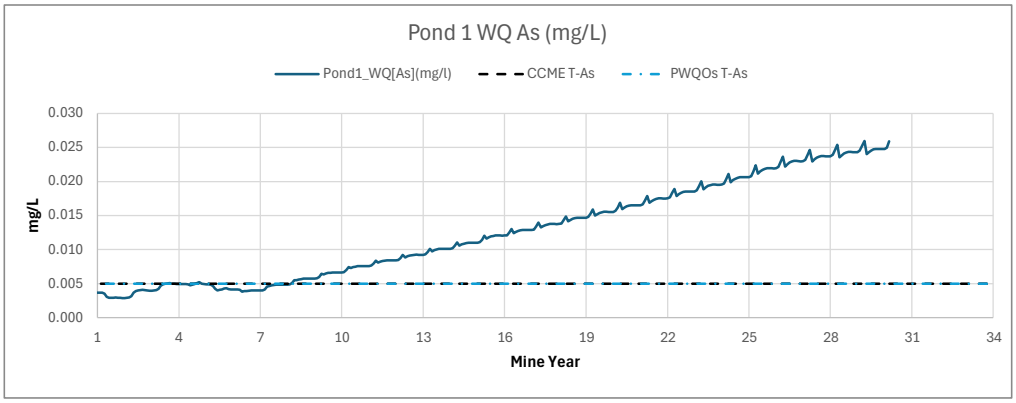
CANADA NICKEL COMPANY

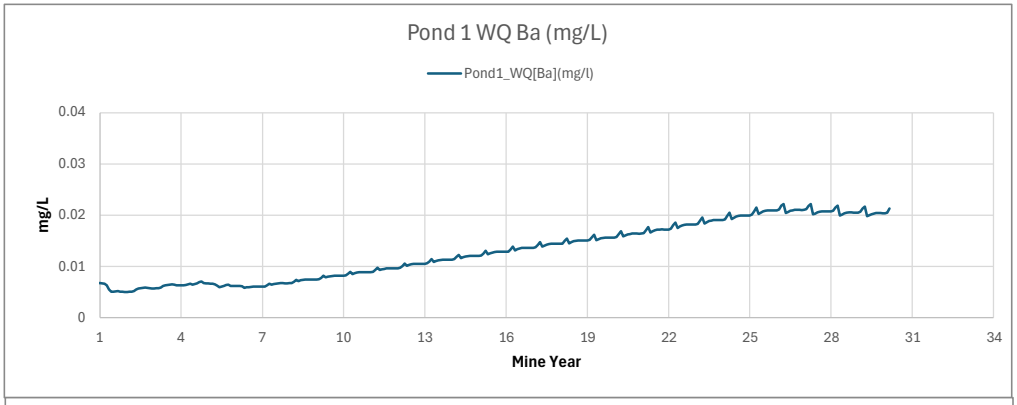
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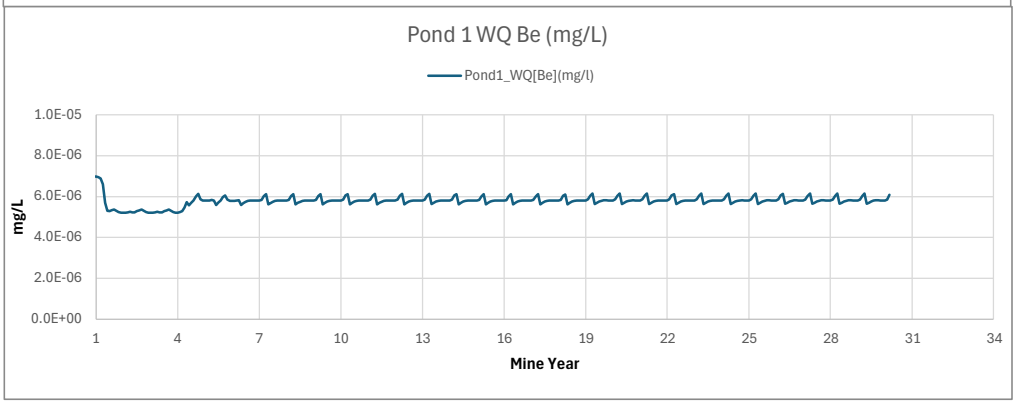

Pond 1 WQ Cr VI (mg/L)
Pond1_WQ[Cr_VI](mg/l)
CCME Cr_VI
PWQOs Cr_VI
mg/L
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

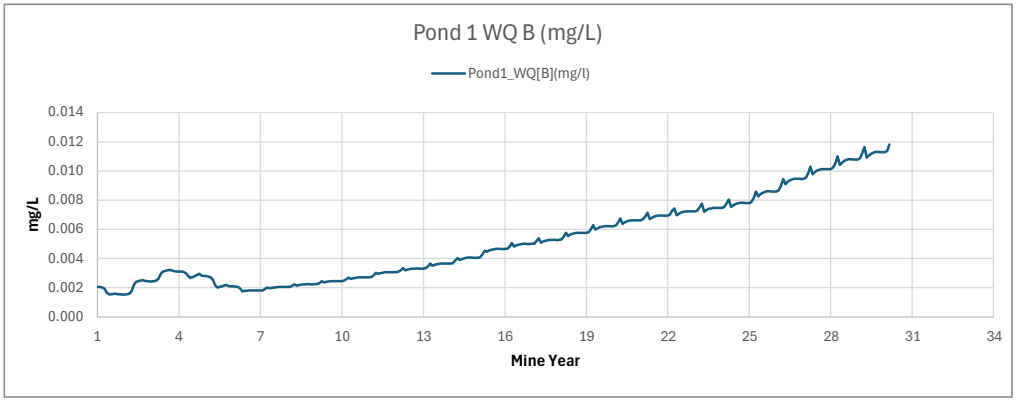

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Pond1_WQ[Al](mg/l)
CCME T-Al
West Buskegau River D-Al
mg/L
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0.20
0.15
0.10
0.05
0.00
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

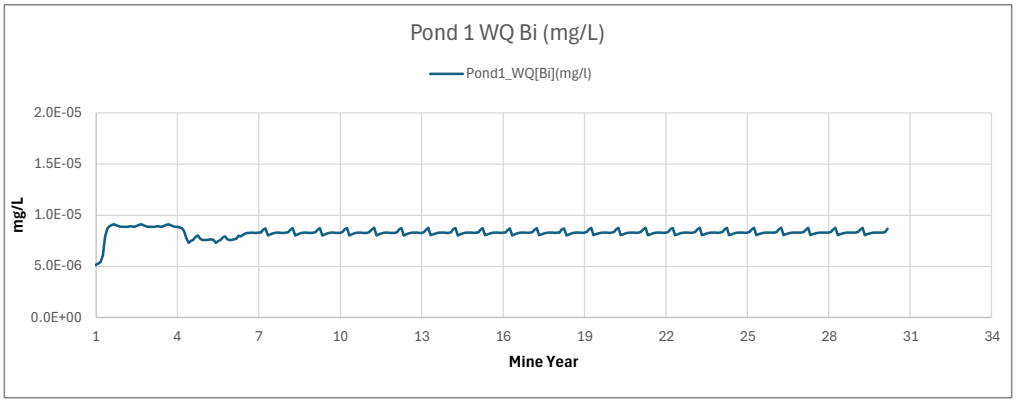

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Pond1_WQ[Ag](mg/l)
mg/L
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3.0E-07
2.0E-07
1.0E-07
0.0E+00
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

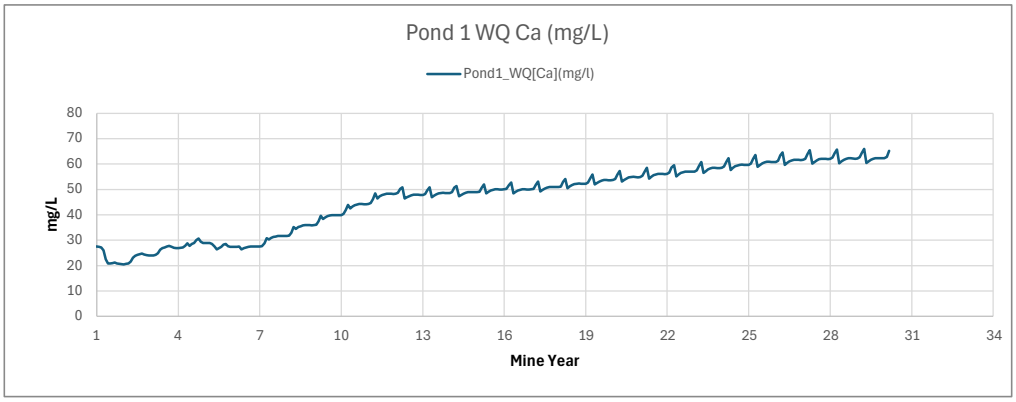

Pond 1 WQ As (mg/L)
Pond1_WQ[As](mg/l)
CCME T-As
PWQOs T-As
mg/L
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0.020
0.015
0.010
0.005
0.000
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

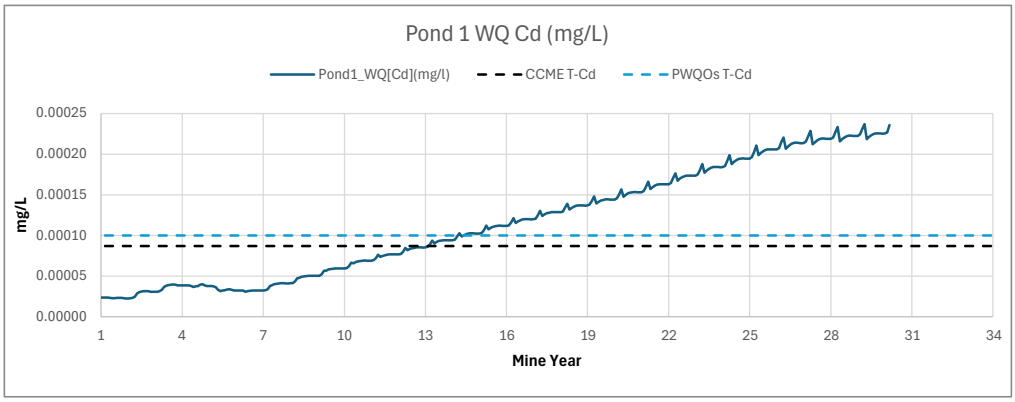

Pond 1 WQ Ba (mg/L)
Pond1_WQ[Ba](mg/l)
mg/L
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0.03
0.02
0.01
0
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4
7
10
13
16
19
22
25
28
31
34
Mine Year

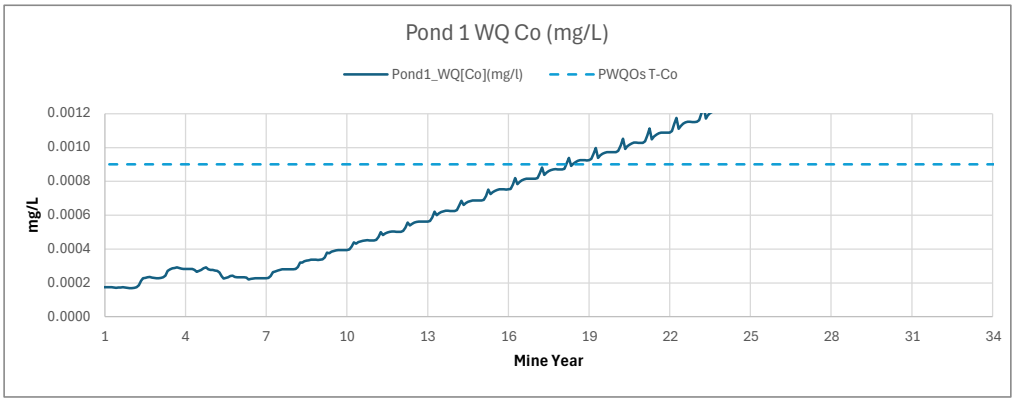

Pond 1 WQ Be (mg/L)
Pond1_WQ[Be](mg/l)
mg/L
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6.0E-06
4.0E-06
2.0E-06
0.0E+00
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

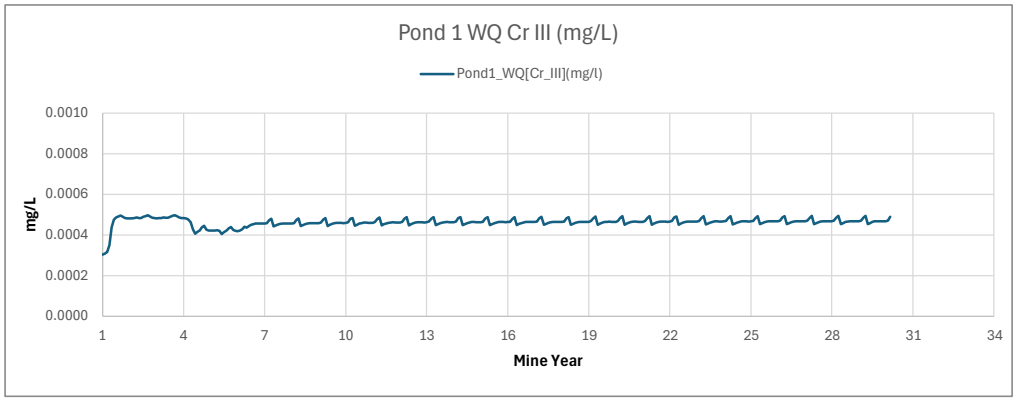

Pond 1 WQ B (mg/L)
Pond1_WQ[B](mg/l)
mg/L
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0.012
0.010
0.008
0.006
0.004
0.002
0.000
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

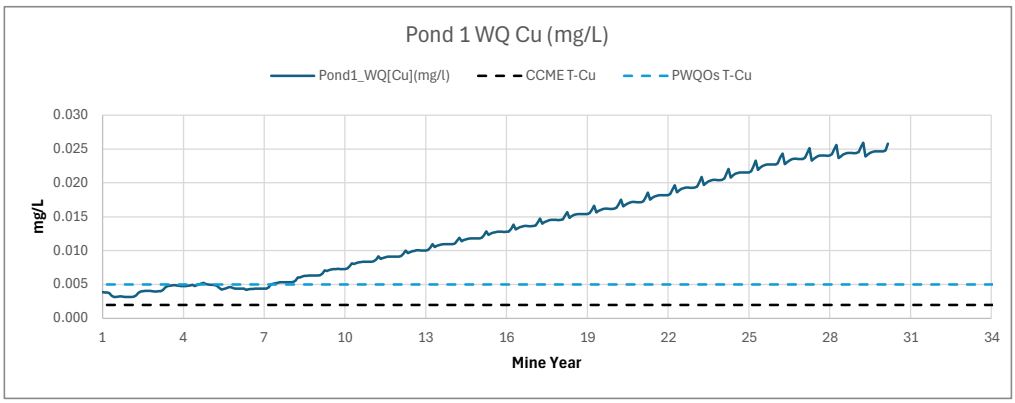

Pond 1 WQ Bi (mg/L)
Pond1_WQ[Bi](mg/l)
mg/L
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1.5E-05
1.0E-05
5.0E-06
0.0E+00
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

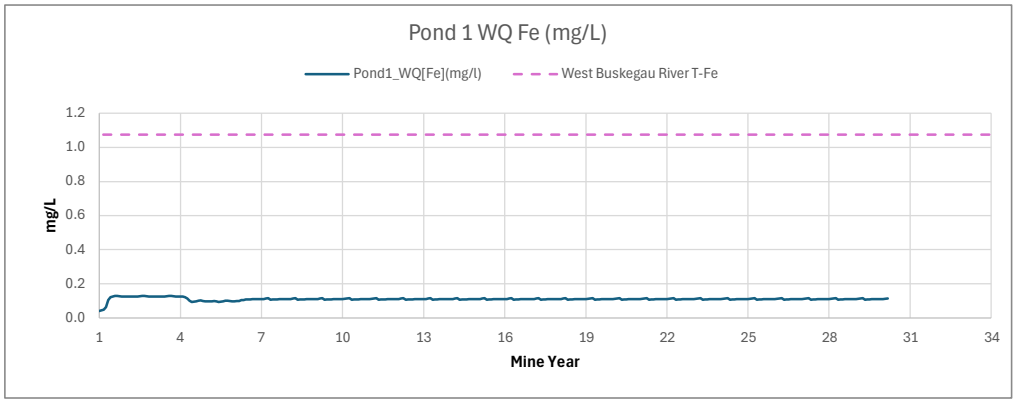

Pond 1 WQ Ca (mg/L)
Pond1_WQ[Ca](mg/l)
mg/L
Mine Year

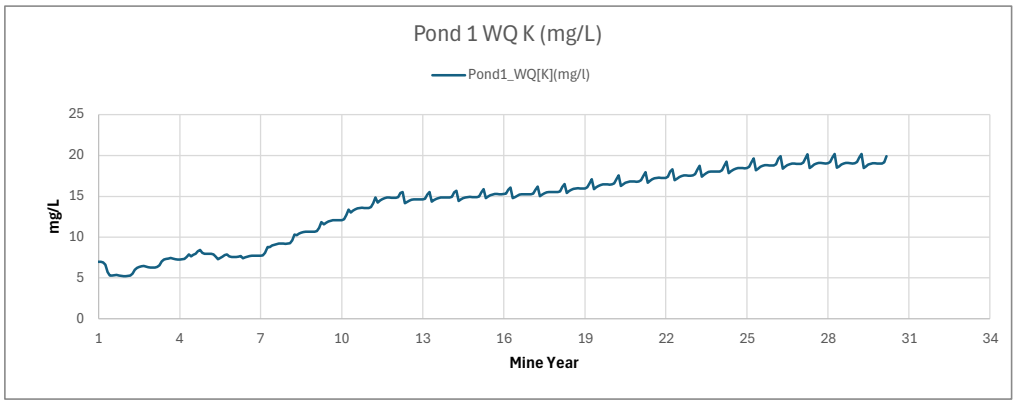

Pond 1 WQ Cd (mg/L)
Pond1_WQ[Cd](mg/l)
CCME T-Cd
PWQOs T-Cd
mg/L
Mine Year

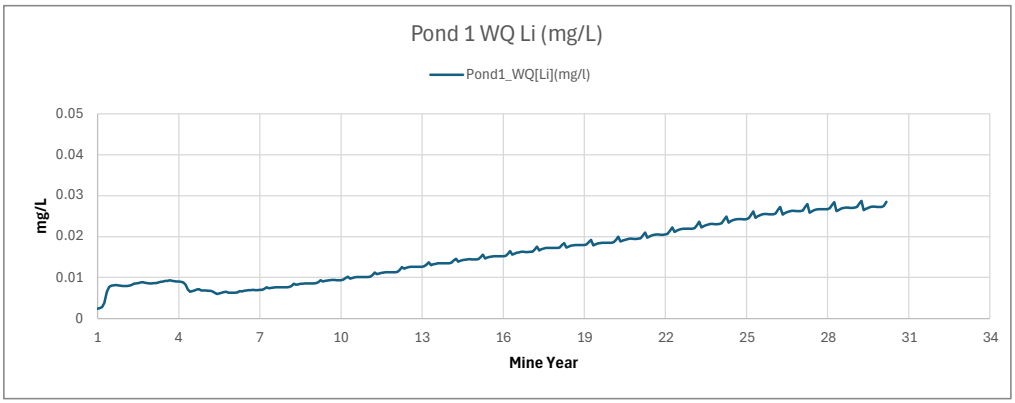

Pond 1 WQ Co (mg/L)
Pond1_WQ[Co](mg/l)
PWQOs T-Co
mg/L
Mine Year

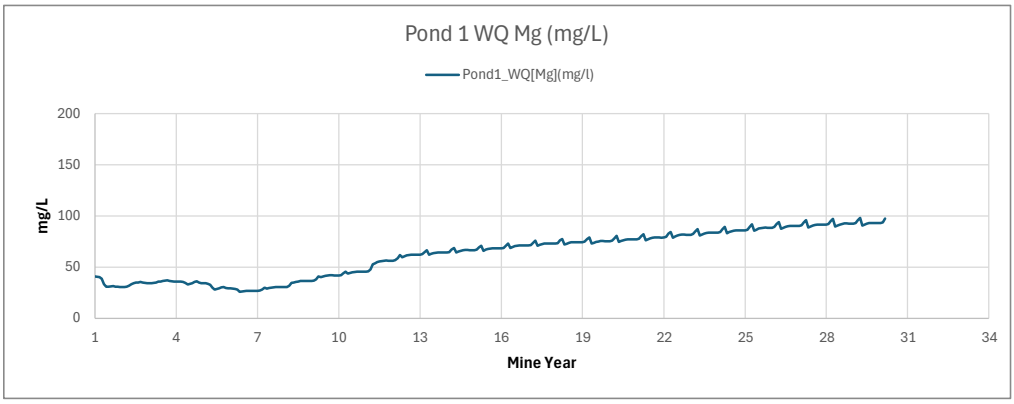

Pond 1 WQ Cr III (mg/L)
Pond1_WQ[Cr_III](mg/l)
mg/L
Mine Year

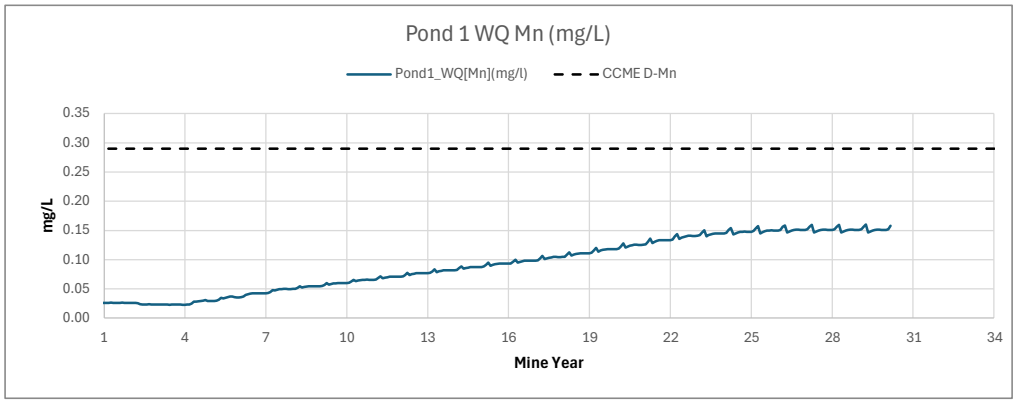

Pond 1 WQ Cu (mg/L)
Pond1_WQ[Cu](mg/l)
CCME T-Cu
PWQOs T-Cu
mg/L
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

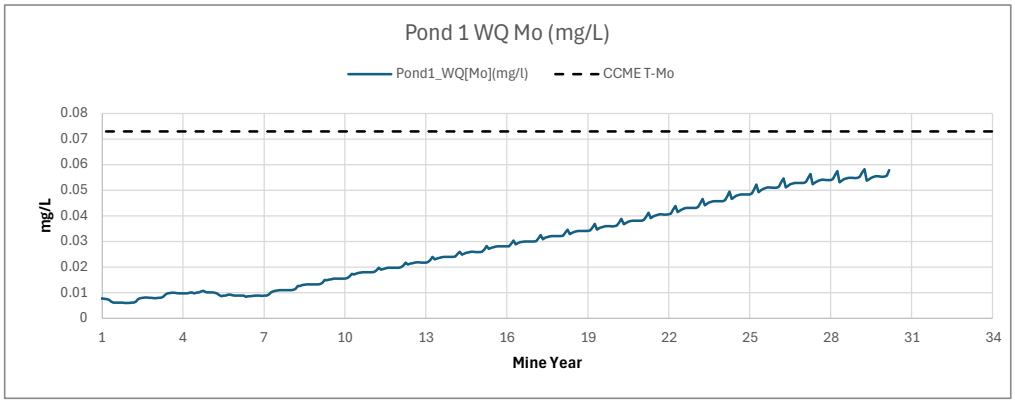

Pond 1 WQ Fe (mg/L)
Pond1_WQ[Fe](mg/l)
West Buskegau River T-Fe
mg/L
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

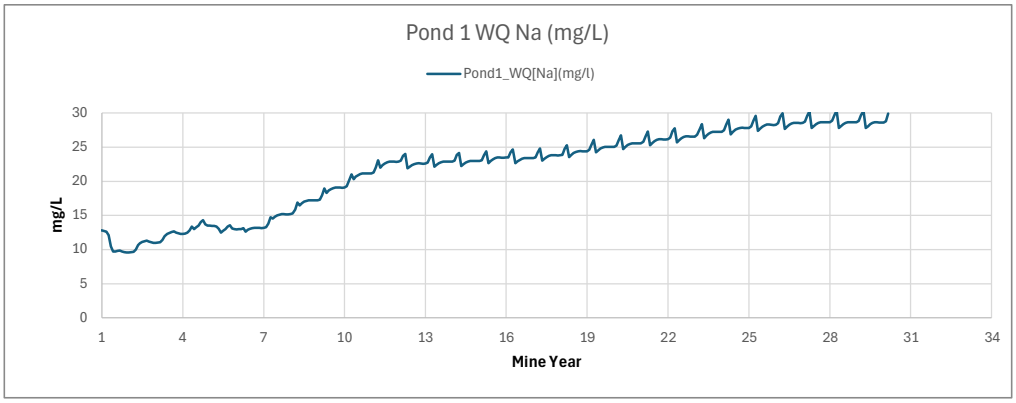

Pond 1 WQ K (mg/L)
Pond1_WQ[K](mg/l)
mg/L
25
20
15
10
5
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

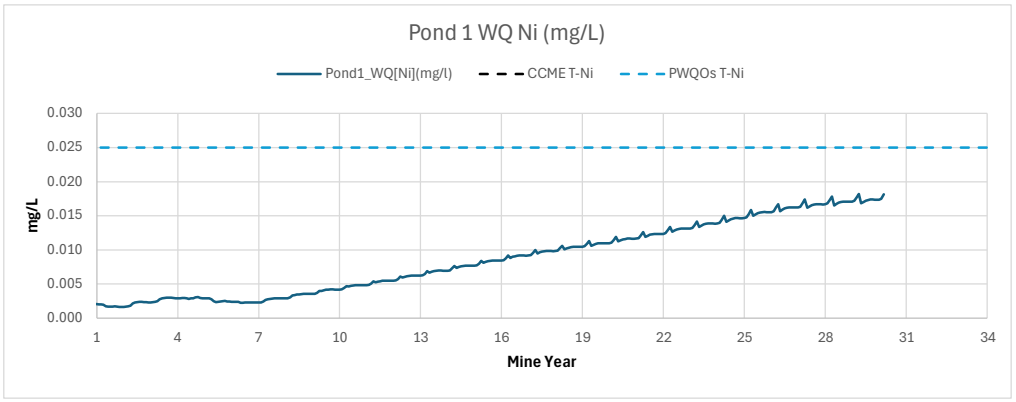

Pond 1 WQ Li (mg/L)
Pond1_WQ[Li](mg/l)
mg/L
0.05
0.04
0.03
0.02
0.01
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

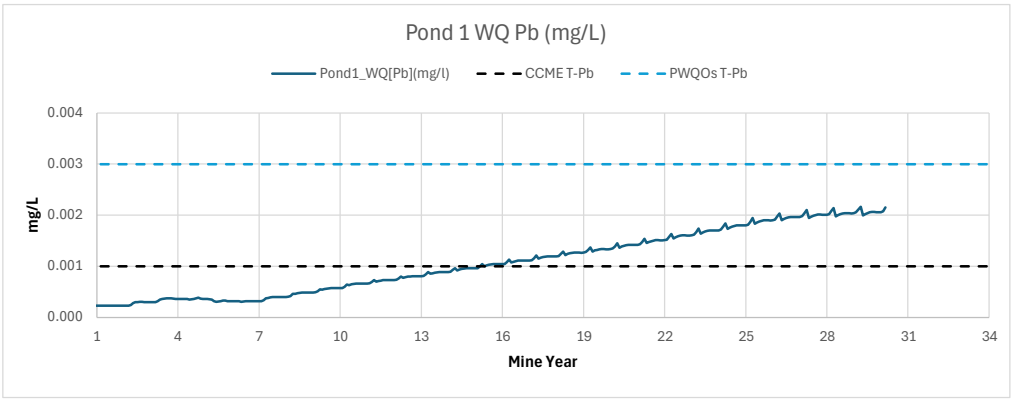

Pond 1 WQ Mg (mg/L)
Pond1_WQ[Mg](mg/l)
mg/L
0
50
100
150
200
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

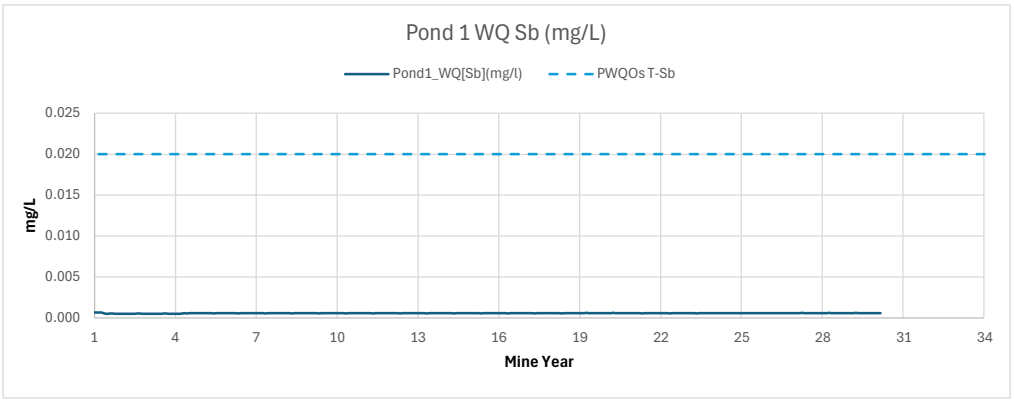

Pond 1 WQ Mn (mg/L)
Pond1_WQ[Mn](mg/l)
CCME D-Mn
mg/L
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

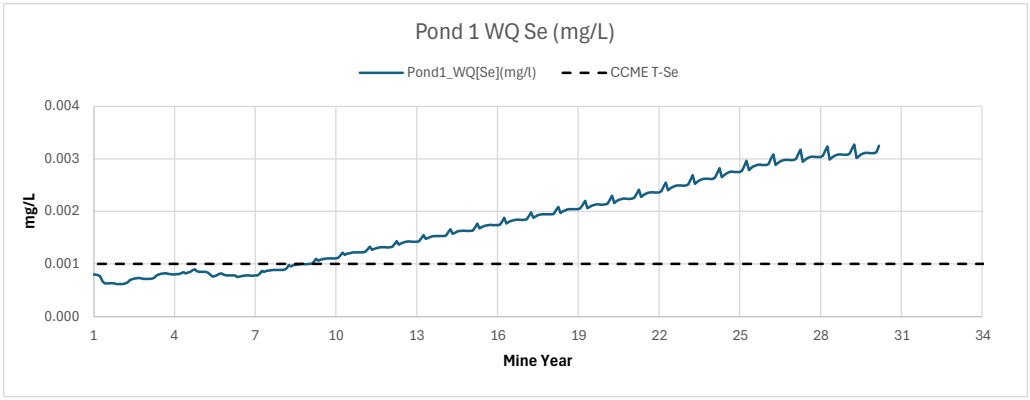

Pond 1 WQ Mo (mg/L)
Pond1_WQ[Mo](mg/l)
CCME T-Mo
mg/L
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

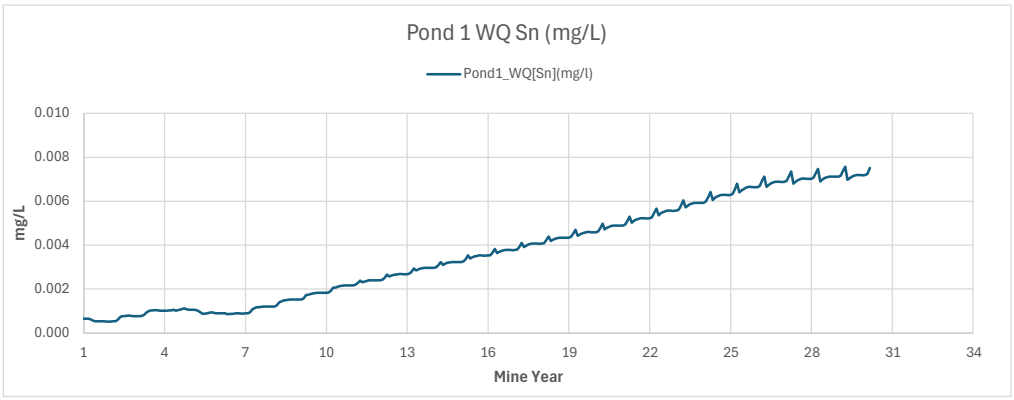

Pond 1 WQ Na (mg/L)
Pond1_WQ[Na](mg/l)
mg/L
0
5
10
15
20
25
30
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

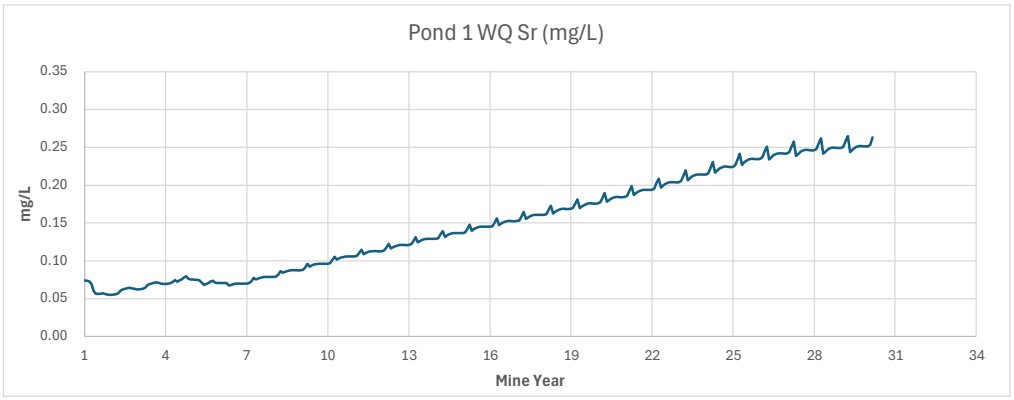

Pond 1 WQ Ni (mg/L)
Pond1_WQ[Ni](mg/l)
CCME T-Ni
PWQOs T-Ni
mg/L
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

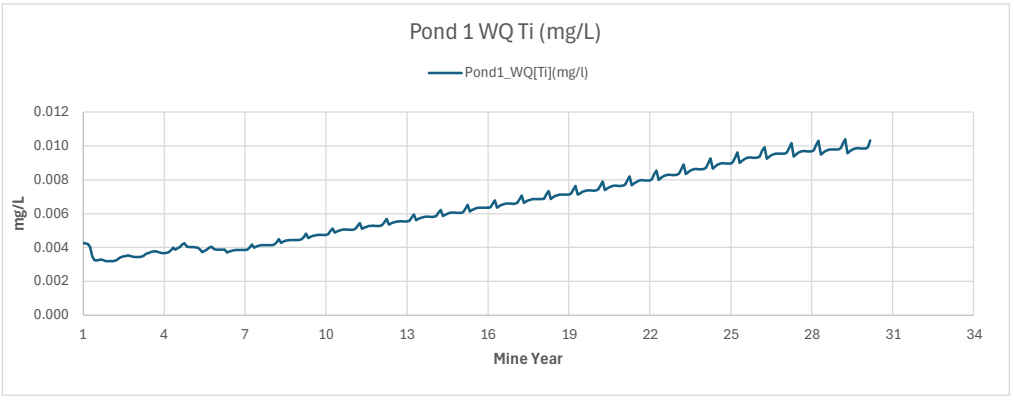

Pond 1 WQ Pb (mg/L)
Pond1_WQ[Pb](mg/l)
CCME T-Pb
PWQOs T-Pb
mg/L
0.004
0.003
0.002
0.001
0.000
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

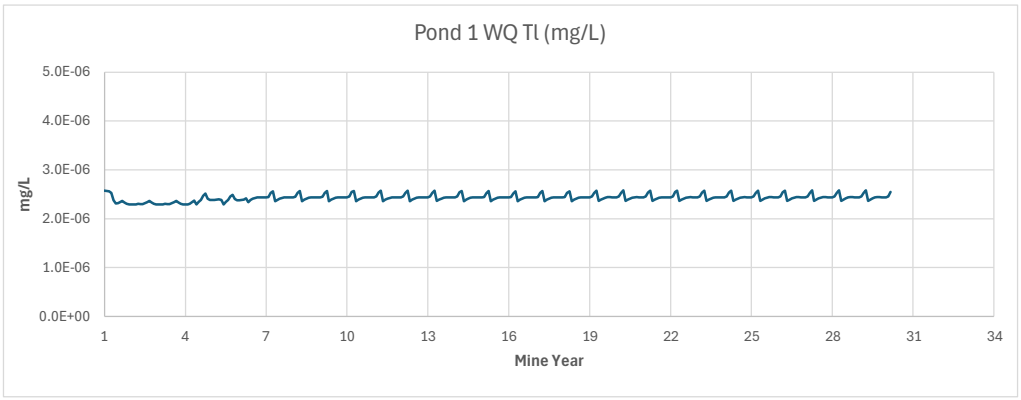

Pond 1 WQ Sb (mg/L)
Pond1_WQ[Sb](mg/l)
PWQOs T-Sb
mg/L
0.025
0.020
0.015
0.010
0.005
0.000
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

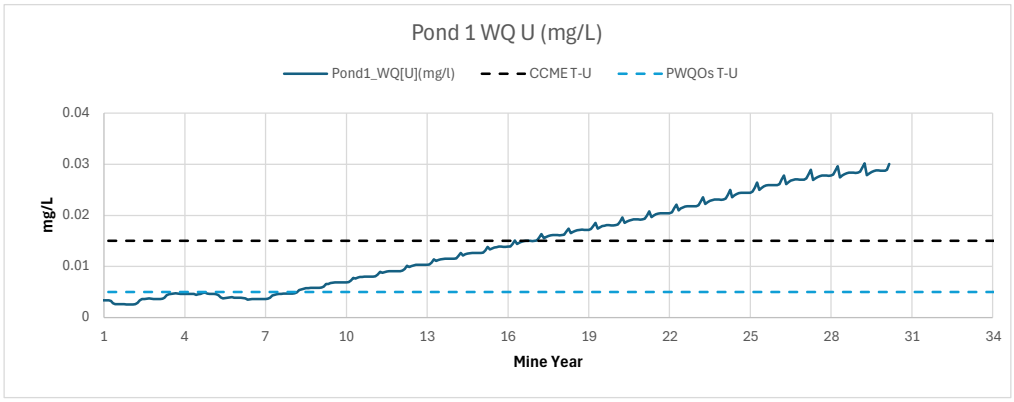

Pond 1 WQ Se (mg/L)
Pond1_WQ[Se](mg/l)
CCME T-Se
mg/L
0.004
0.003
0.002
0.001
0.000
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

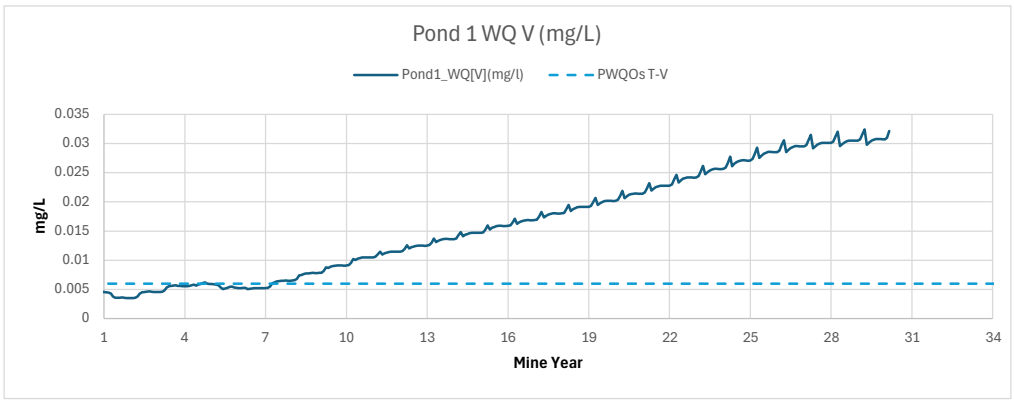

Pond 1 WQ Sn (mg/L)
Pond1_WQ[Sn](mg/l)
0.010
0.008
0.006
0.004
0.002
0.000
mg/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

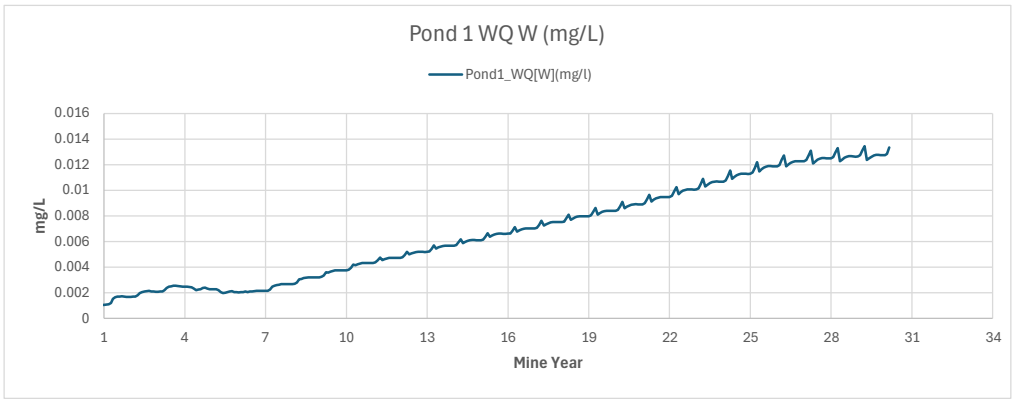

Pond 1 WQ Sr (mg/L)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
mg/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

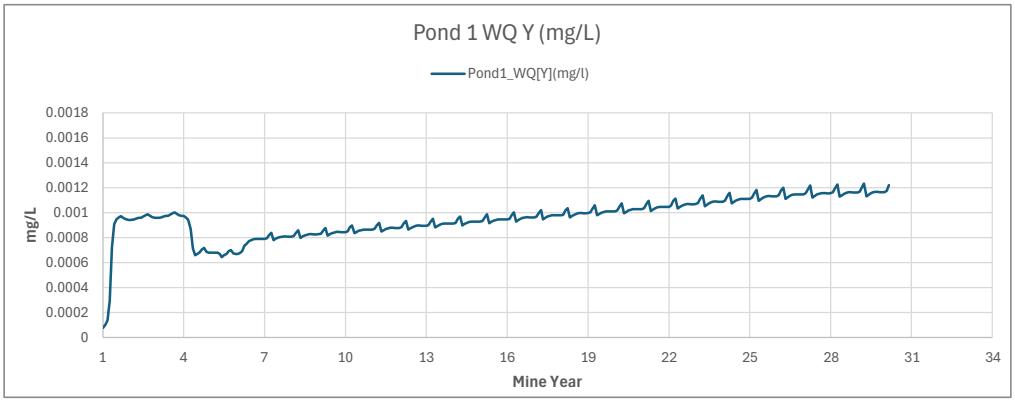

Pond 1 WQ Ti (mg/L)
Pond1_WQ[Ti](mg/l)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
mg/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

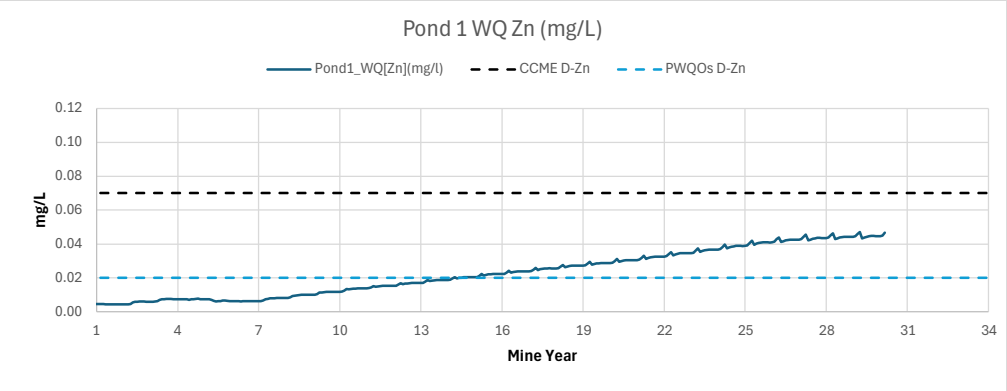

Pond 1 WQ Tl (mg/L)
5.0E-06
4.0E-06
3.0E-06
2.0E-06
1.0E-06
0.0E+00
mg/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

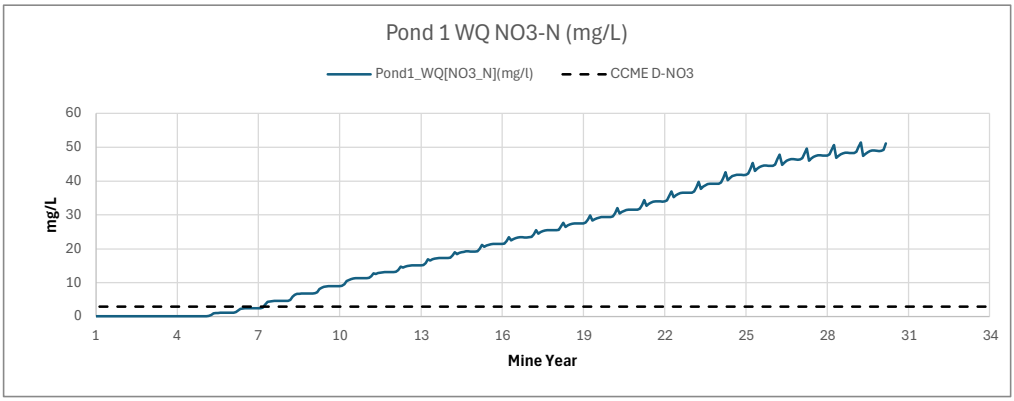

Pond 1 WQ U (mg/L)
Pond1_WQ[U](mg/l)
CCME T-U
PWQOs T-U
mg/L
0.04
0.03
0.02
0.01
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

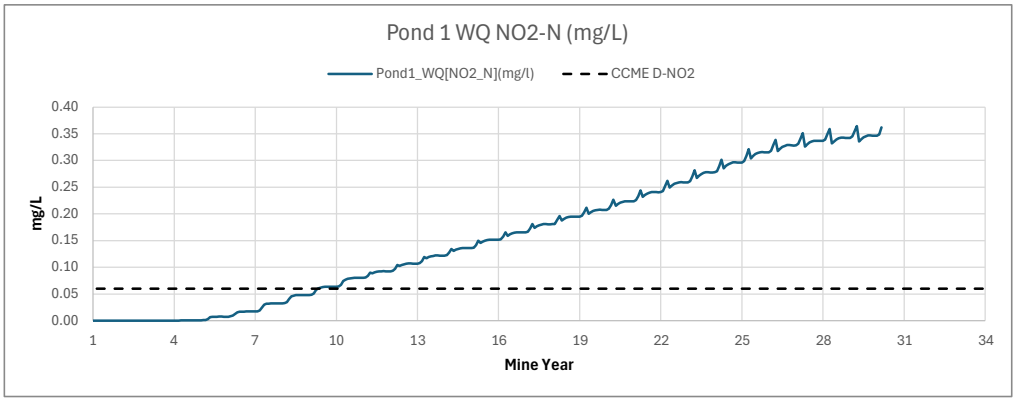

Pond 1 WQ V (mg/L)
Pond1_WQ[V](mg/l)
PWQOs T-V
mg/L
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

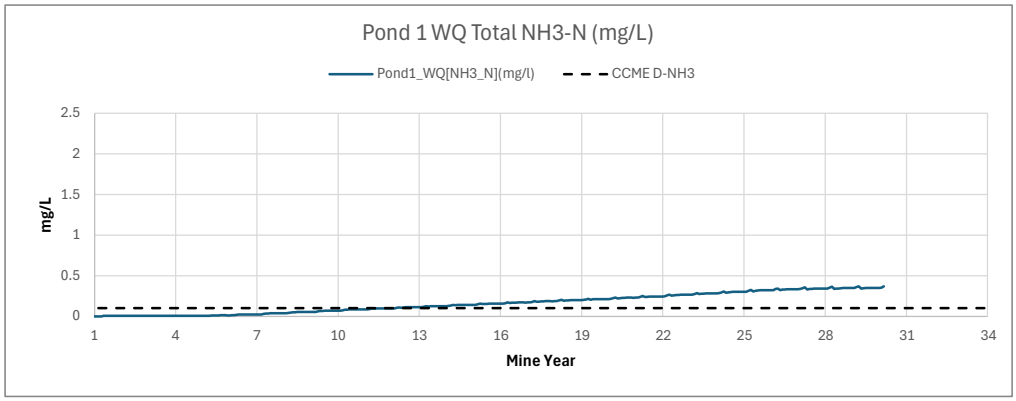

Pond 1 WQ W (mg/L)
Pond1_WQ[W](mg/l)
mg/L
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

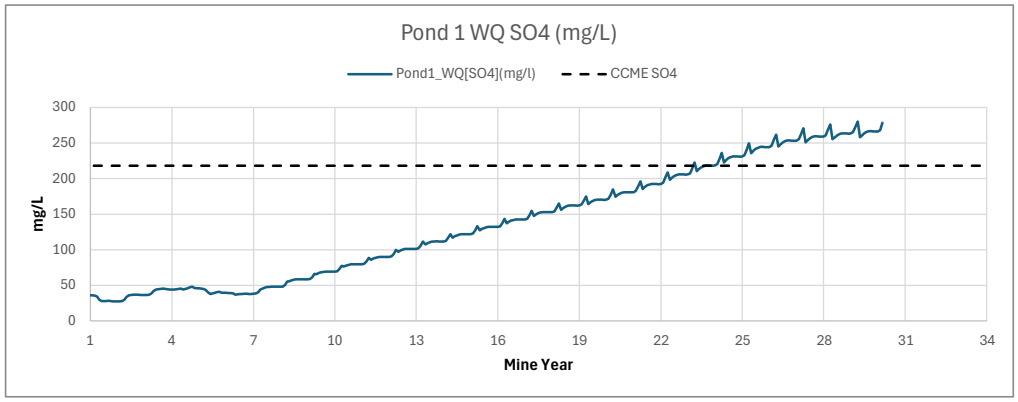

Pond 1 WQ Y (mg/L)
Pond1_WQ[Y](mg/l)
mg/L
0.0018
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

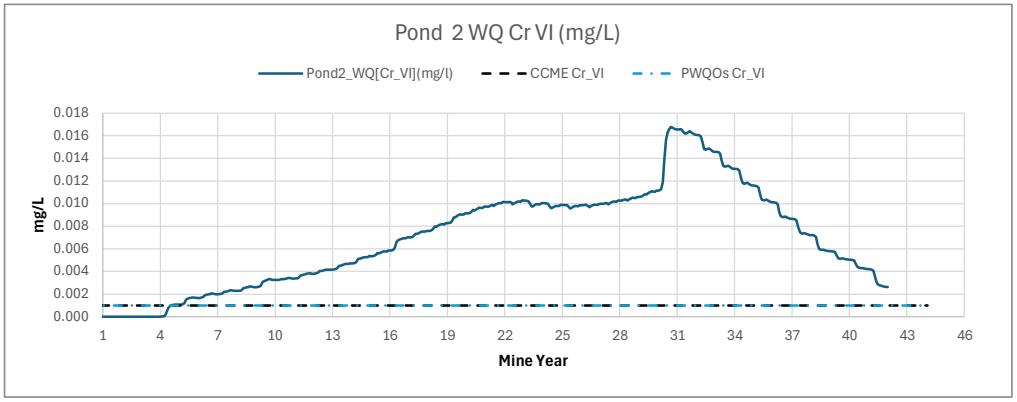

Pond 1 WQ Zn (mg/L)
Pond1_WQ[Zn](mg/l)
CCME D-Zn
PWQOs D-Zn
mg/L
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

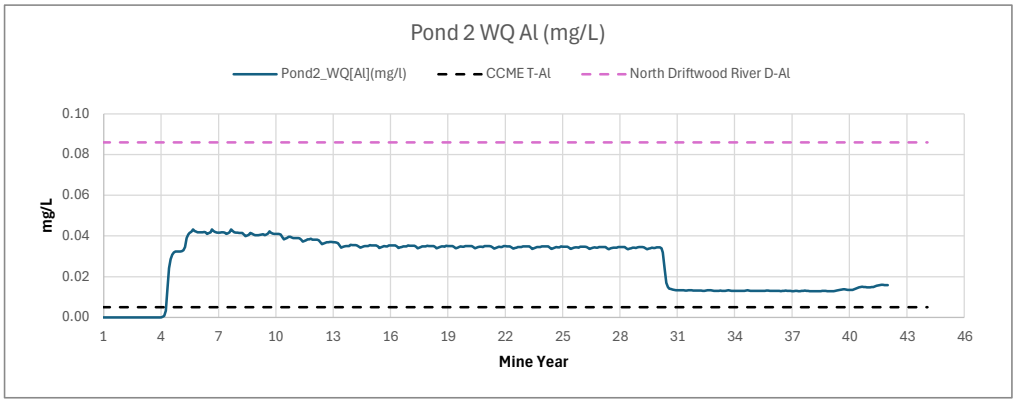

Pond 1 WQ NO3-N (mg/L)
Pond1_WQ[NO3_N](mg/l)
CCME D-NO3
mg/L
60
50
40
30
20
10
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

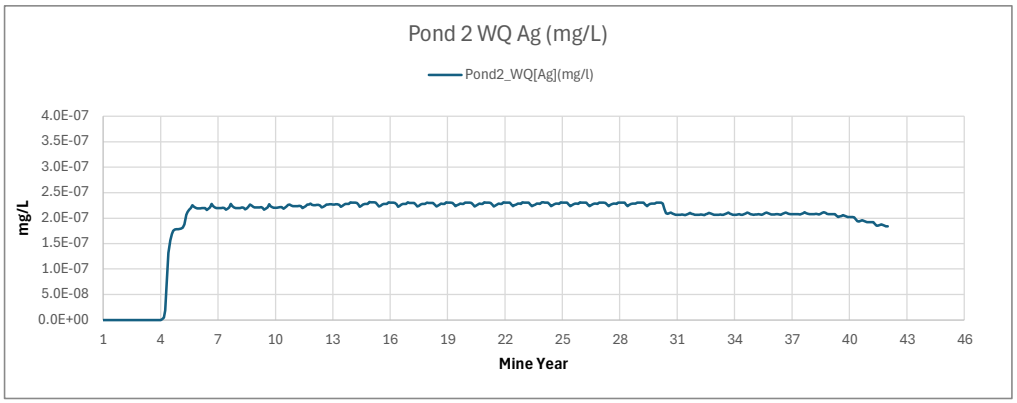

Pond 1 WQ NO2-N (mg/L)
Pond1_WQ[NO2_N](mg/l)
CCME D-NO2
mg/L
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

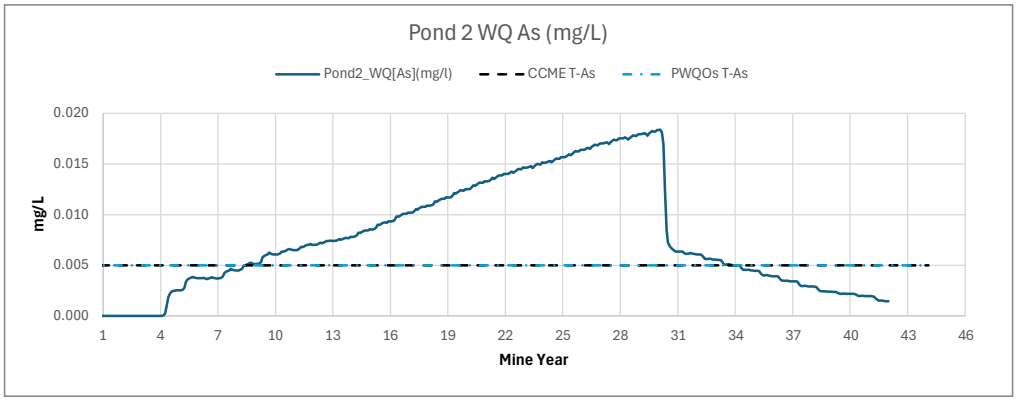

Pond 1 WQ Total NH3-N (mg/L)
Pond1_WQ[NH3_N](mg/l)
CCME D-NH3
mg/L
2.5
2
1.5
1
0.5
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

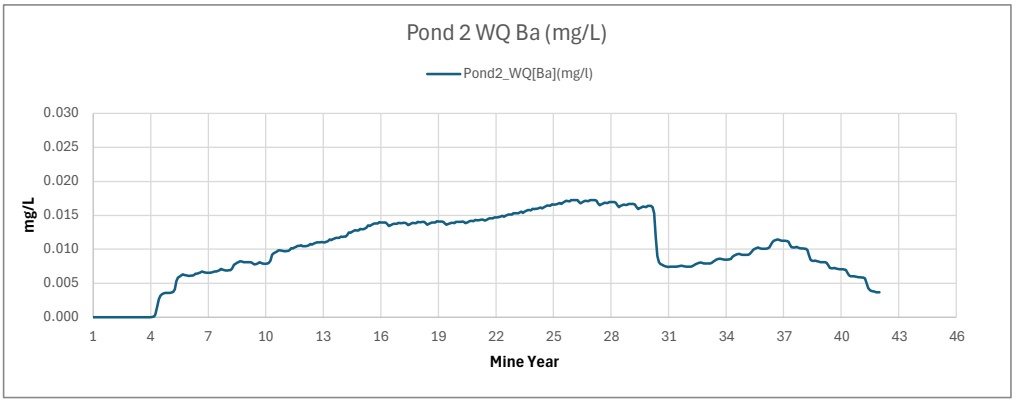

Pond 1 WQ SO4 (mg/L)
Pond1_WQ[SO4](mg/l)
CCME SO4
300
250
200
150
100
50
0
mg/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

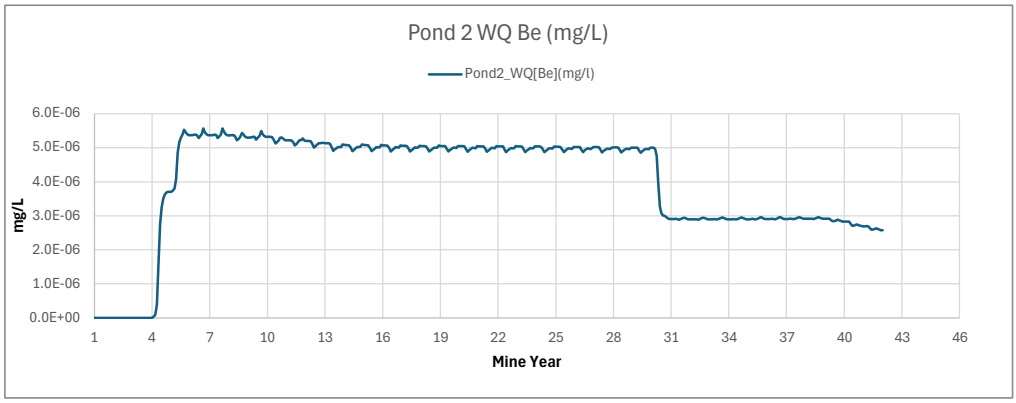

Pond 2 WQ Cr VI (mg/L)
Pond2_WQ[Cr_VI](mg/l)
CCME Cr_VI
PWQOs Cr_VI
mg/L
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

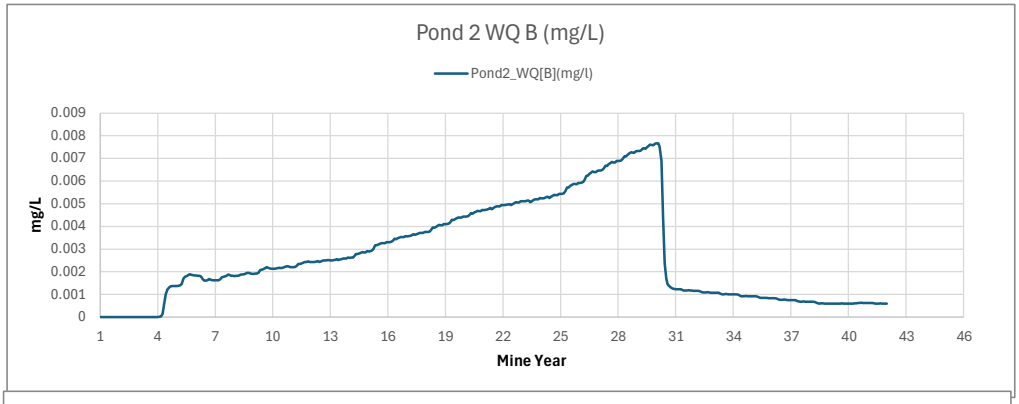

Pond 2 WQ Al (mg/L)
Pond2_WQ[Al](mg/l)
CCME T-Al
North Driftwood River D-Al
mg/L
0.10
0.08
0.06
0.04
0.02
0.00
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

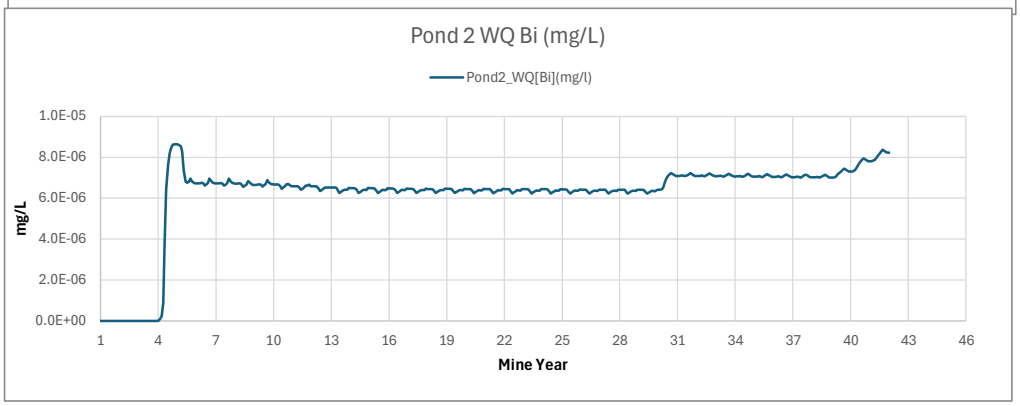

Pond 2 WQ Ag (mg/L)
Pond2_WQ[Ag](mg/l)
mg/L
4.0E-07
3.5E-07
3.0E-07
2.5E-07
2.0E-07
1.5E-07
1.0E-07
5.0E-08
0.0E+00
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

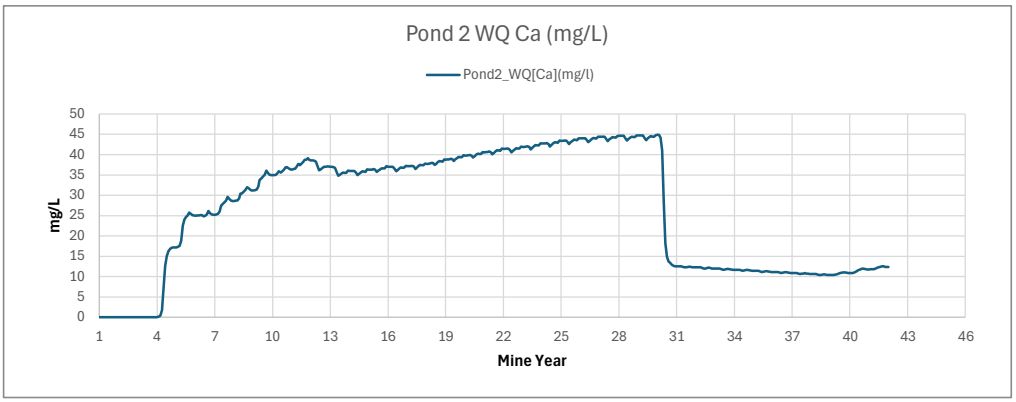

Pond 2 WQ As (mg/L)
Pond2_WQ[As](mg/l)
CCME T-As
PWQOs T-As
mg/L
0.020
0.015
0.010
0.005
0.000
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

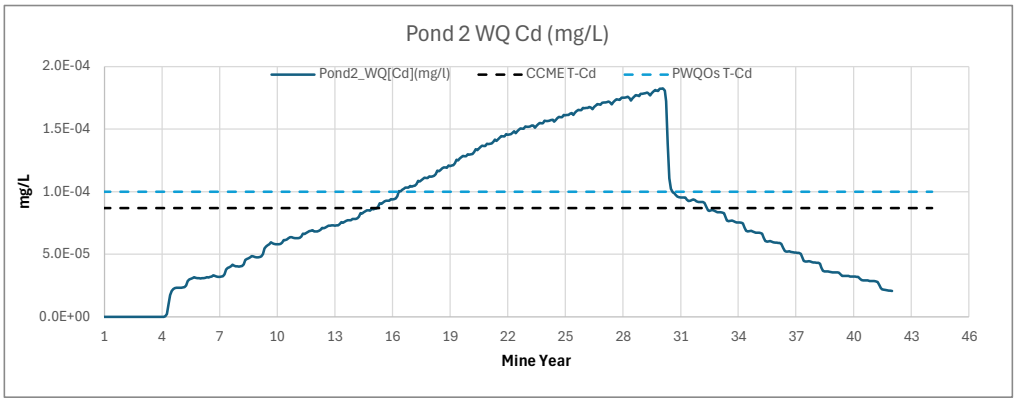

Pond 2 WQ Ba (mg/L)
Pond2_WQ[Ba](mg/l)
mg/L
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

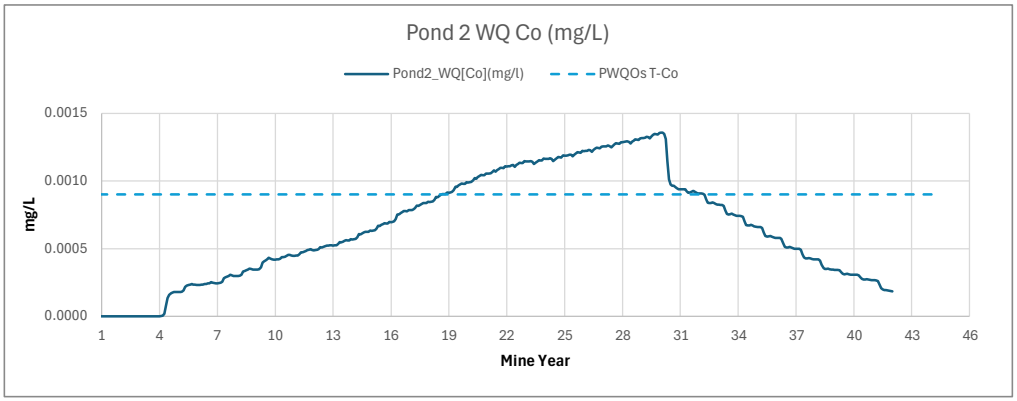

Pond 2 WQ Be (mg/L)
Pond2_WQ[Be](mg/l)
mg/L
6.0E-06
5.0E-06
4.0E-06
3.0E-06
2.0E-06
1.0E-06
0.0E+00
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

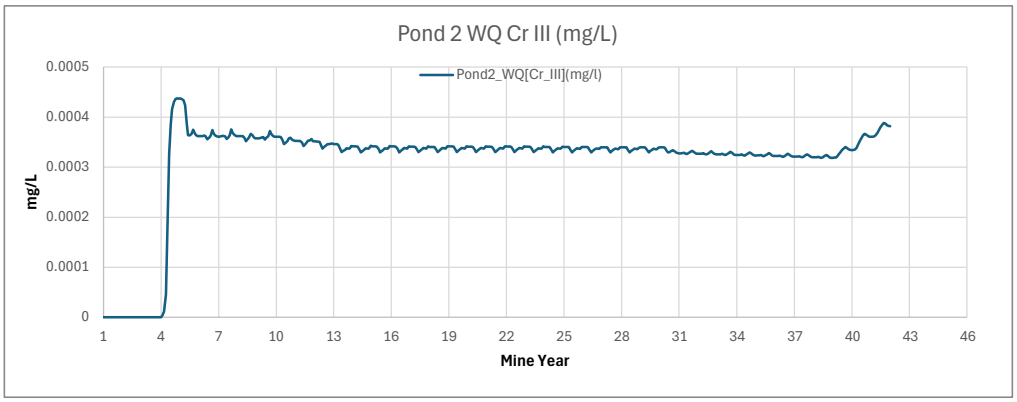

Pond 2 WQ B (mg/L)
Pond2_WQ[B](mg/l)
mg/L
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

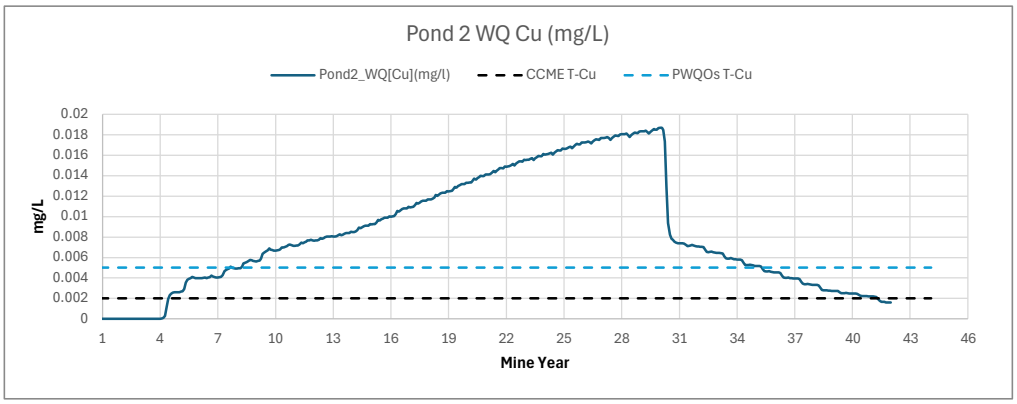

Pond 2 WQ Bi (mg/L)
Pond2_WQ[Bi](mg/l)
mg/L
1.0E-05
8.0E-06
6.0E-06
4.0E-06
2.0E-06
0.0E+00
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

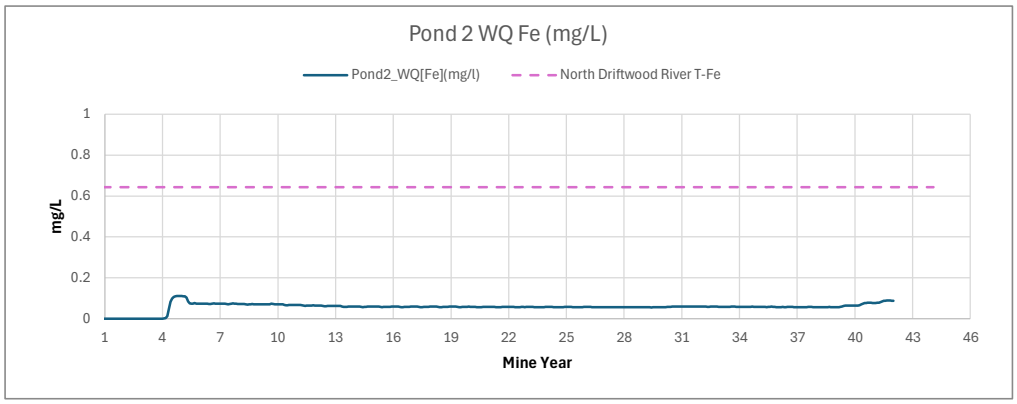

Pond 2 WQ Ca (mg/L)
Pond2_WQ[Ca](mg/l)
mg/L
Mine Year

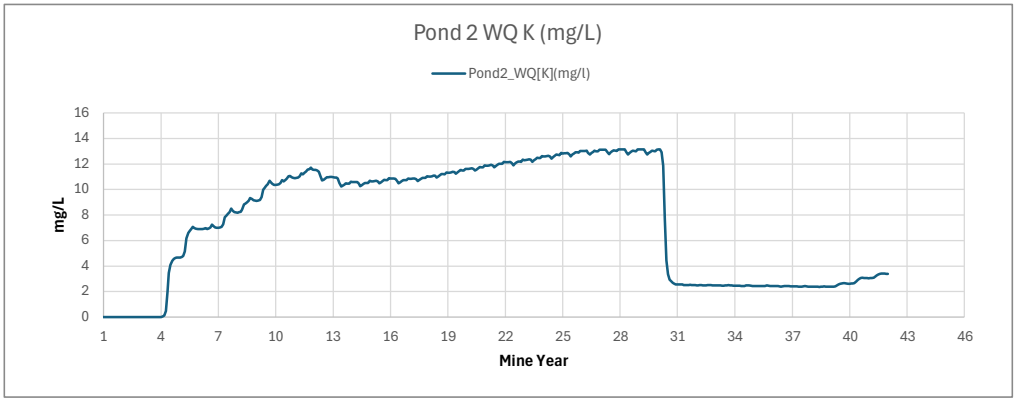

Pond 2 WQ Cd (mg/L)
Pond2_WQ[Cd](mg/l)
CCME T-Cd
PWQOs T-Cd
mg/L
Mine Year

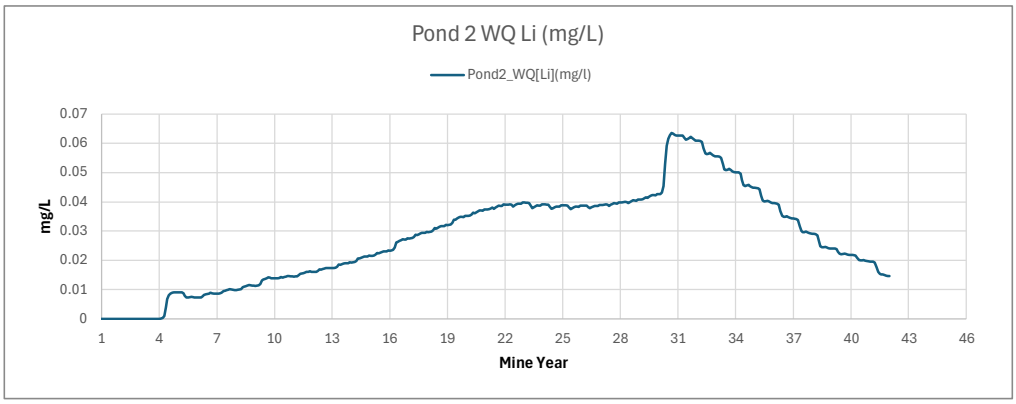

Pond 2 WQ Co (mg/L)
Pond2_WQ[Co](mg/l)
PWQOs T-Co
mg/L
Mine Year

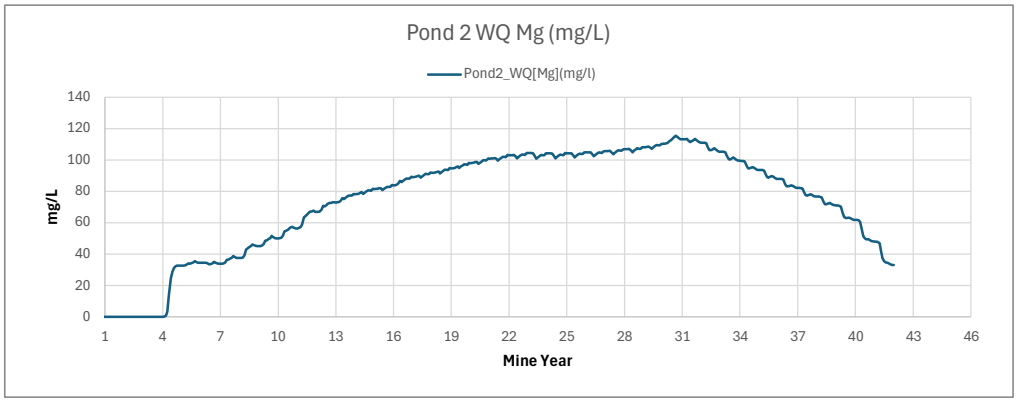

Pond 2 WQ Cr III (mg/L)
Pond2_WQ[Cr_III](mg/l)
mg/L
Mine Year

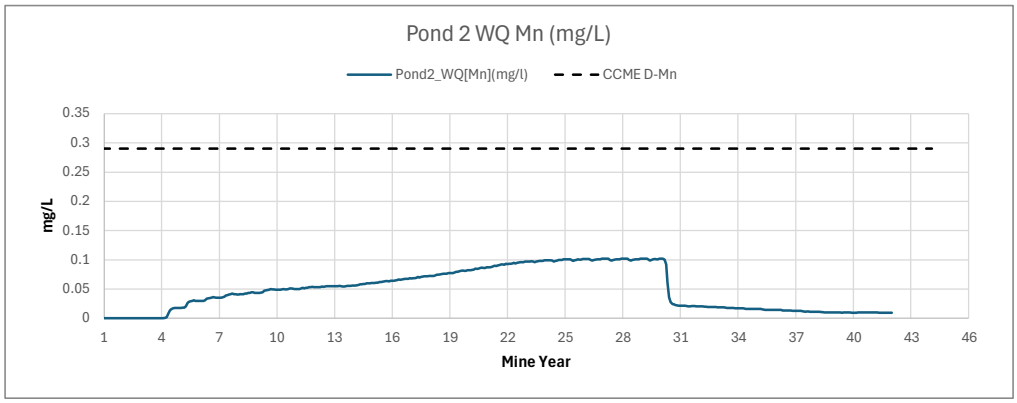

Pond 2 WQ Cu (mg/L)
Pond2_WQ[Cu](mg/l)
CCME T-Cu
PWQOs T-Cu
mg/L
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

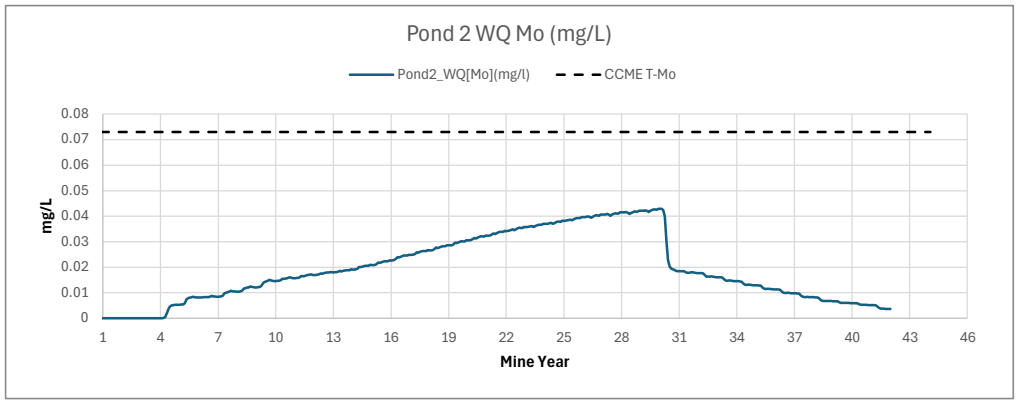

Pond 2 WQ Fe (mg/L)
Pond2_WQ[Fe](mg/l)
North Driftwood River T-Fe
mg/L
1
0.8
0.6
0.4
0.2
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

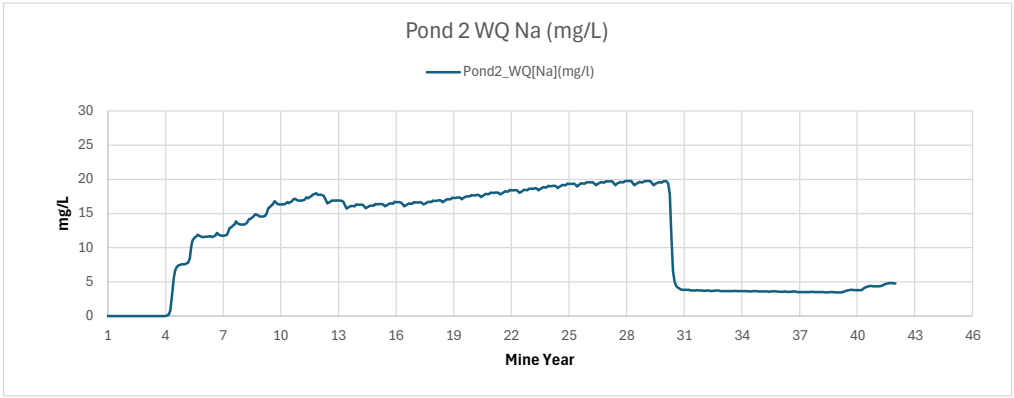

Pond 2 WQ K (mg/L)
Pond2_WQ[K](mg/l)
mg/L
16
14
12
10
8
6
4
2
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

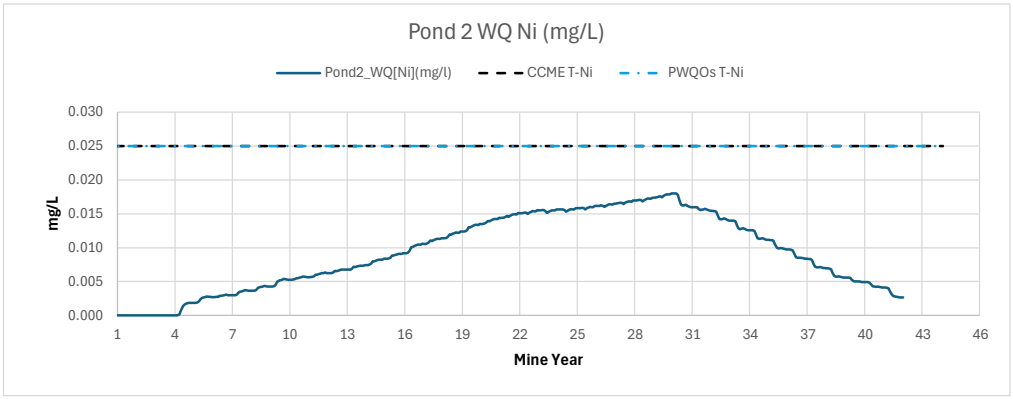

Pond 2 WQ Li (mg/L)
Pond2_WQ[Li](mg/l)
mg/L
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

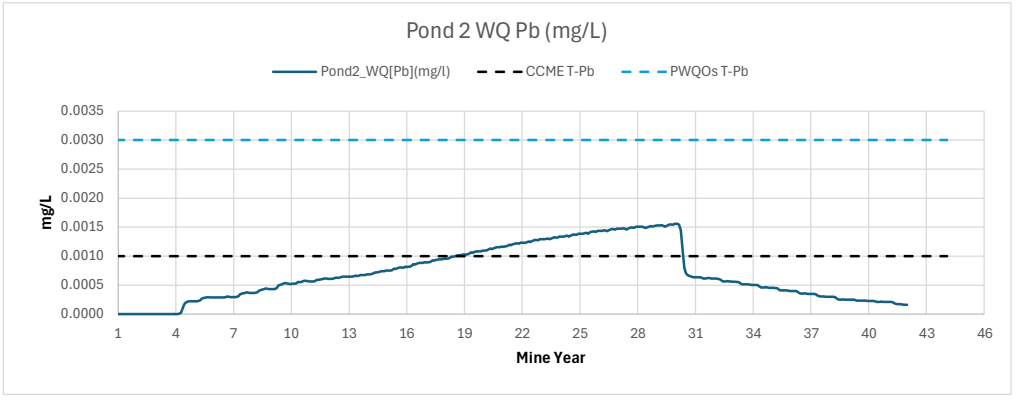

Pond 2 WQ Mg (mg/L)
Pond2_WQ[Mg](mg/l)
mg/L
0
20
40
60
80
100
120
140
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
Mine Year

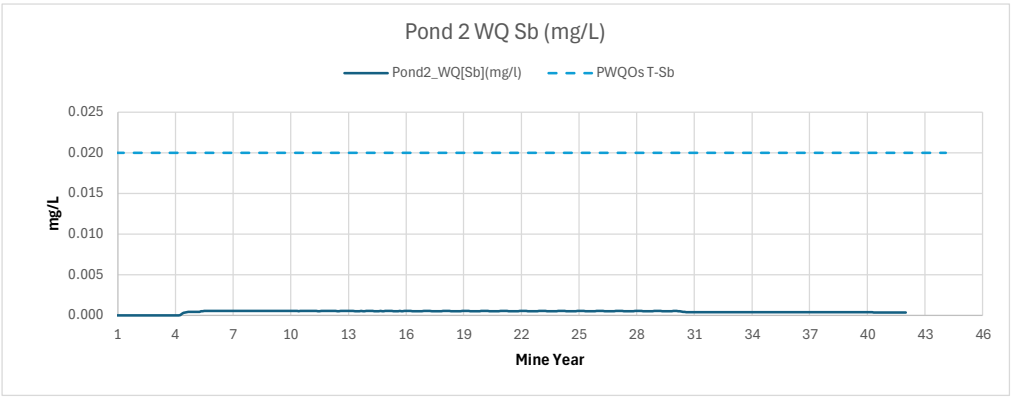

Pond 2 WQ Mn (mg/L)
Pond2_WQ[Mn](mg/l)
CCME D-Mn
mg/L
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
Mine Year

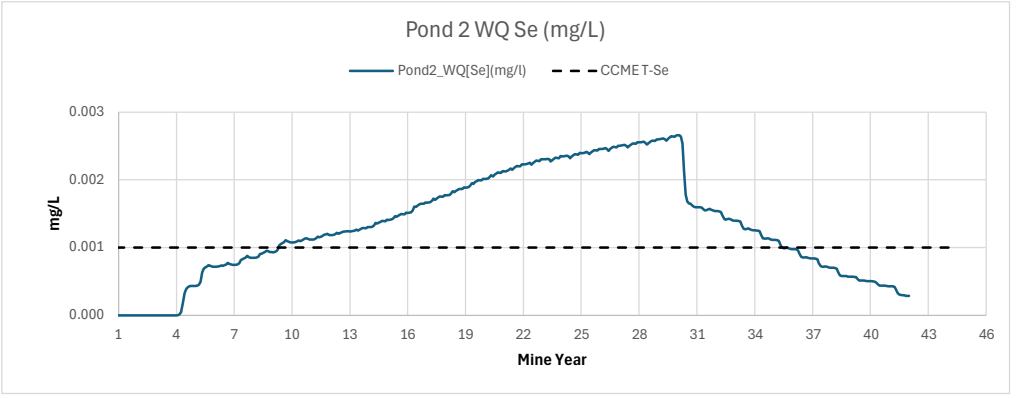

Pond 2 WQ Mo (mg/L)
Pond2_WQ[Mo](mg/l)
CCME T-Mo
mg/L
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
Mine Year

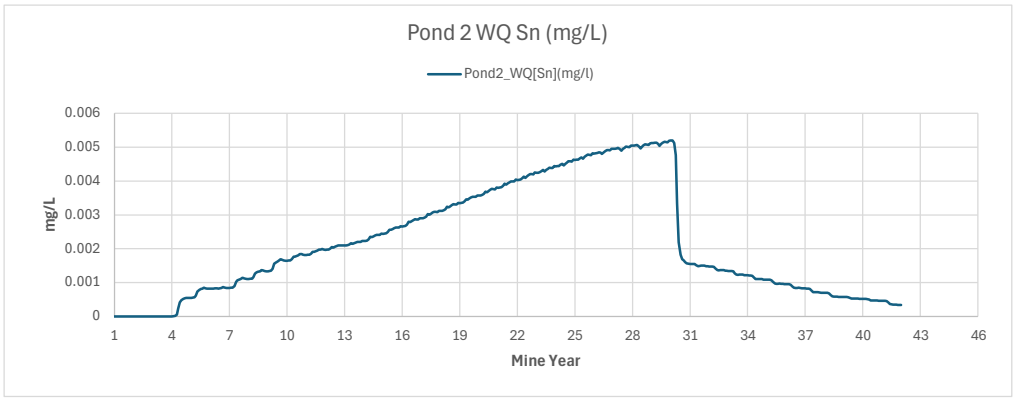

Pond 2 WQ Na (mg/L)
Pond2_WQ[Na](mg/l)
mg/L
0
5
10
15
20
25
30
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
Mine Year

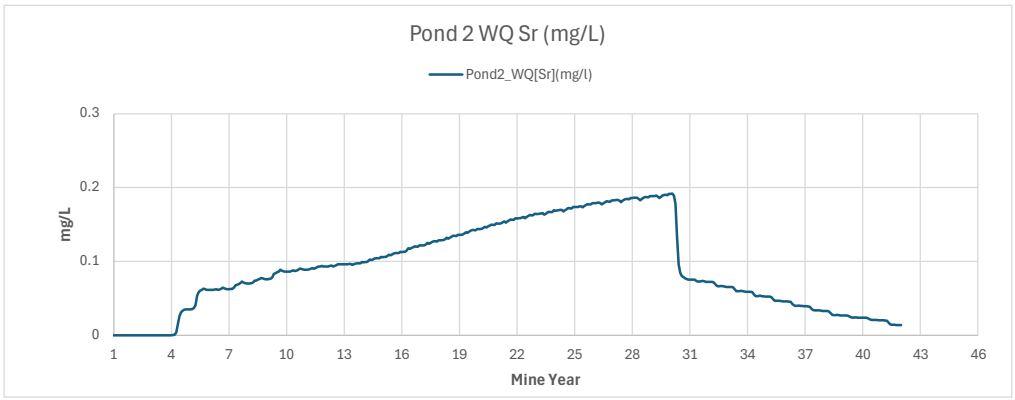

Pond 2 WQ Ni (mg/L)
Pond2_WQ[Ni](mg/l)
CCME T-Ni
PWQOs T-Ni
mg/L
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

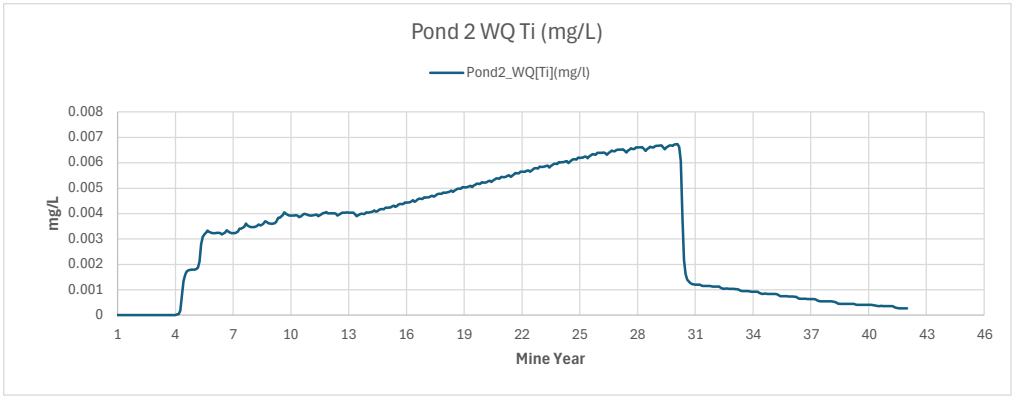

Pond 2 WQ Pb (mg/L)
Pond2_WQ[Pb](mg/l)
CCME T-Pb
PWQOs T-Pb
mg/L
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

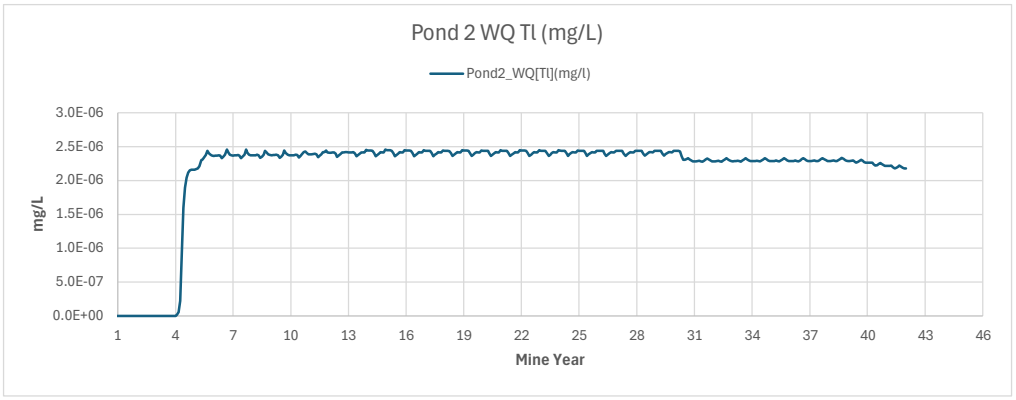

Pond 2 WQ Sb (mg/L)
Pond2_WQ[Sb](mg/l)
PWQOs T-Sb
mg/L
0.025
0.020
0.015
0.010
0.005
0.000
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

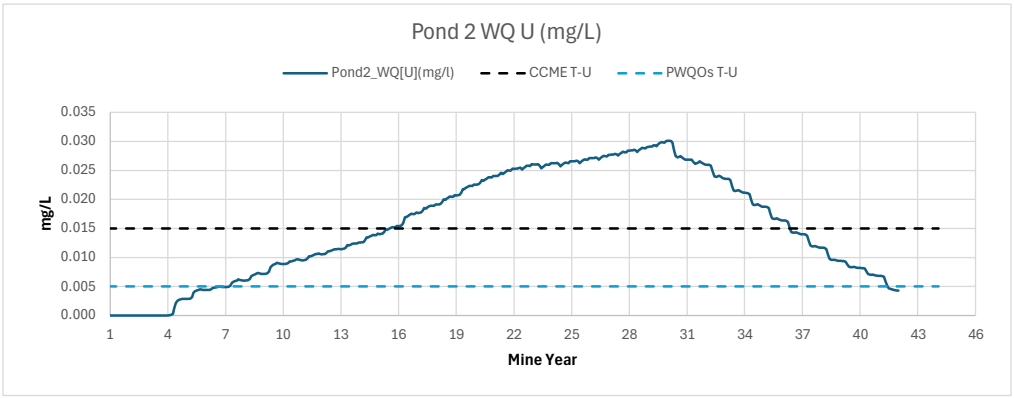

Pond 2 WQ Se (mg/L)
Pond2_WQ[Se](mg/l)
CCME T-Se
mg/L
0.003
0.002
0.001
0.000
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

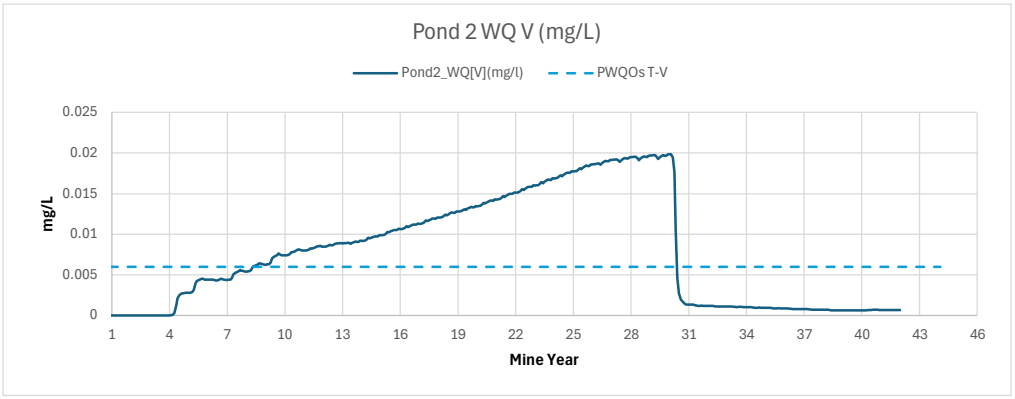

Pond 2 WQ Sn (mg/L)
Pond2_WQ[Sn](mg/l)
mg/L
0.006
0.005
0.004
0.003
0.002
0.001
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

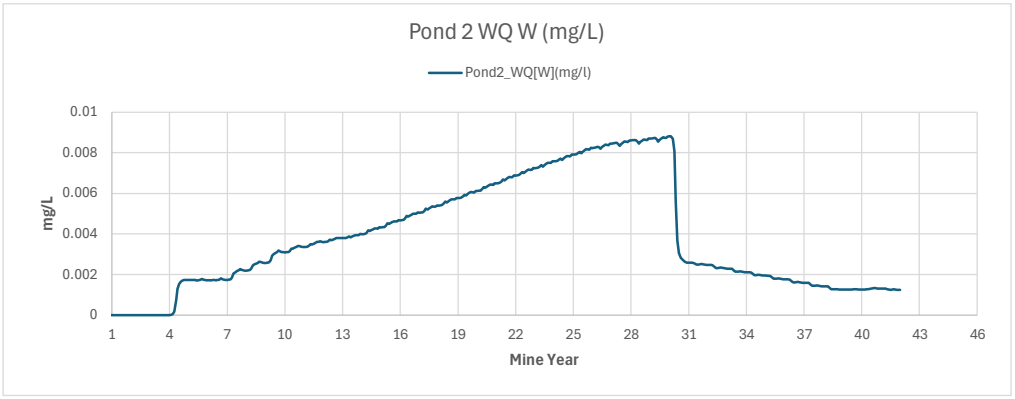

Pond 2 WQ Sr (mg/L)
Pond2_WQ[Sr](mg/l)
mg/L
0.3
0.2
0.1
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

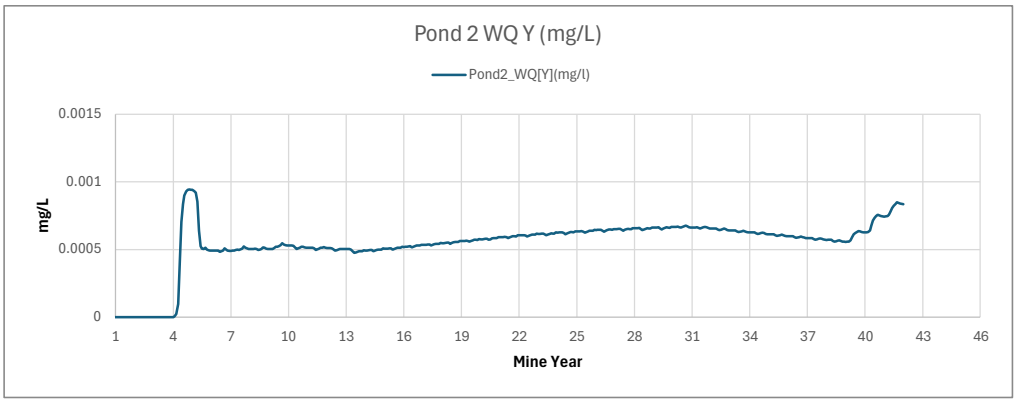

Pond 2 WQ Ti (mg/L)
Pond2_WQ[Ti](mg/l)
mg/L
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

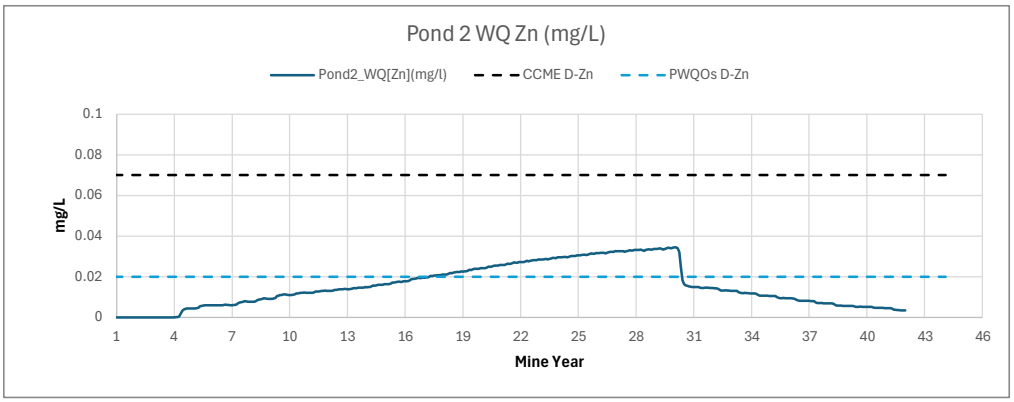

Pond 2 WQ Tl (mg/L)
Pond2_WQ[Tl](mg/l)
mg/L
3.0E-06
2.5E-06
2.0E-06
1.5E-06
1.0E-06
5.0E-07
0.0E+00
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

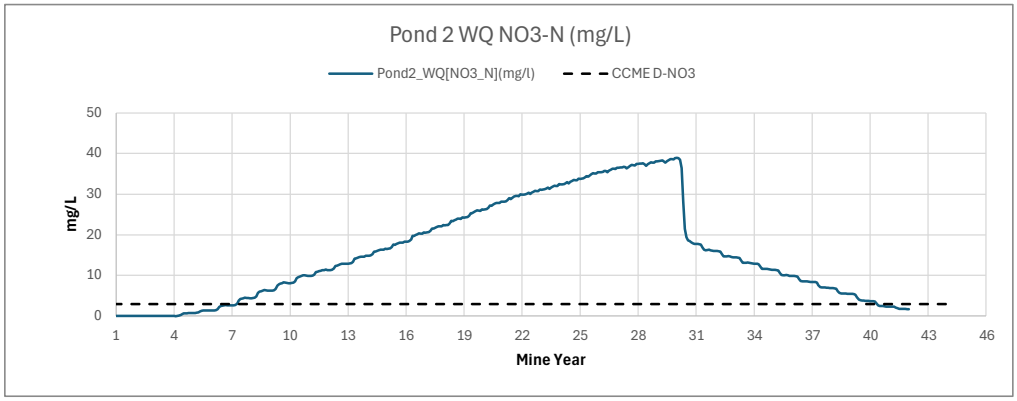

Pond 2 WQ U (mg/L)
Pond2_WQ[U](mg/l)
CCME T-U
PWQOs T-U
mg/L
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

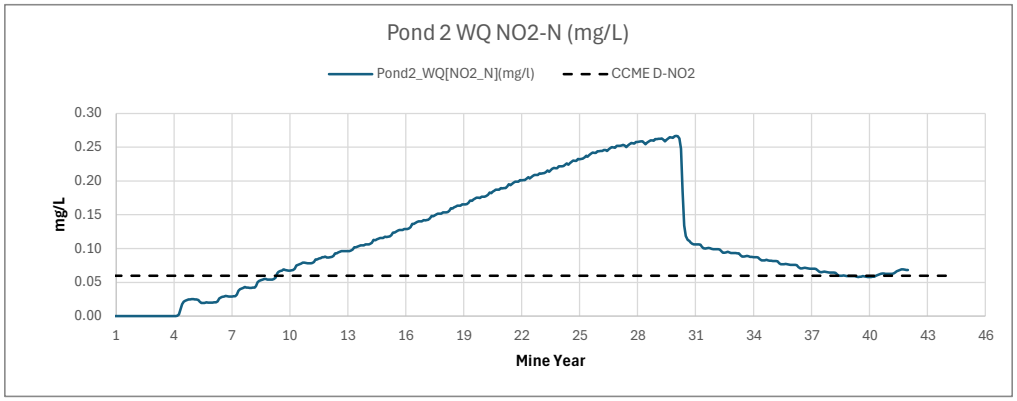

Pond 2 WQ V (mg/L)
Pond2_WQ[V](mg/l)
PWQOs T-V
mg/L
0.025
0.02
0.015
0.01
0.005
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

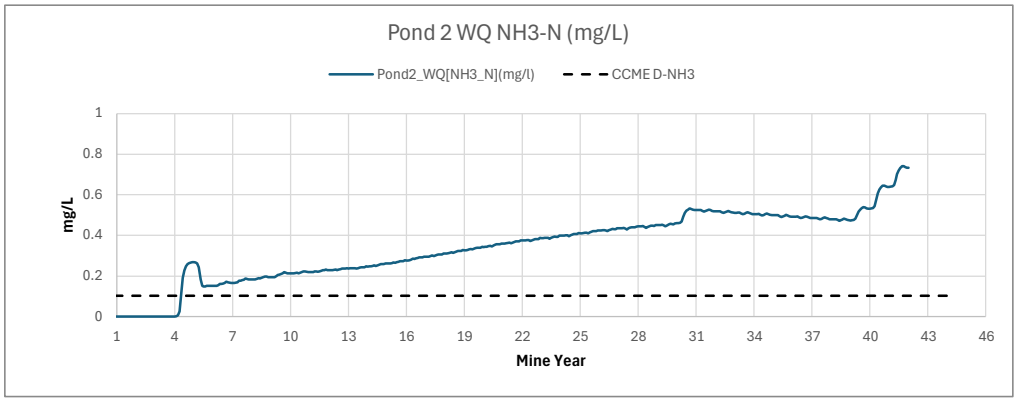

Pond 2 WQ W (mg/L)
Pond2_WQ[W](mg/l)
mg/L
0.01
0.008
0.006
0.004
0.002
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

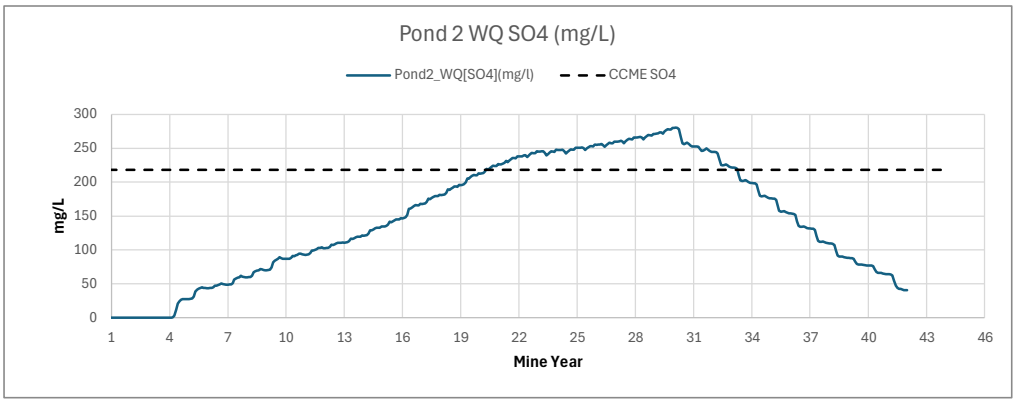

Pond 2 WQ Y (mg/L)
Pond2_WQ[Y](mg/l)
mg/L
0.0015
0.001
0.0005
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

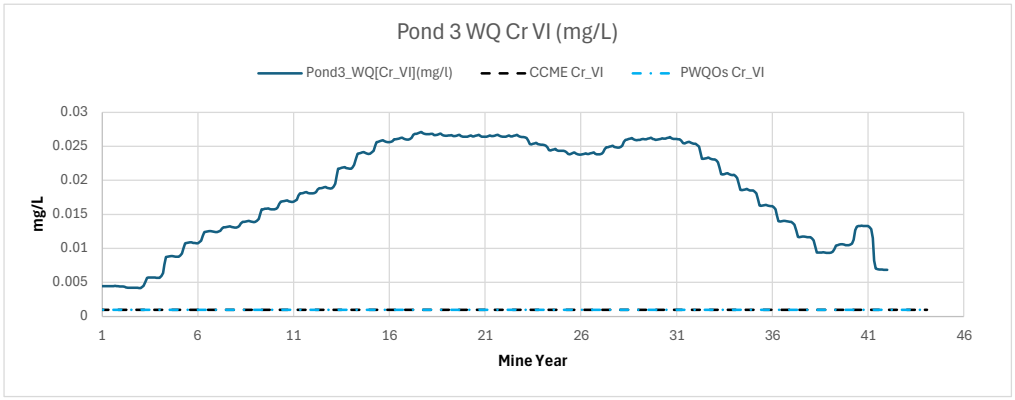

Pond 2 WQ Zn (mg/L)
Pond2_WQ[Zn](mg/l)
CCME D-Zn
PWQOs D-Zn
mg/L
0.1
0.08
0.06
0.04
0.02
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

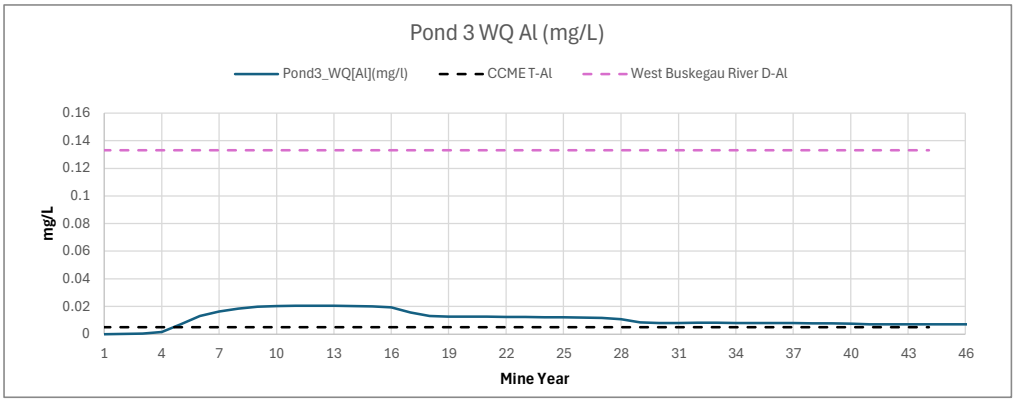

Pond 2 WQ NO3-N (mg/L)
Pond2_WQ[NO3_N](mg/l)
CCME D-NO3
mg/L
50
40
30
20
10
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

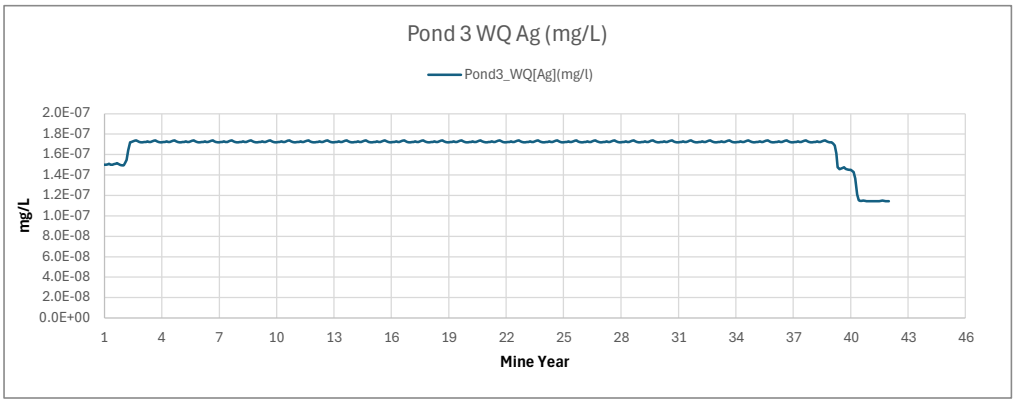

Pond 2 WQ NO2-N (mg/L)
Pond2_WQ[NO2_N](mg/l)
CCME D-NO2
mg/L
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

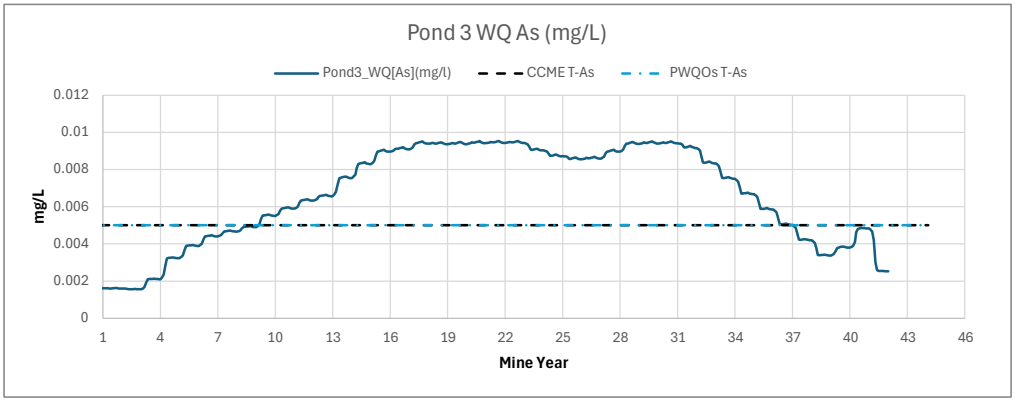

Pond 2 WQ NH3-N (mg/L)
Pond2_WQ[NH3_N](mg/l)
CCME D-NH3
mg/L
1
0.8
0.6
0.4
0.2
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

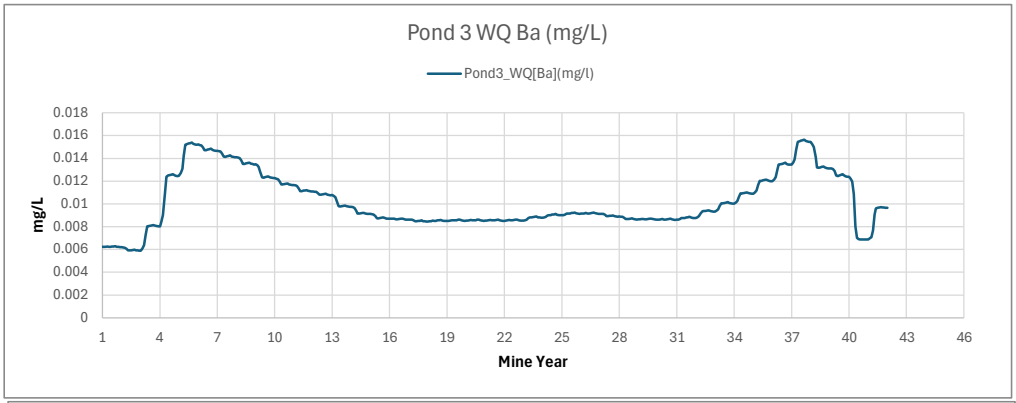

Pond 2 WQ SO4 (mg/L)
Pond2_WQ[SO4](mg/l)
CCME SO4
mg/L
300
250
200
150
100
50
0
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
Mine Year

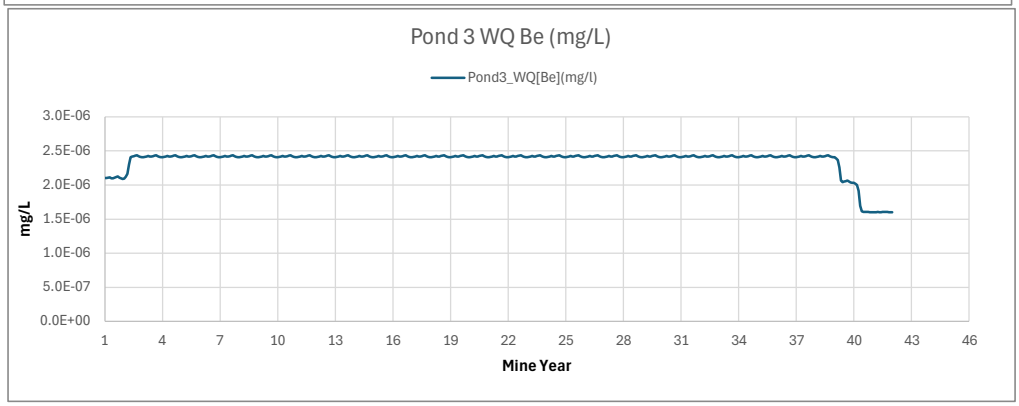

Pond 3 WQ Cr VI (mg/L)
Pond3_WQ[Cr_VI](mg/l)
CCME Cr_VI
PWQOs Cr_VI
mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
1
6
11
16
21
26
31
36
41
46
Mine Year

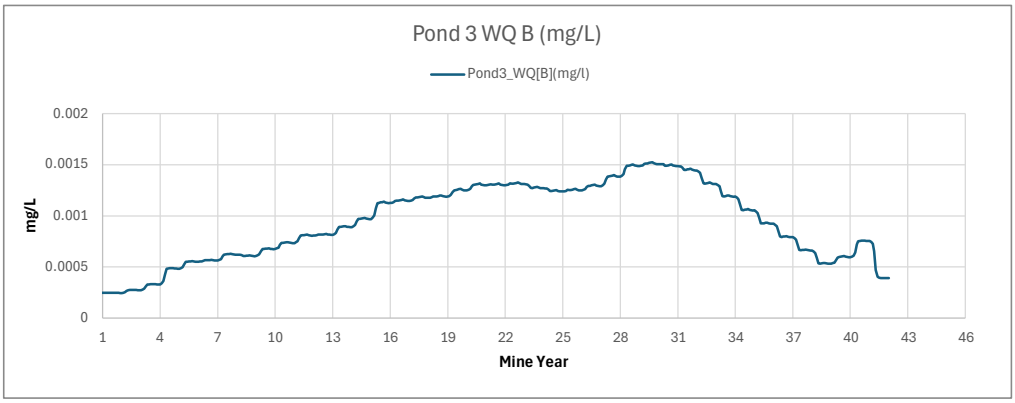

Pond 3 WQ Al (mg/L)
Pond3_WQ[Al](mg/l)
CCME T-Al
West Buskegau River D-Al
mg/L
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
Mine Year

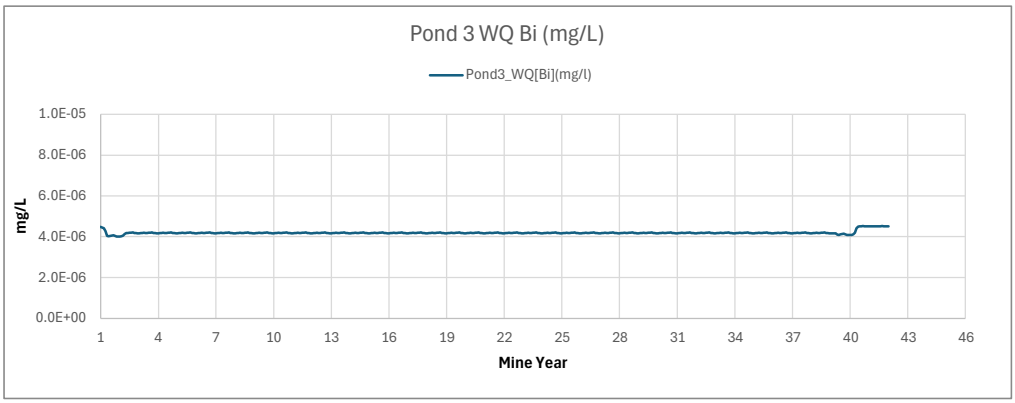

Pond 3 WQ Ag (mg/L)
Pond3_WQ[Ag](mg/l)
mg/L
2.0E-07
1.8E-07
1.6E-07
1.4E-07
1.2E-07
1.0E-07
8.0E-08
6.0E-08
4.0E-08
2.0E-08
0.0E+00
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
Mine Year

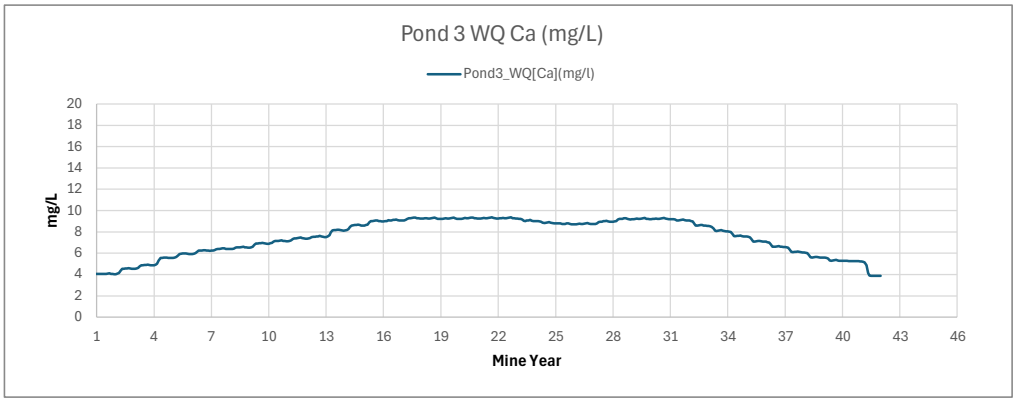

Pond 3 WQ As (mg/L)
Pond3_WQ[As](mg/l)
CCME T-As
PWQOs T-As
mg/L
0.012
0.01
0.008
0.006
0.004
0.002
0
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
Mine Year

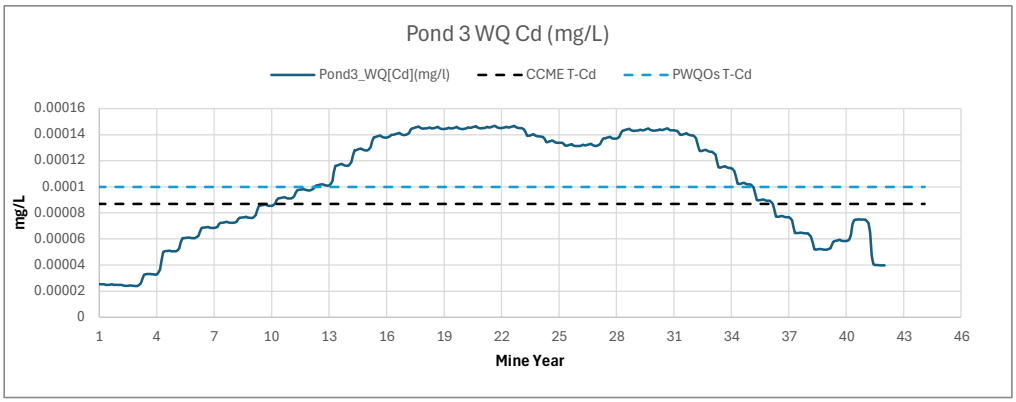

Pond 3 WQ Ba (mg/L)
Pond3_WQ[Ba](mg/l)
mg/L
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

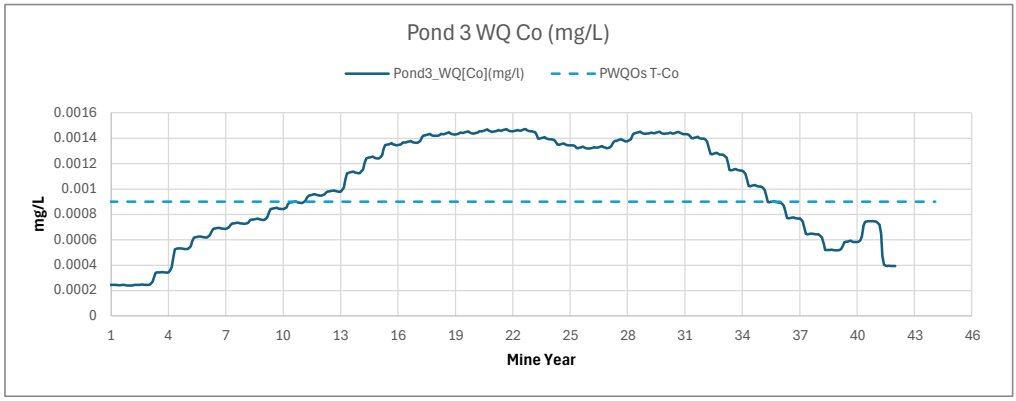

Pond 3 WQ Be (mg/L)
Pond3_WQ[Be](mg/l)
mg/L
3.0E-06
2.5E-06
2.0E-06
1.5E-06
1.0E-06
5.0E-07
0.0E+00
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

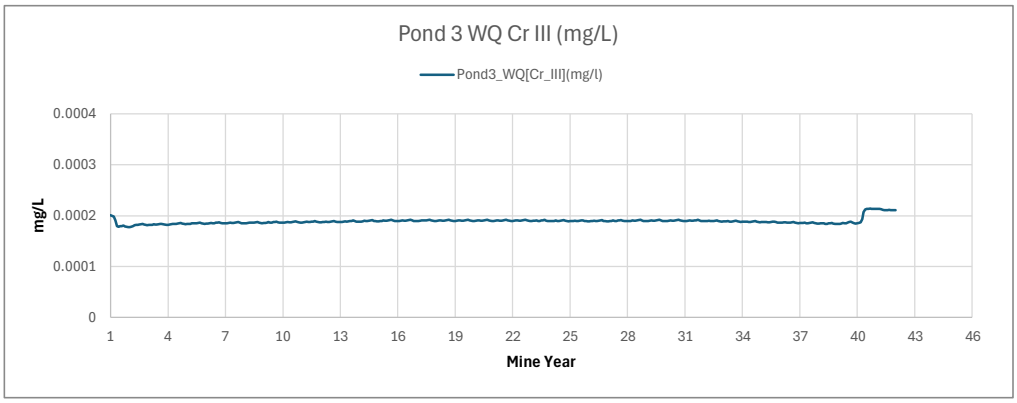

Pond 3 WQ B (mg/L)
Pond3_WQ[B](mg/l)
mg/L
0.002
0.0015
0.001
0.0005
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

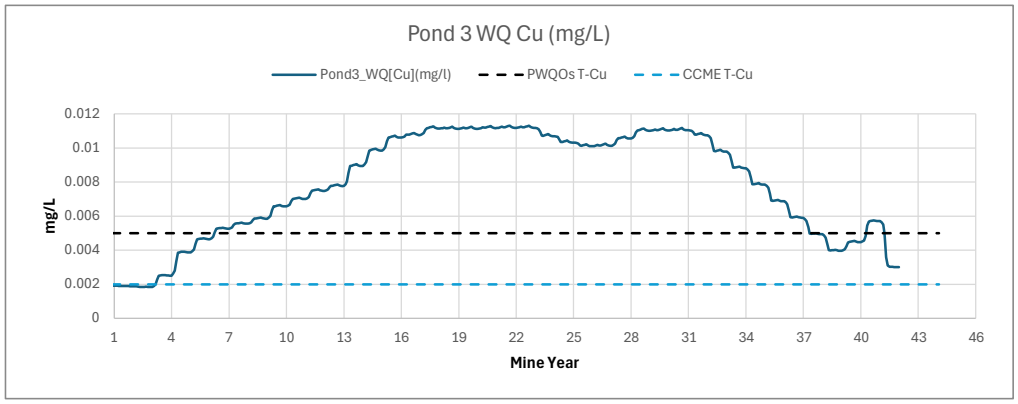

Pond 3 WQ Bi (mg/L)
Pond3_WQ[Bi](mg/l)
mg/L
1.0E-05
8.0E-06
6.0E-06
4.0E-06
2.0E-06
0.0E+00
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

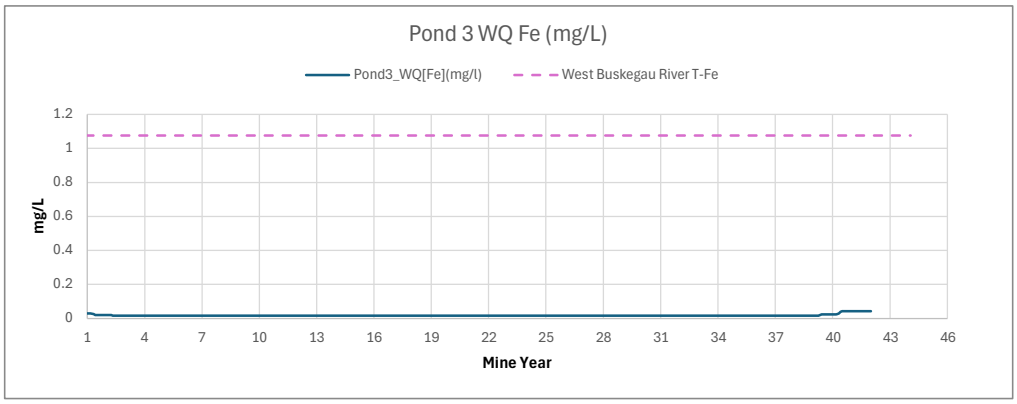

Pond 3 WQ Ca (mg/L)
Pond3_WQ[Ca](mg/l)
mg/L
Mine Year

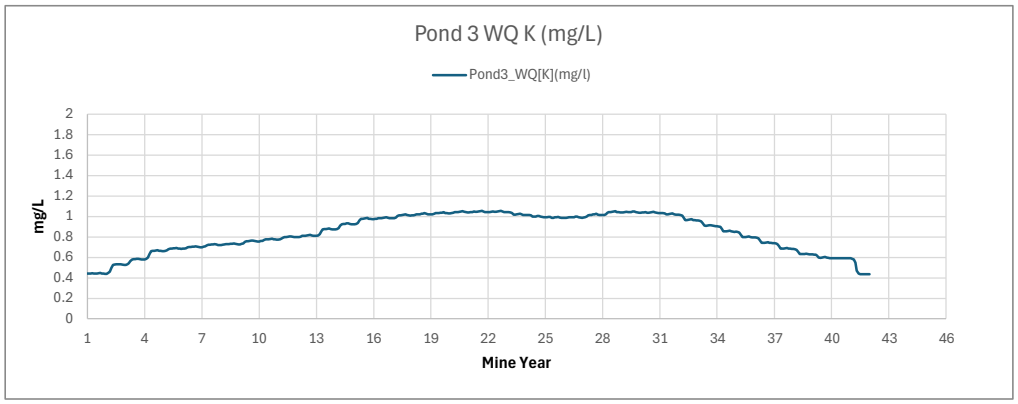

Pond 3 WQ Cd (mg/L)
Pond3_WQ[Cd](mg/l)
CCME T-Cd
PWQOs T-Cd
mg/L
Mine Year

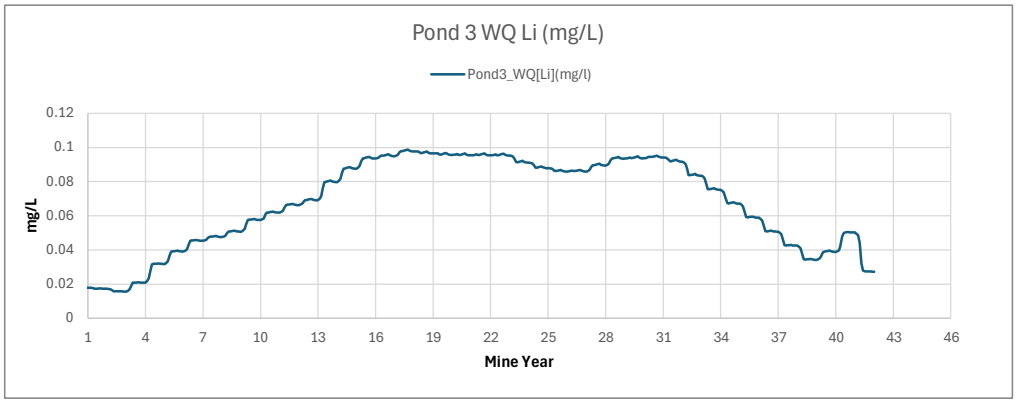

Pond 3 WQ Co (mg/L)
Pond3_WQ[Co](mg/l)
PWQOs T-Co
mg/L
Mine Year

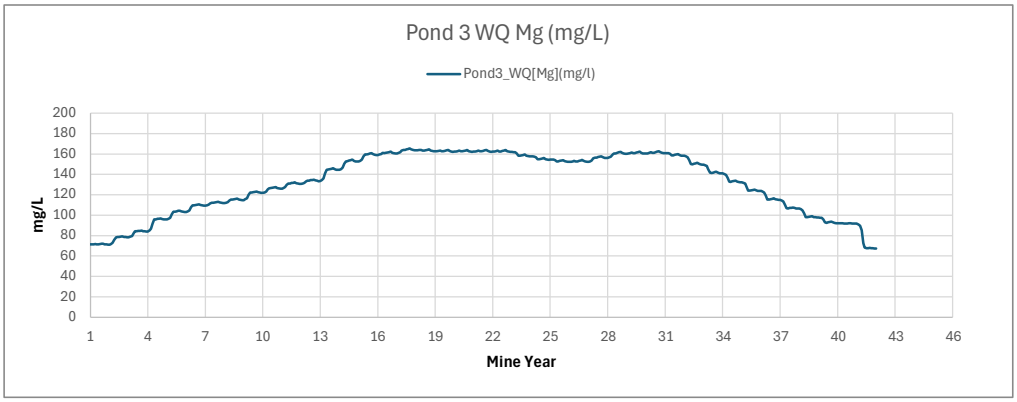

Pond 3 WQ Cr III (mg/L)
Pond3_WQ[Cr_III](mg/l)
mg/L
Mine Year

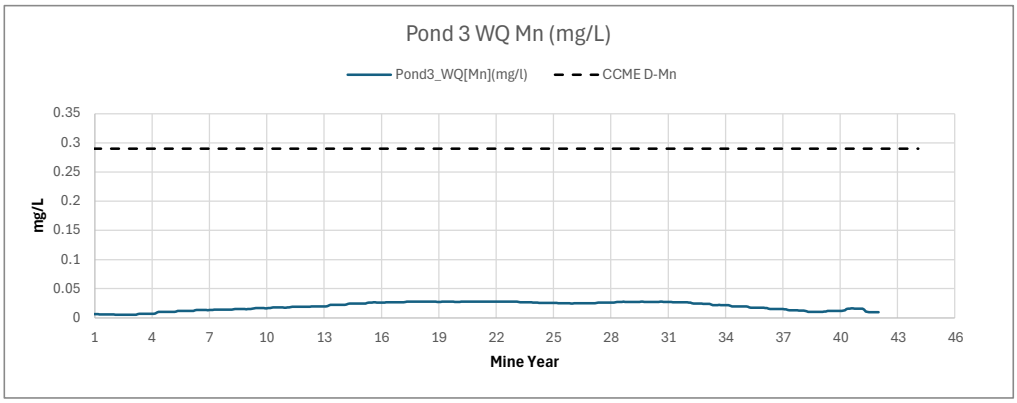

Pond 3 WQ Cu (mg/L)
Pond3_WQ[Cu](mg/l)
PWQOs T-Cu
CCME T-Cu
mg/L
0.012
0.01
0.008
0.006
0.004
0.002
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

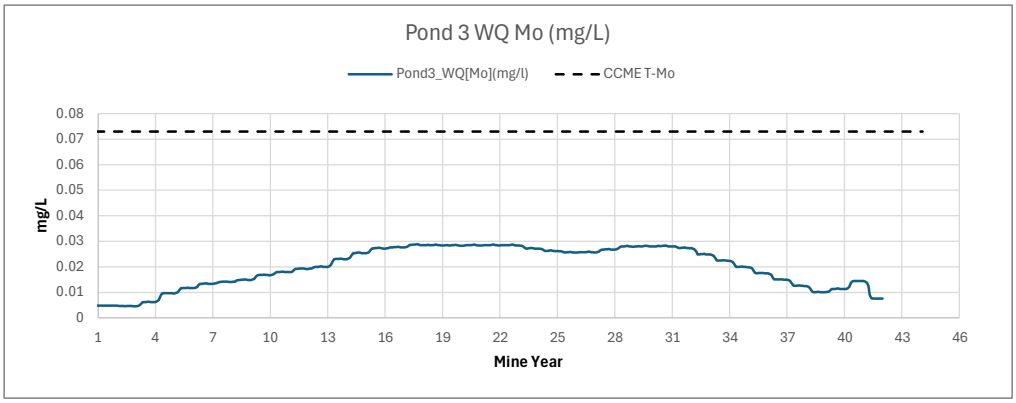

Pond 3 WQ Fe (mg/L)
Pond3_WQ[Fe](mg/l)
West Buskegau River T-Fe
mg/L
1.2
1
0.8
0.6
0.4
0.2
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

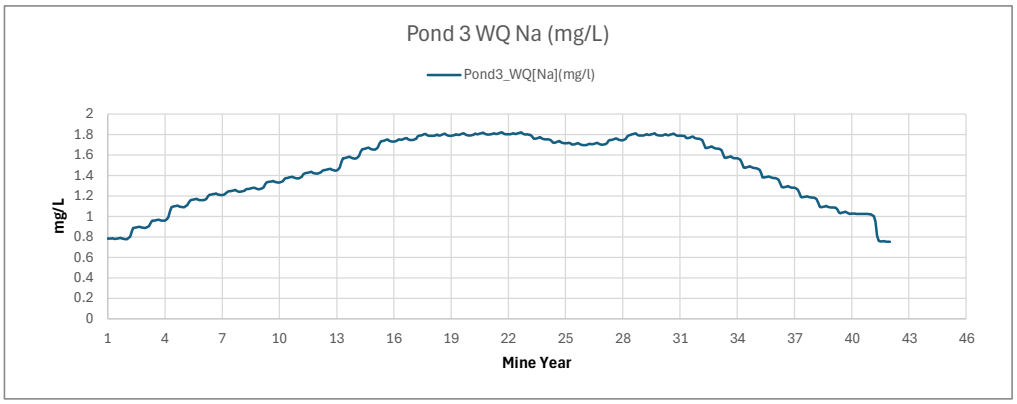

Pond 3 WQ K (mg/L)
Pond3_WQ[K](mg/l)
mg/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

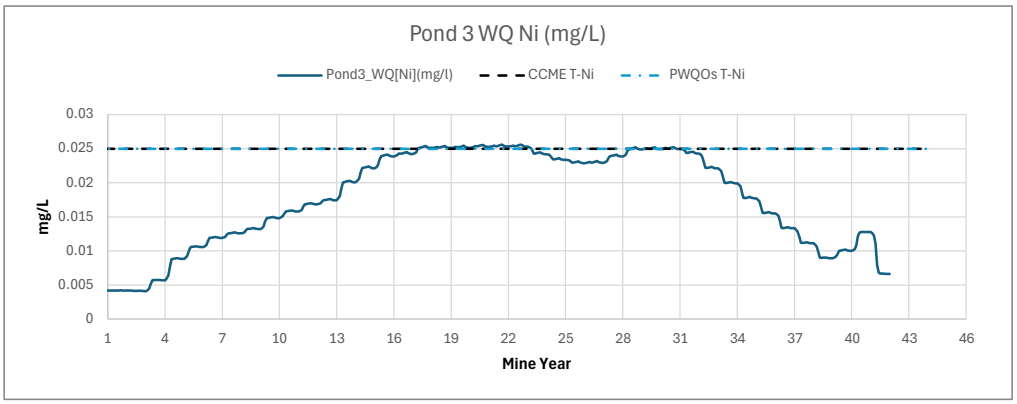

Pond 3 WQ Li (mg/L)
Pond3_WQ[Li](mg/l)
mg/L
0.12
0.1
0.08
0.06
0.04
0.02
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

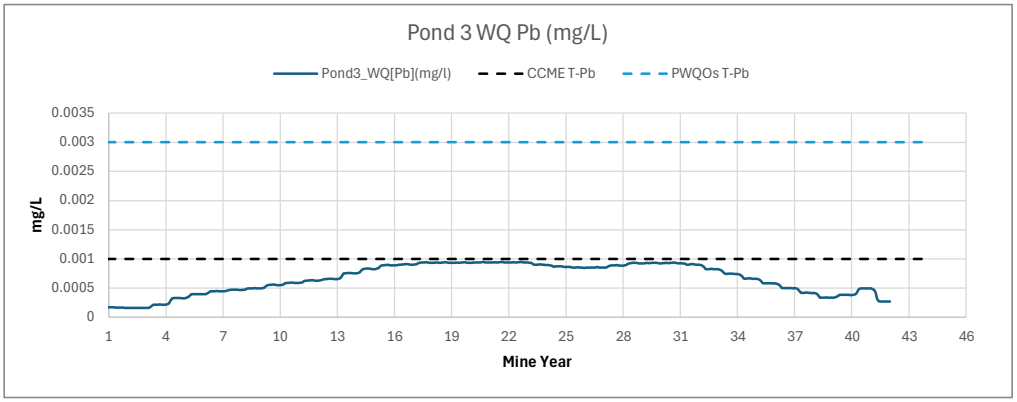

Pond 3 WQ Mg (mg/L)
Pond3_WQ[Mg](mg/l)
mg/L
Mine Year

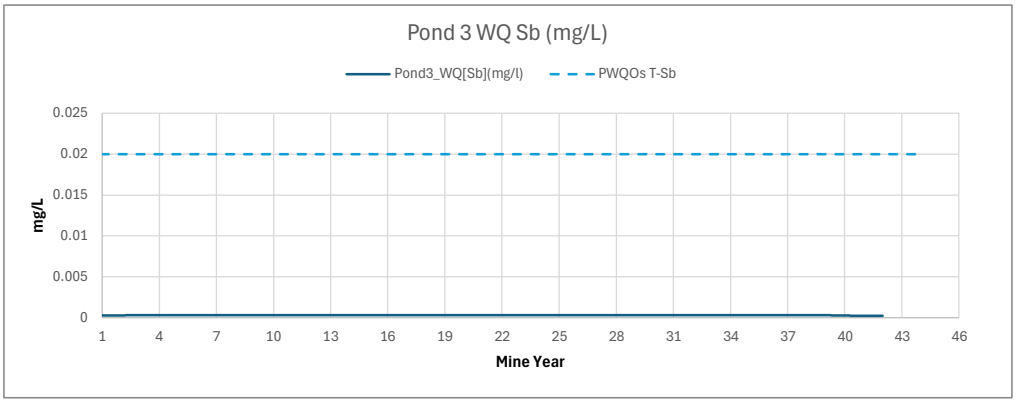

Pond 3 WQ Mn (mg/L)
Pond3_WQ[Mn](mg/l)
CCME D-Mn
mg/L
Mine Year

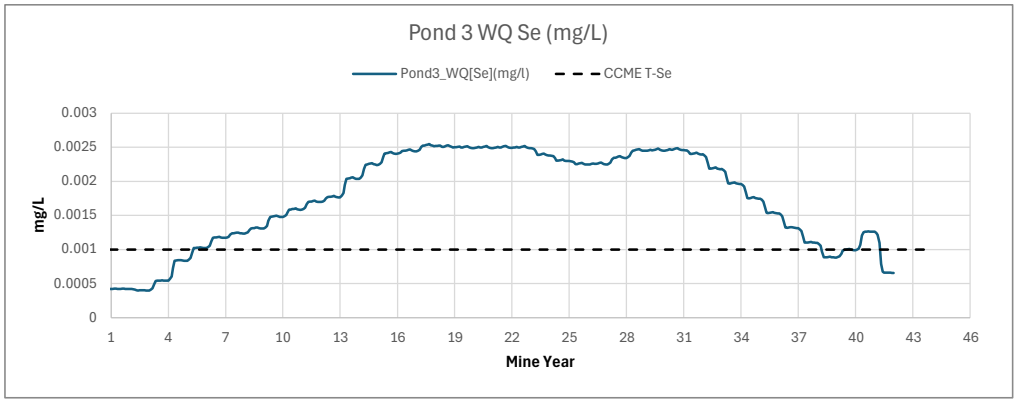

Pond 3 WQ Mo (mg/L)
Pond3_WQ[Mo](mg/l)
CCME T-Mo
mg/L
Mine Year

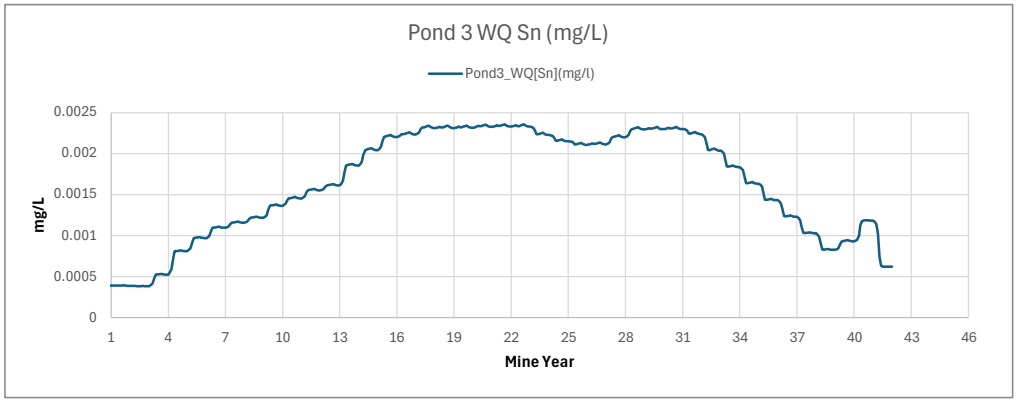

Pond 3 WQ Na (mg/L)
Pond3_WQ[Na](mg/l)
mg/L
Mine Year

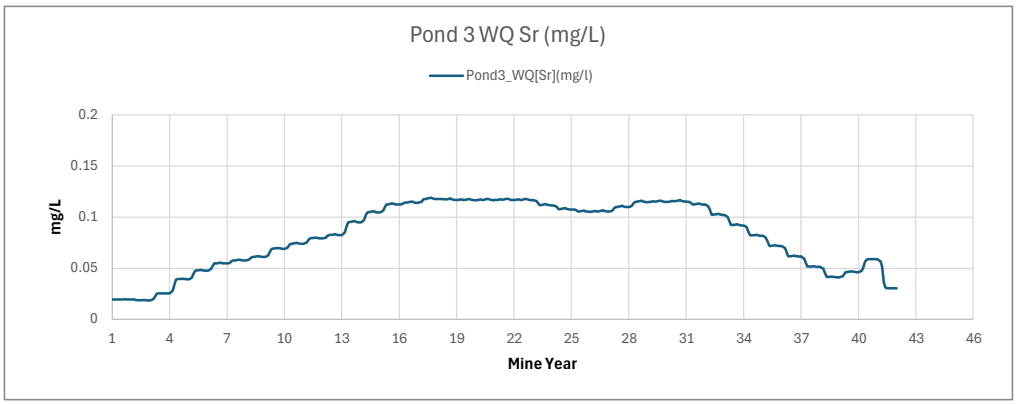

Pond 3 WQ Ni (mg/L)
Pond3_WQ[Ni](mg/l)
CCME T-Ni
PWQOs T-Ni
mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

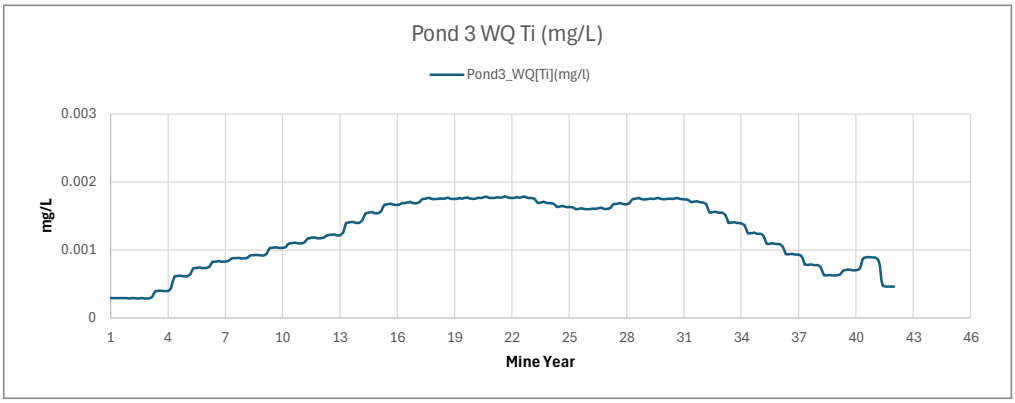

Pond 3 WQ Pb (mg/L)
Pond3_WQ[Pb](mg/l)
CCME T-Pb
PWQOs T-Pb
mg/L
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

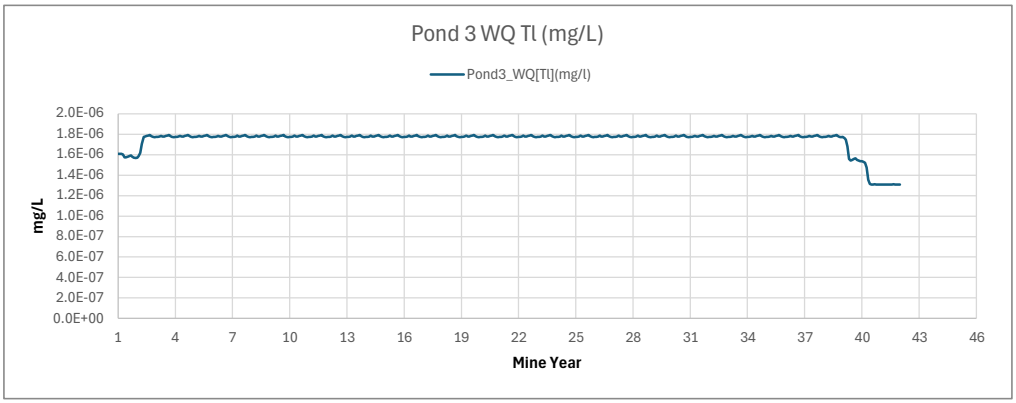

Pond 3 WQ Sb (mg/L)
Pond3_WQ[Sb](mg/l)
PWQOs T-Sb
mg/L
0.025
0.02
0.015
0.01
0.005
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

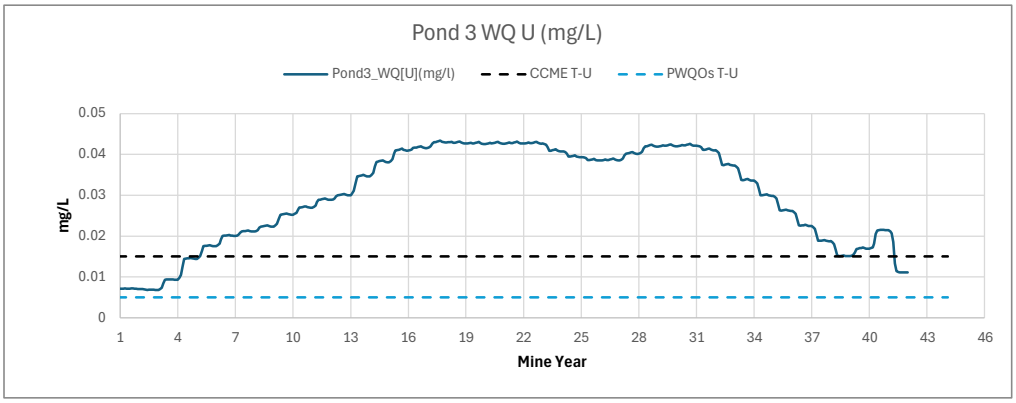

Pond 3 WQ Se (mg/L)
Pond3_WQ[Se](mg/l)
CCME T-Se
mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

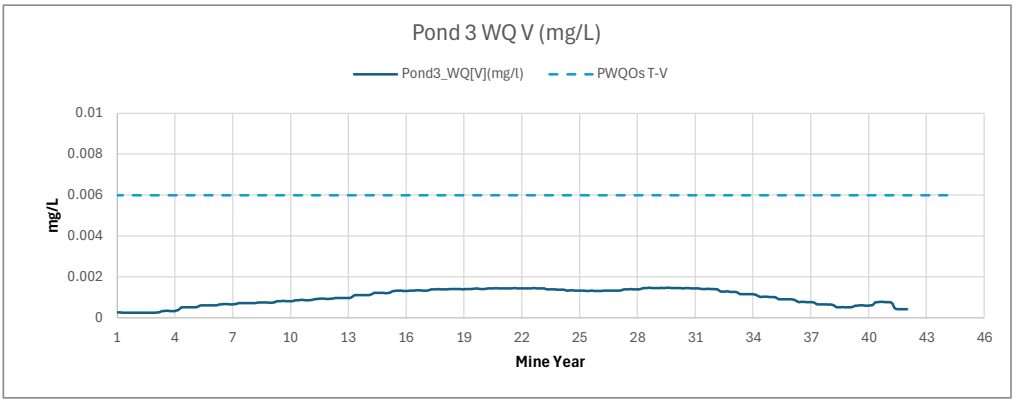

Pond 3 WQ Sn (mg/L)
Pond3_WQ[Sn](mg/l)
mg/L
0.0025
0.002
0.0015
0.001
0.0005
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

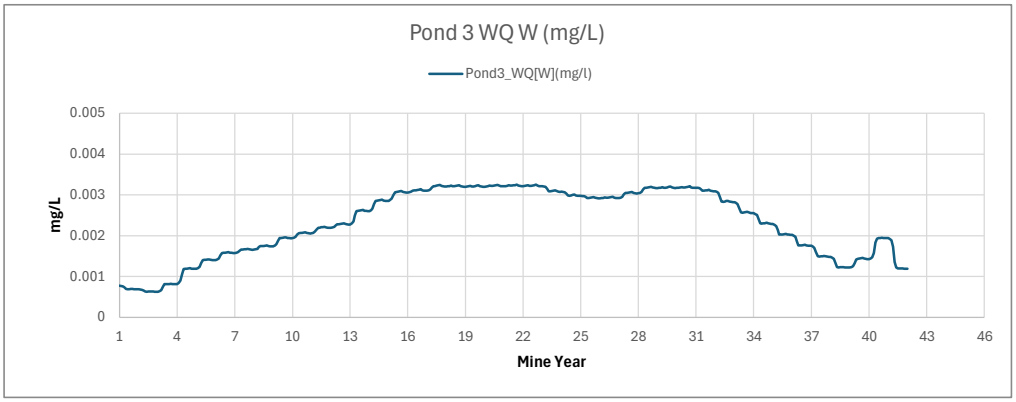

Pond 3 WQ Sr (mg/L)
Pond3_WQ[Sr](mg/l)
mg/L
0.2
0.15
0.1
0.05
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

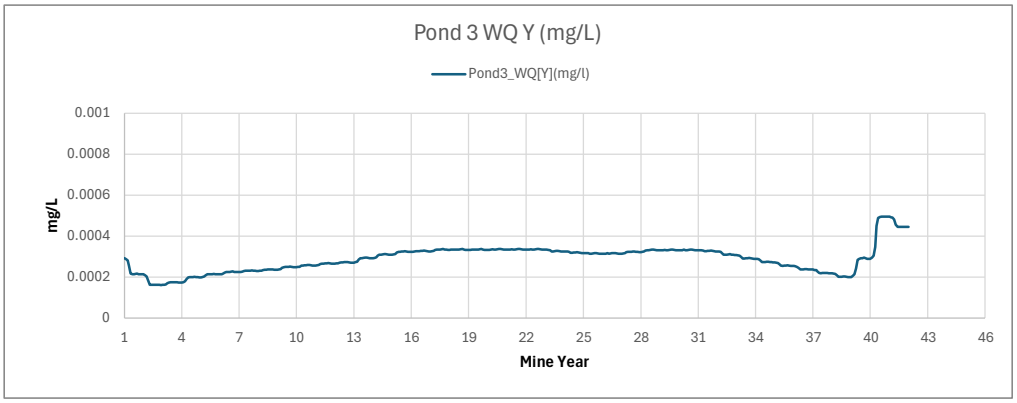

Pond 3 WQ Ti (mg/L)
Pond3_WQ[Ti](mg/l)
mg/L
0.003
0.002
0.001
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

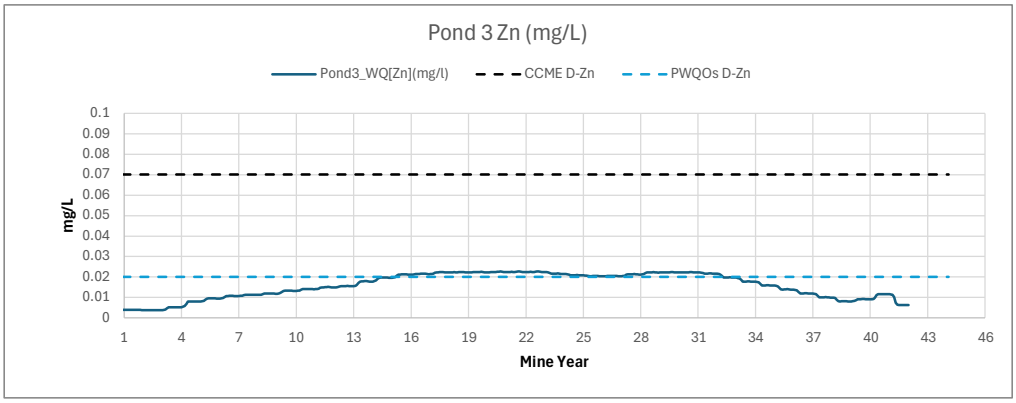

Pond 3 WQ Tl (mg/L)
Pond3_WQ[Tl](mg/l)
mg/L
2.0E-06
1.8E-06
1.6E-06
1.4E-06
1.2E-06
1.0E-06
8.0E-07
6.0E-07
4.0E-07
2.0E-07
0.0E+00
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

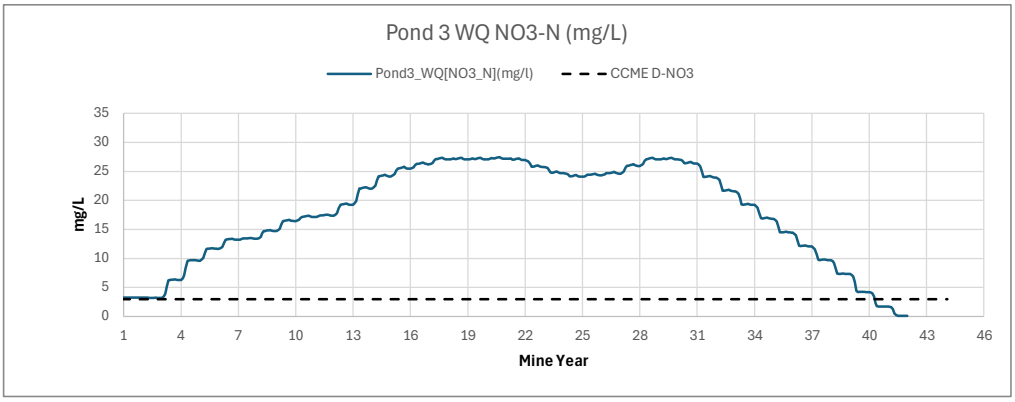

Pond 3 WQ U (mg/L)
Pond3_WQ[U](mg/l)
CCME T-U
PWQOs T-U
mg/L
0.05
0.04
0.03
0.02
0.01
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

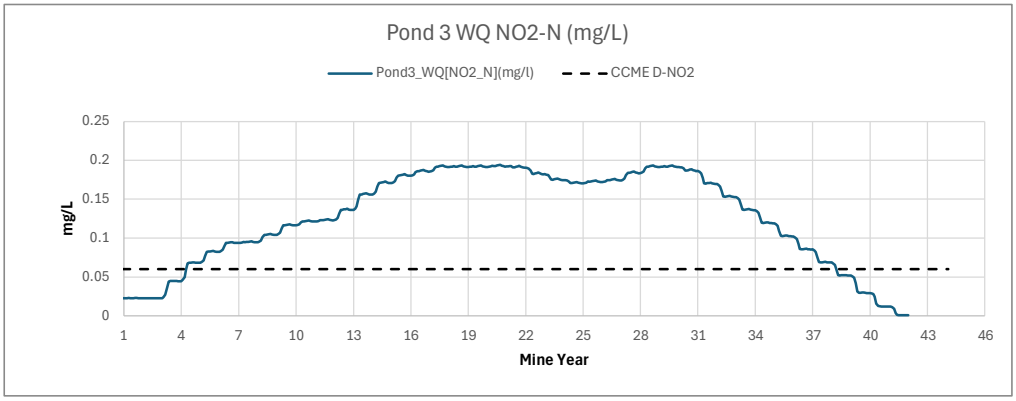

Pond 3 WQ V (mg/L)
Pond3_WQ[V](mg/l)
PWQOs T-V
mg/L
0.01
0.008
0.006
0.004
0.002
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

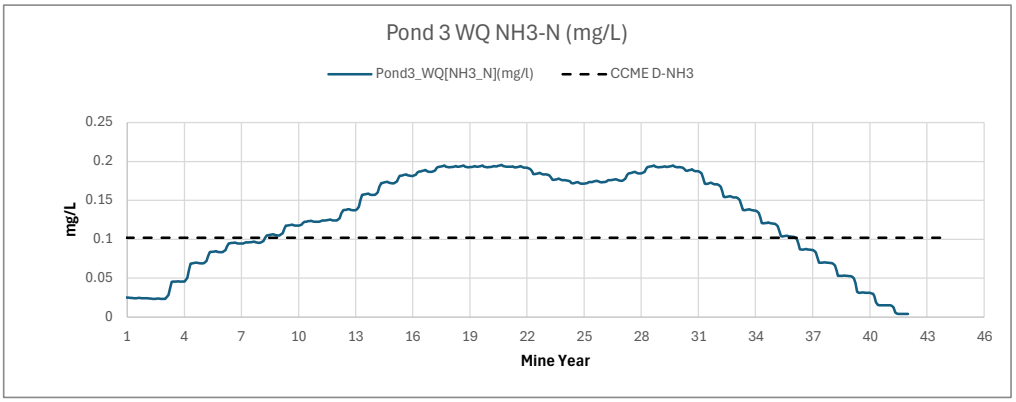

Pond 3 WQ W (mg/L)
Pond3_WQ[W](mg/l)
mg/L
0.005
0.004
0.003
0.002
0.001
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

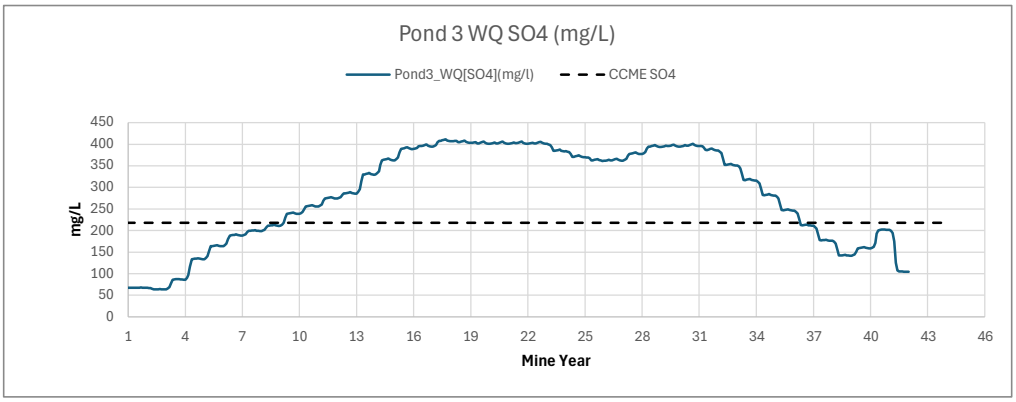

Pond 3 WQ Y (mg/L)
Pond3_WQ[Y](mg/l)
mg/L
0.001
0.0008
0.0006
0.0004
0.0002
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

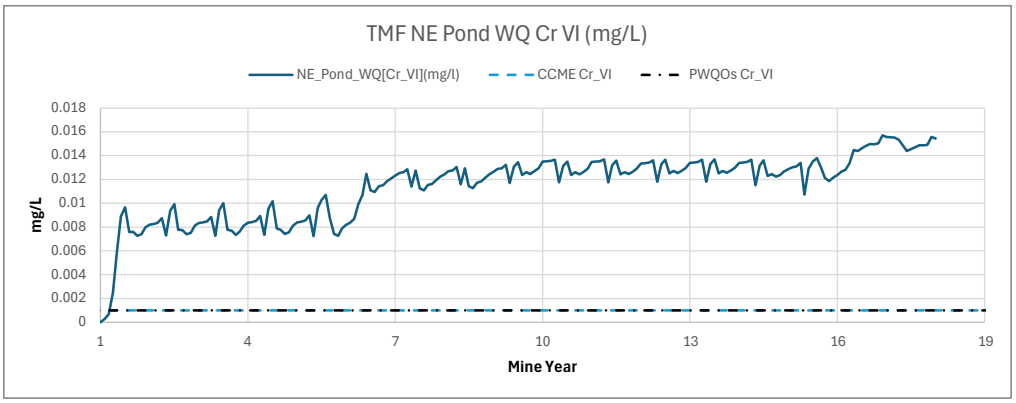

Pond 3 Zn (mg/L)
Pond3_WQ[Zn](mg/l)
CCME D-Zn
PWQOs D-Zn
mg/L
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

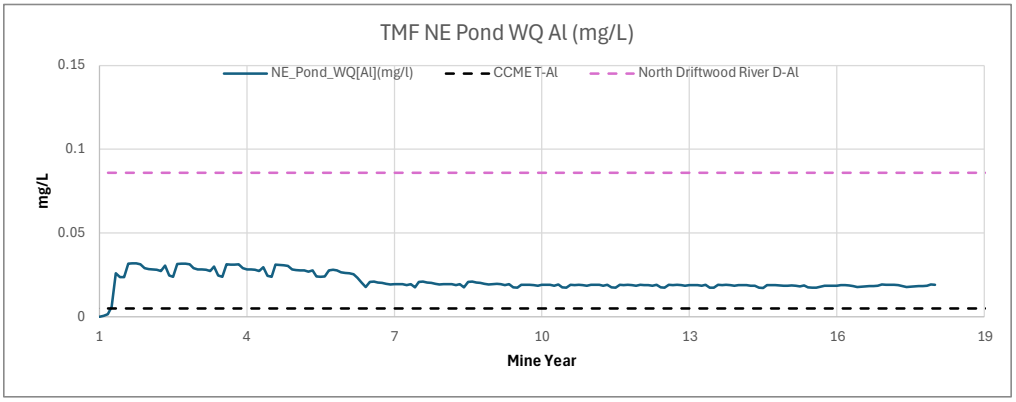

Pond 3 WQ NO3-N (mg/L)
Pond3_WQ[NO3_N](mg/l)
CCME D-NO3
mg/L
35
30
25
20
15
10
5
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

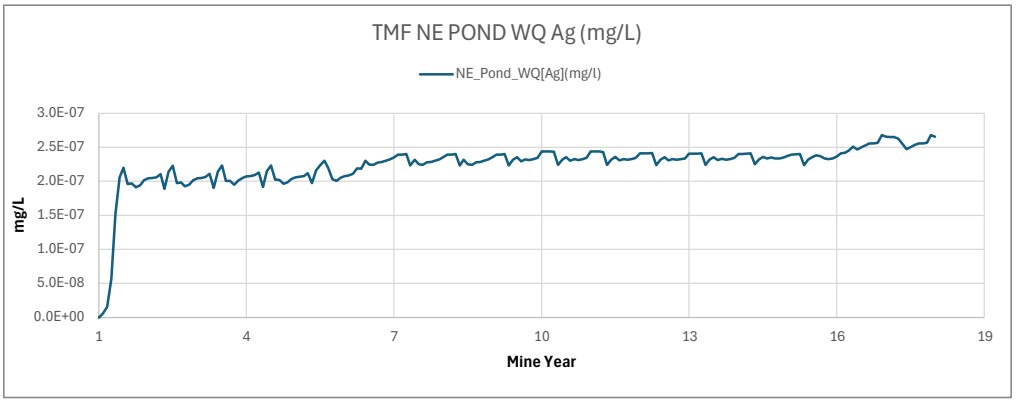

Pond 3 WQ NO2-N (mg/L)
Pond3_WQ[NO2_N](mg/l)
CCME D-NO2
mg/L
0.25
0.2
0.15
0.1
0.05
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

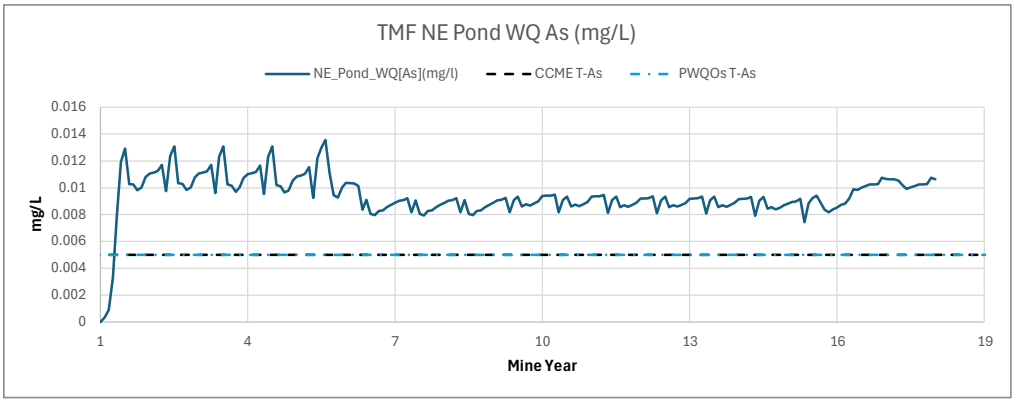

Pond 3 WQ NH3-N (mg/L)
Pond3_WQ[NH3_N](mg/l)
CCME D-NH3
mg/L
0.25
0.2
0.15
0.1
0.05
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46
Mine Year

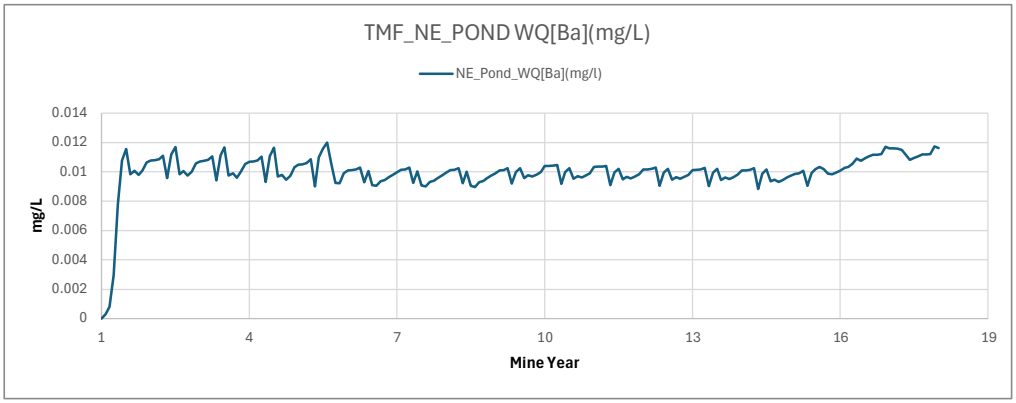

Pond 3 WQ SO4 (mg/L)
Pond3_WQ[SO4](mg/l)
CCME SO4
mg/L
450
400
350
300
250
200
150
100
50
0
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
Mine Year

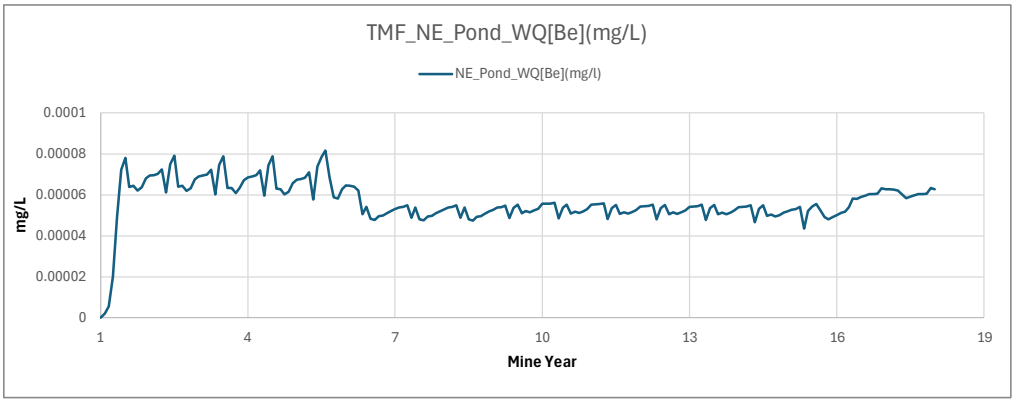

TMF NE Pond WQ Cr VI (mg/L)
NE_Pond_WQ[Cr_VI](mg/l)
CCME Cr_VI
PWQOs Cr_VI
mg/L
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1
4
7
10
13
16
19
Mine Year

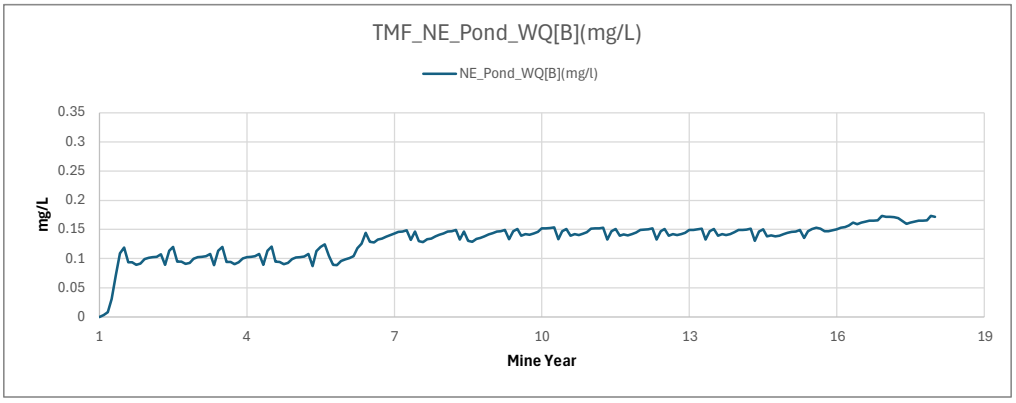

TMF NE Pond WQ Al (mg/L)
NE_Pond_WQ[Al](mg/l)
CCME T-Al
North Driftwood River D-Al
mg/L
0.15
0.1
0.05
0
1
4
7
10
13
16
19
Mine Year

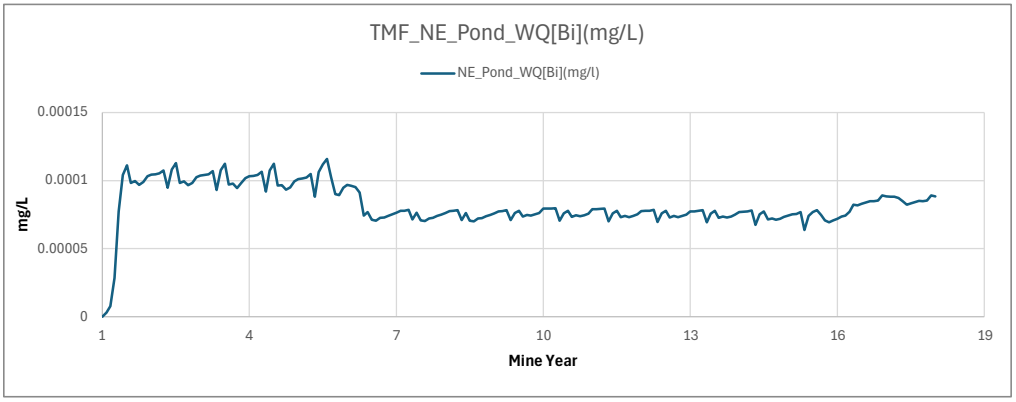

TMF NE POND WQ Ag (mg/L)
NE_Pond_WQ[Ag](mg/l)
mg/L
3.0E-07
2.5E-07
2.0E-07
1.5E-07
1.0E-07
5.0E-08
0.0E+00
1
4
7
10
13
16
19
Mine Year

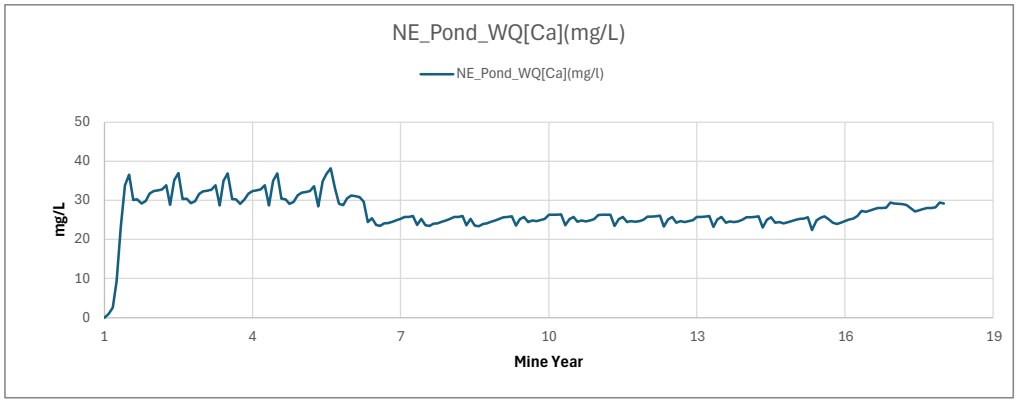

TMF NE Pond WQ As (mg/L)
NE_Pond_WQ[As](mg/l)
CCME T-As
PWQOs T-As
mg/L
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1
4
7
10
13
16
19
Mine Year

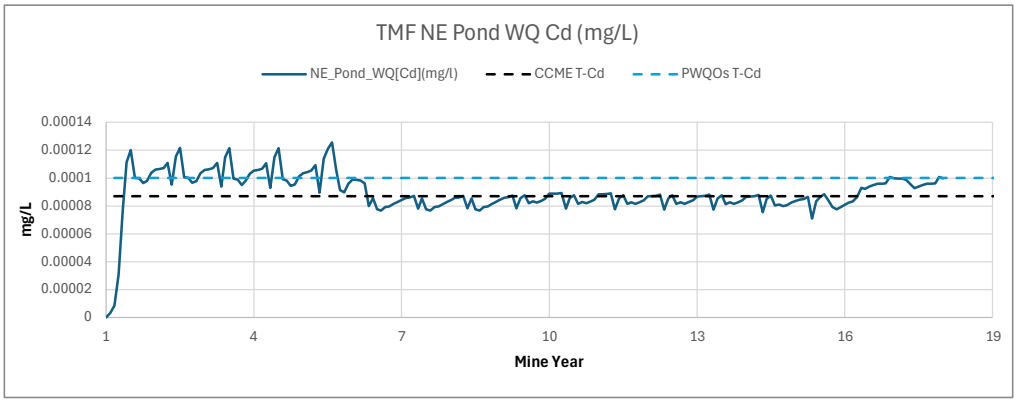

TMF_NE_POND WQ[Ba](mg/L)
NE_Pond_WQ[Ba](mg/l)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
mg/L
1
4
7
10
13
16
19
Mine Year

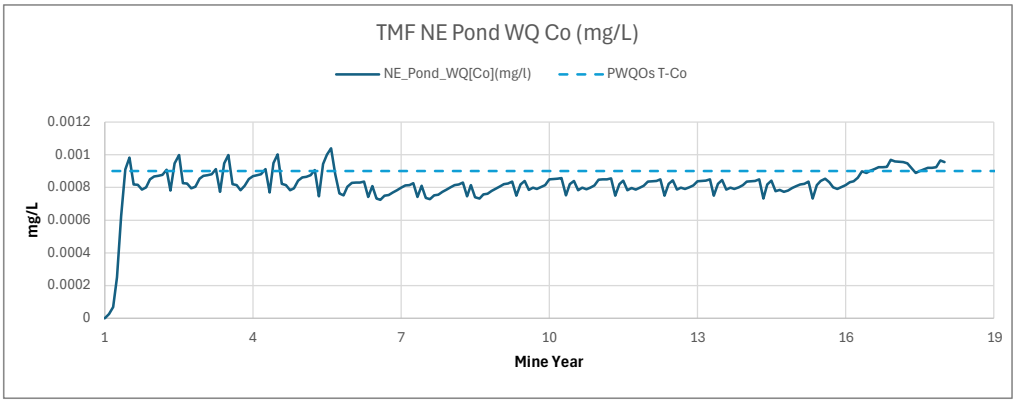

TMF_NE_Pond_WQ[Be](mg/L)
NE_Pond_WQ[Be](mg/l)
0.0001
0.00008
0.00006
0.00004
0.00002
0
mg/L
1
4
7
10
13
16
19
Mine Year

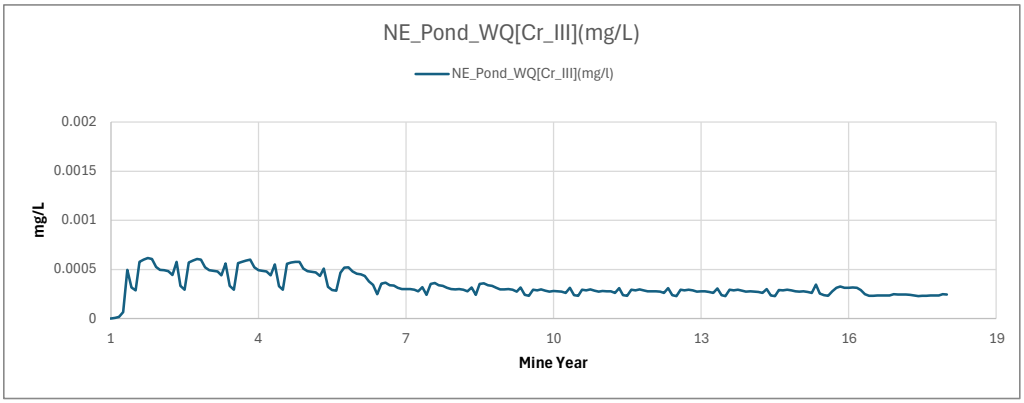

TMF_NE_Pond_WQ[B](mg/L)
NE_Pond_WQ[B](mg/l)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
mg/L
1
4
7
10
13
16
19
Mine Year

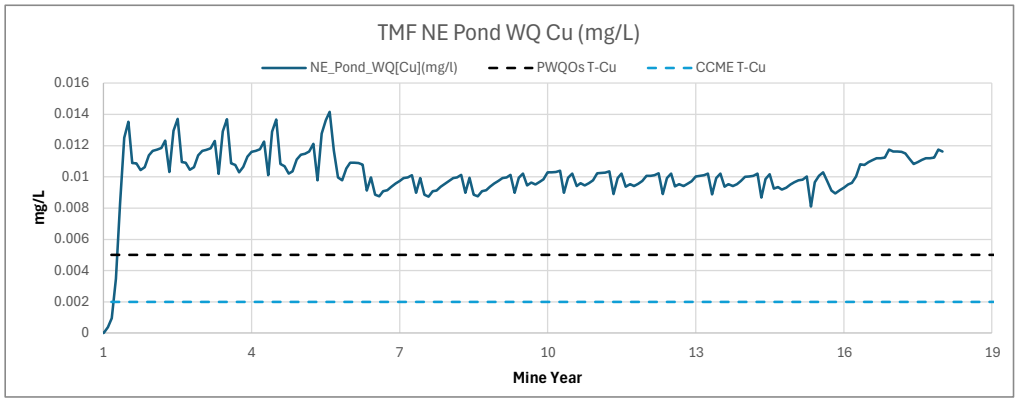

TMF_NE_Pond_WQ[Bi](mg/L)
NE_Pond_WQ[Bi](mg/l)
0.00015
0.0001
0.00005
0
mg/L
1
4
7
10
13
16
19
Mine Year

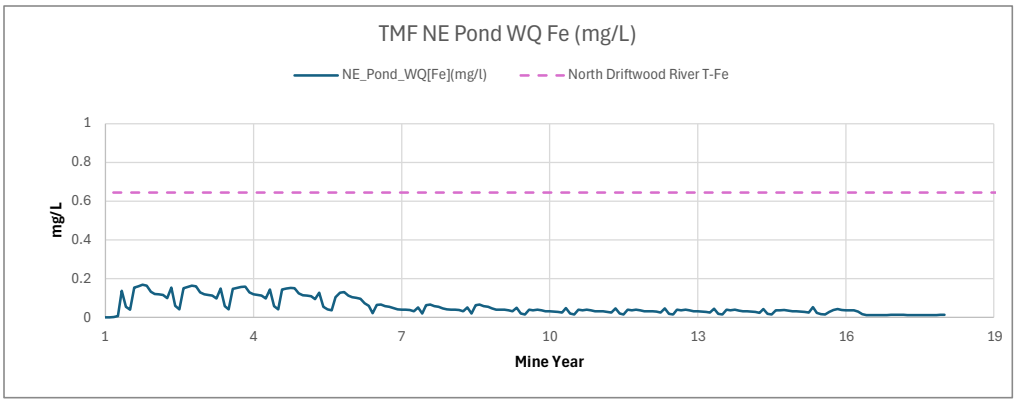

NE_Pond_WQ[Ca](mg/L)
NE_Pond_WQ[Ca](mg/l)
50
40
30
20
10
0
mg/L
1
4
7
10
13
16
19
Mine Year

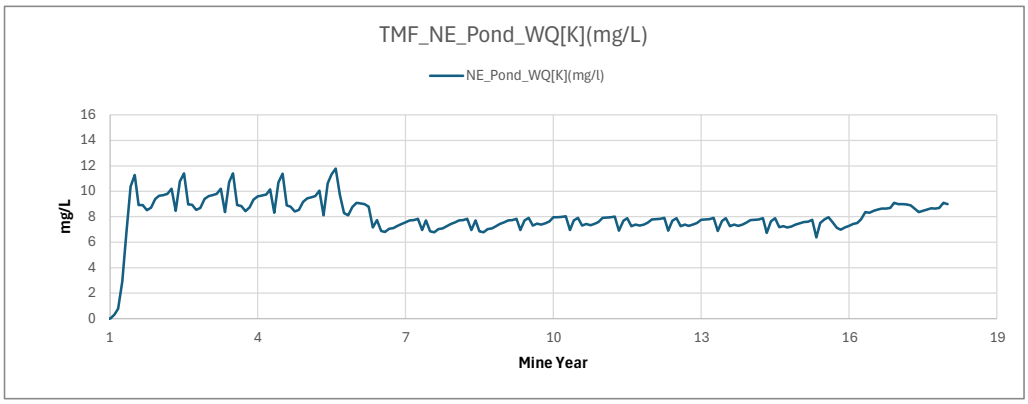

TMF NE Pond WQ Cd (mg/L)
NE_Pond_WQ[Cd](mg/l)
CCME T-Cd
PWQOs T-Cd
0.00014
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
mg/L
1
4
7
10
13
16
19
Mine Year

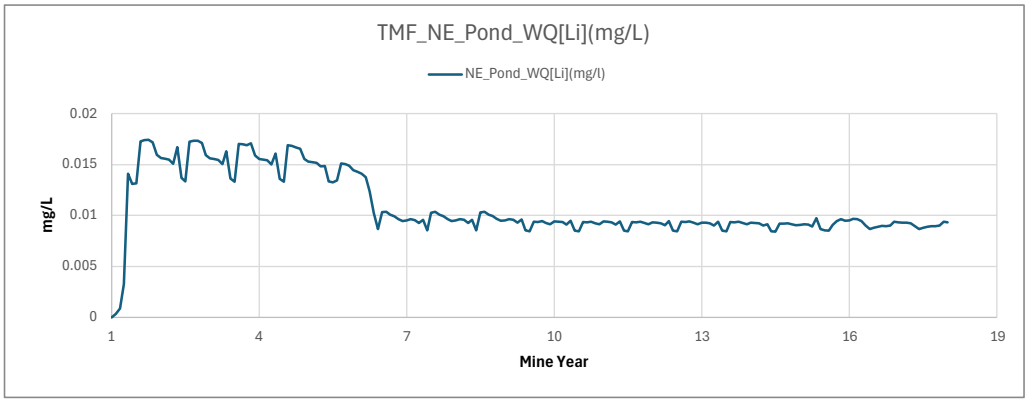

TMF NE Pond WQ Co (mg/L)
NE_Pond_WQ[Co](mg/l)
PWQOs T-Co
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
mg/L
1
4
7
10
13
16
19
Mine Year

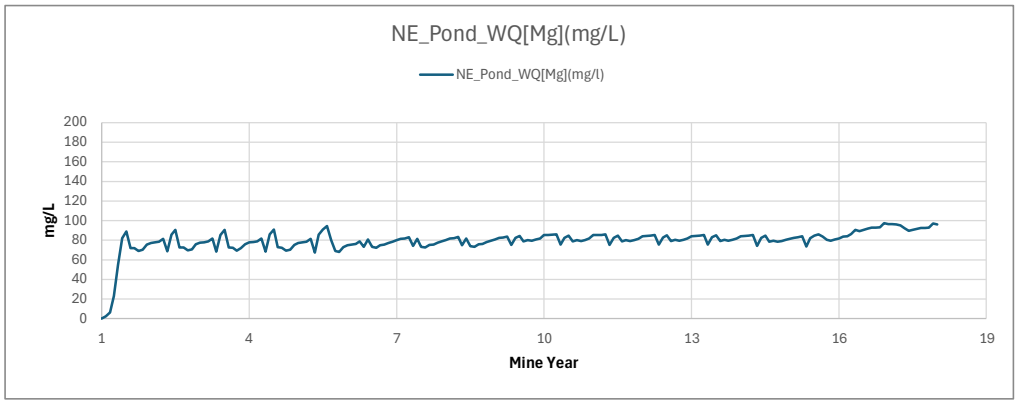

NE_Pond_WQ[Cr_III](mg/L)
NE_Pond_WQ[Cr_III](mg/l)
0.002
0.0015
0.001
0.0005
0
mg/L
1
4
7
10
13
16
19
Mine Year

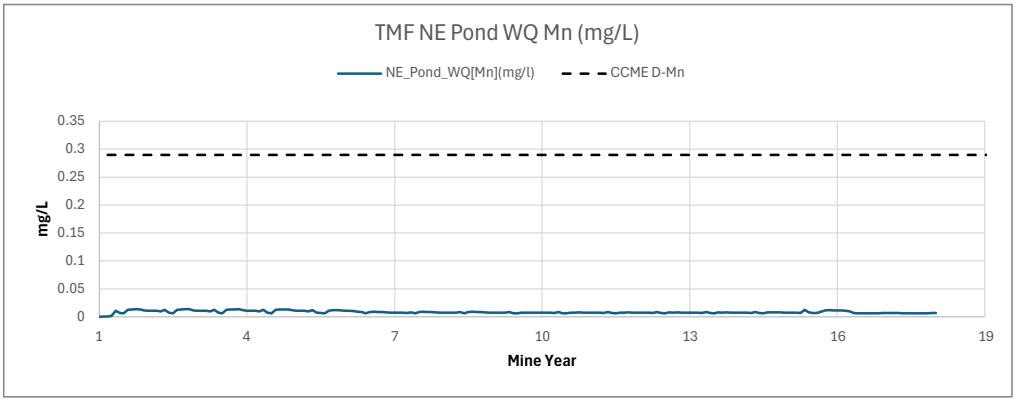

TMF NE Pond WQ Cu (mg/L)
NE_Pond_WQ[Cu](mg/l)
PWQOs T-Cu
CCME T-Cu
mg/L
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1
4
7
10
13
16
19
Mine Year

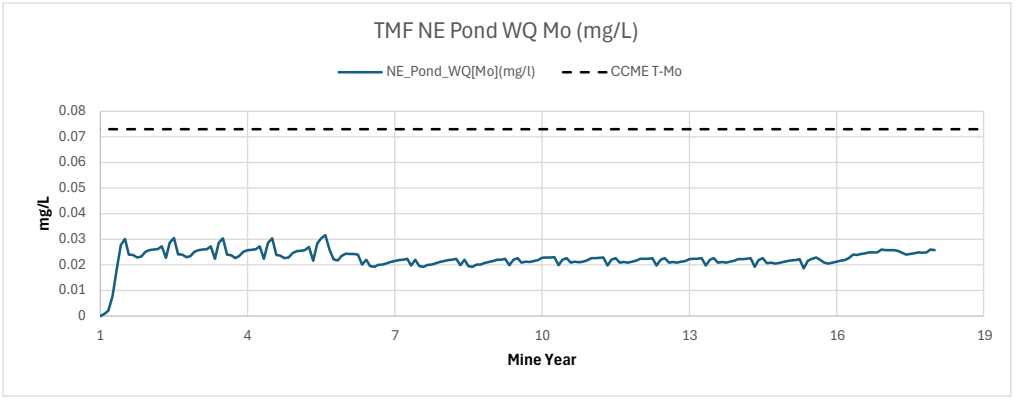

TMF NE Pond WQ Fe (mg/L)
NE_Pond_WQ[Fe](mg/l)
North Driftwood River T-Fe
mg/L
1
0.8
0.6
0.4
0.2
0
1
4
7
10
13
16
19
Mine Year

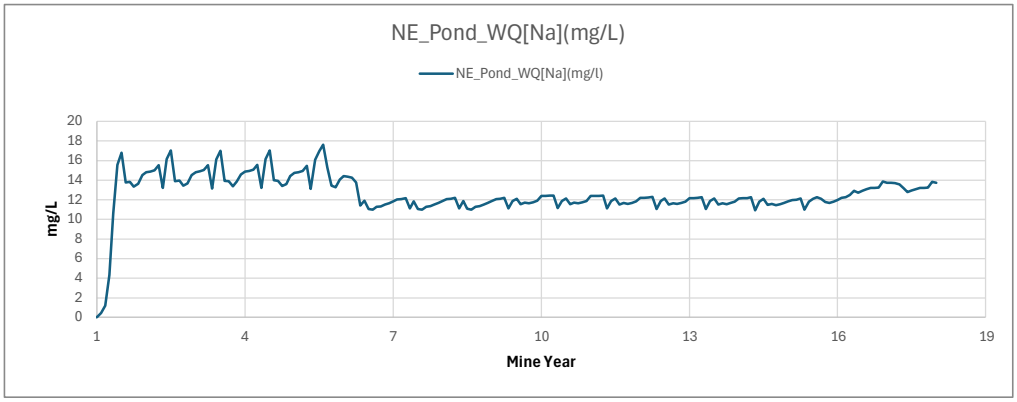

TMF_NE_Pond_WQ[K](mg/L)
NE_Pond_WQ[K](mg/l)
mg/L
16
14
12
10
8
6
4
2
0
1
4
7
10
13
16
19
Mine Year

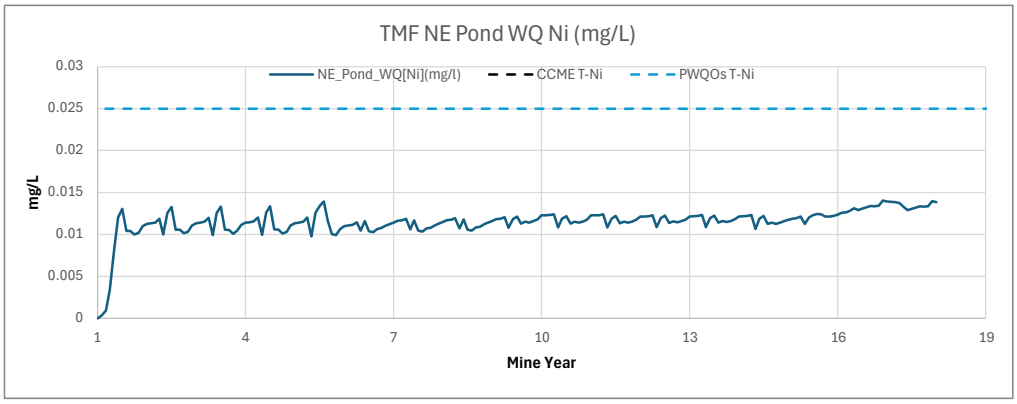

TMF_NE_Pond_WQ[Li](mg/L)
NE_Pond_WQ[Li](mg/l)
mg/L
0.02
0.015
0.01
0.005
0
1
4
7
10
13
16
19
Mine Year

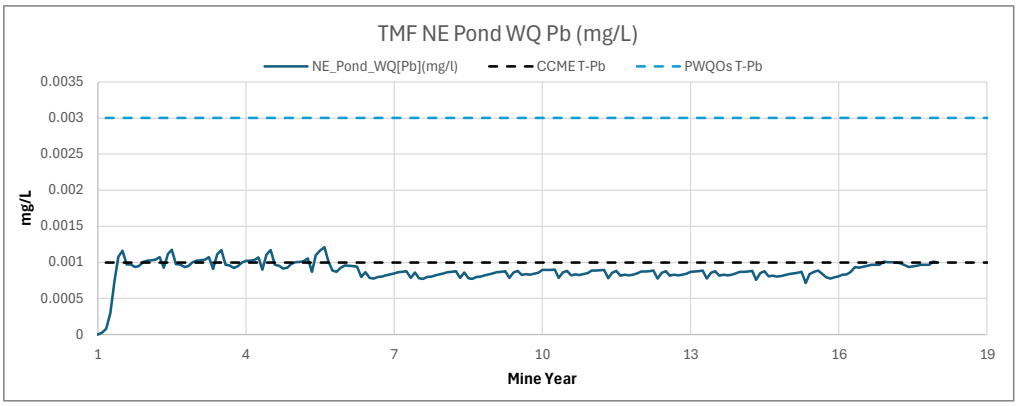

NE_Pond_WQ[Mg](mg/L)
NE_Pond_WQ[Mg](mg/l)
mg/L
Mine Year

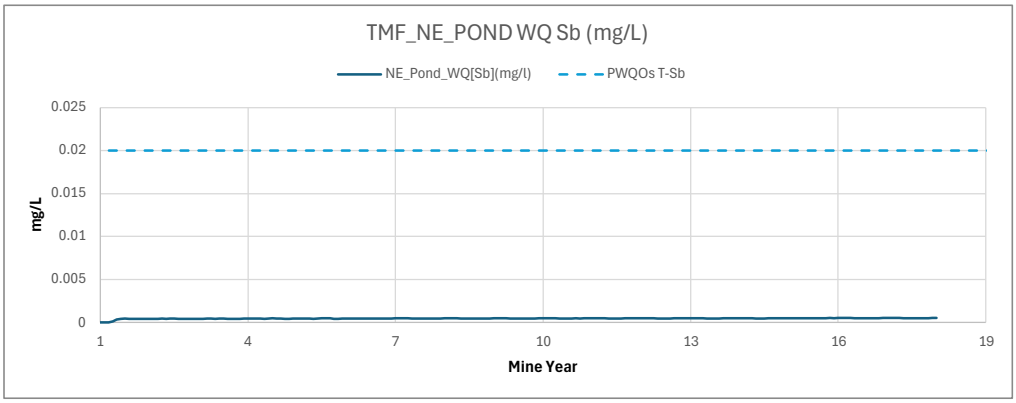

TMF NE Pond WQ Mn (mg/L)
NE_Pond_WQ[Mn](mg/l)
CCME D-Mn
mg/L
Mine Year

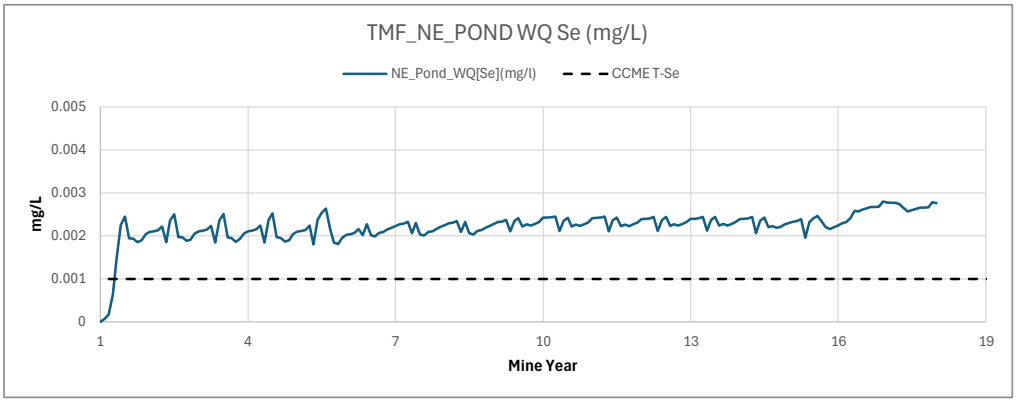

TMF NE Pond WQ Mo (mg/L)
NE_Pond_WQ[Mo](mg/l)
CCME T-Mo
mg/L
Mine Year

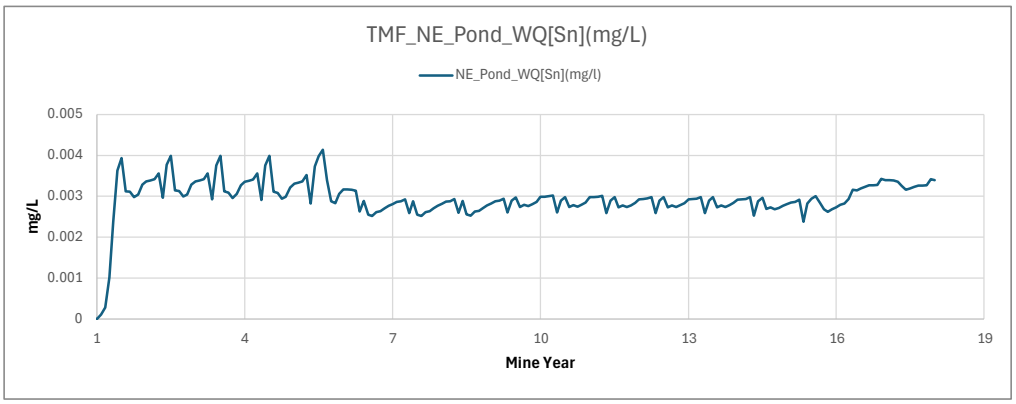

NE_Pond_WQ[Na](mg/L)
NE_Pond_WQ[Na](mg/l)
mg/L
Mine Year

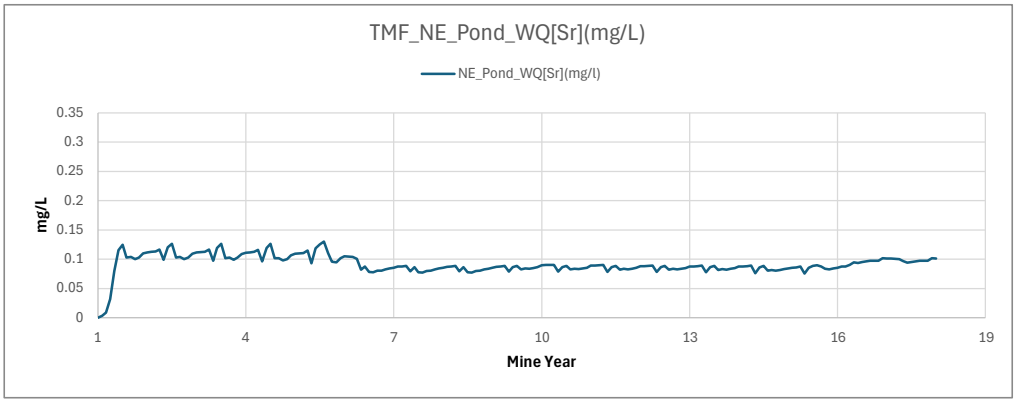

TMF NE Pond WQ Ni (mg/L)
NE_Pond_WQ[Ni](mg/l)
CCME T-Ni
PWQOs T-Ni
mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
1
4
7
10
13
16
19
Mine Year

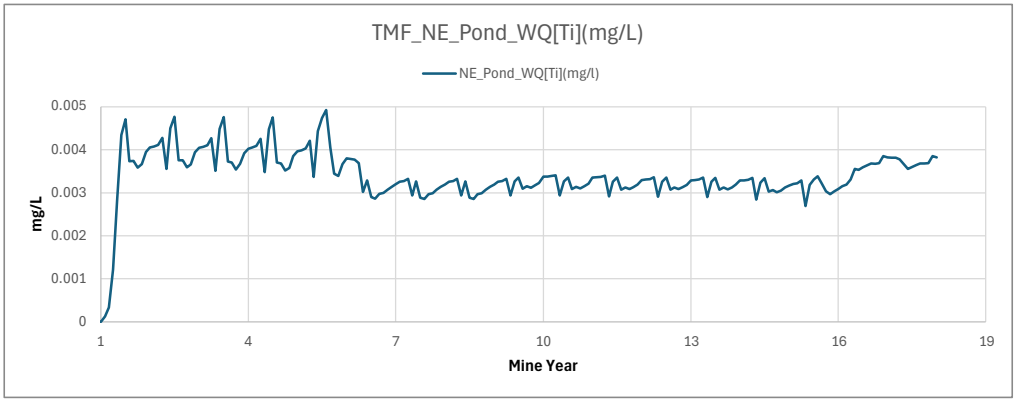

TMF NE Pond WQ Pb (mg/L)
NE_Pond_WQ[Pb](mg/l)
CCME T-Pb
PWQOs T-Pb
mg/L
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
1
4
7
10
13
16
19
Mine Year

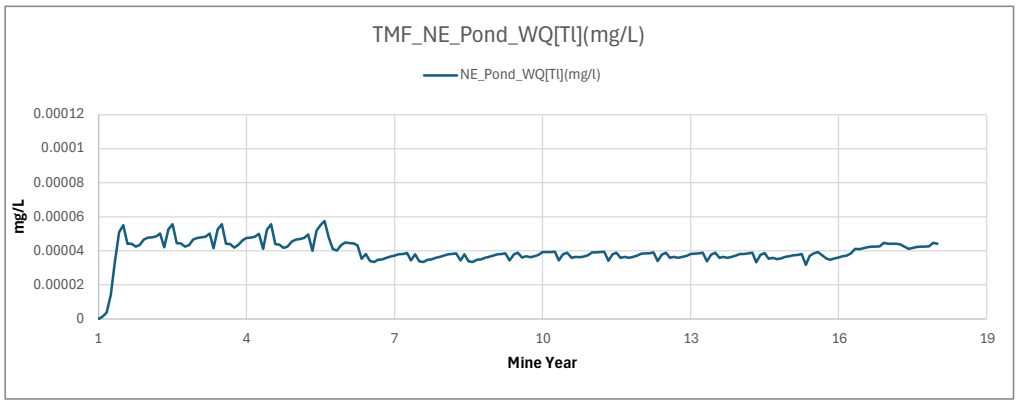

TMF_NE_POND WQ Sb (mg/L)
NE_Pond_WQ[Sb](mg/l)
PWQOs T-Sb
mg/L
0.025
0.02
0.015
0.01
0.005
0
1
4
7
10
13
16
19
Mine Year

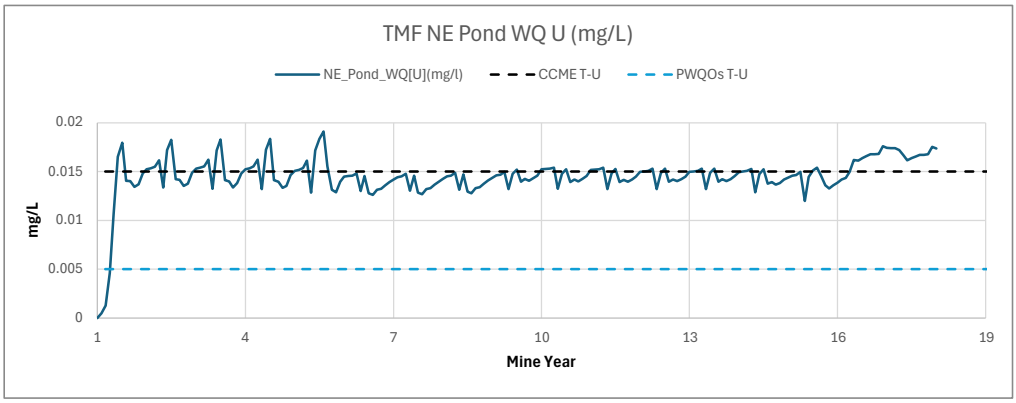

TMF_NE_POND WQ Se (mg/L)
NE_Pond_WQ[Se](mg/l)
CCME T-Se
mg/L
0.005
0.004
0.003
0.002
0.001
0
1
4
7
10
13
16
19
Mine Year

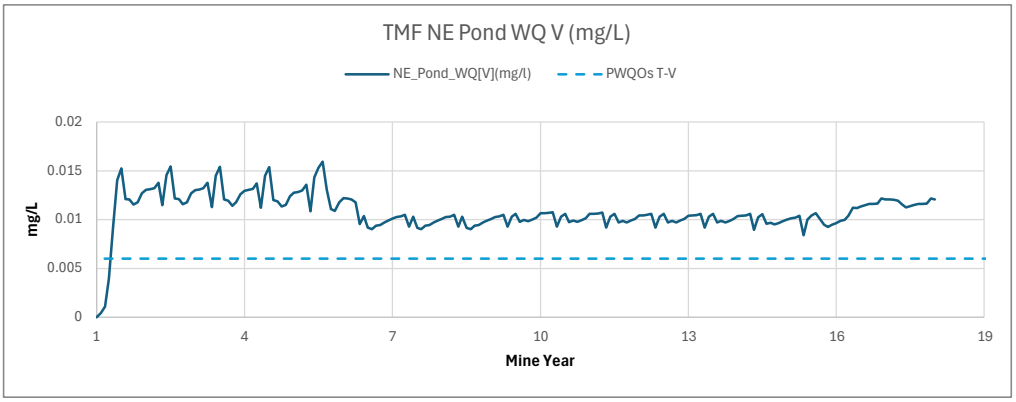

TMF_NE_Pond_WQ[Sn](mg/L)
NE_Pond_WQ[Sn](mg/l)
mg/L
0.005
0.004
0.003
0.002
0.001
0
1
4
7
10
13
16
19
Mine Year

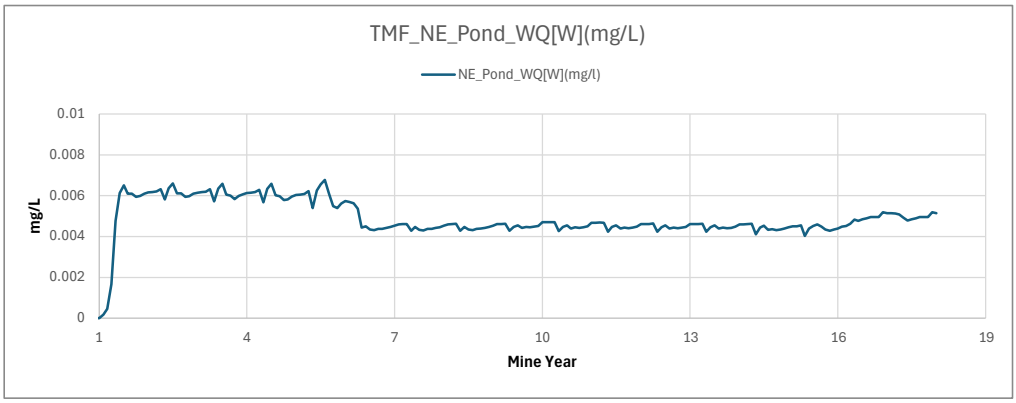

TMF_NE_Pond_WQ[Sr](mg/L)
NE_Pond_WQ[Sr](mg/l)
mg/L
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1
4
7
10
13
16
19
Mine Year

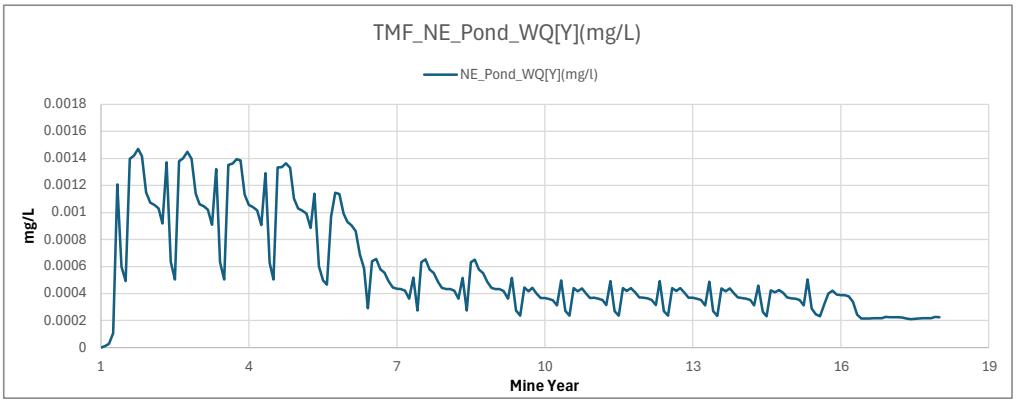

TMF_NE_Pond_WQ[Ti](mg/L)
NE_Pond_WQ[Ti](mg/l)
mg/L
0.005
0.004
0.003
0.002
0.001
0
1
4
7
10
13
16
19
Mine Year

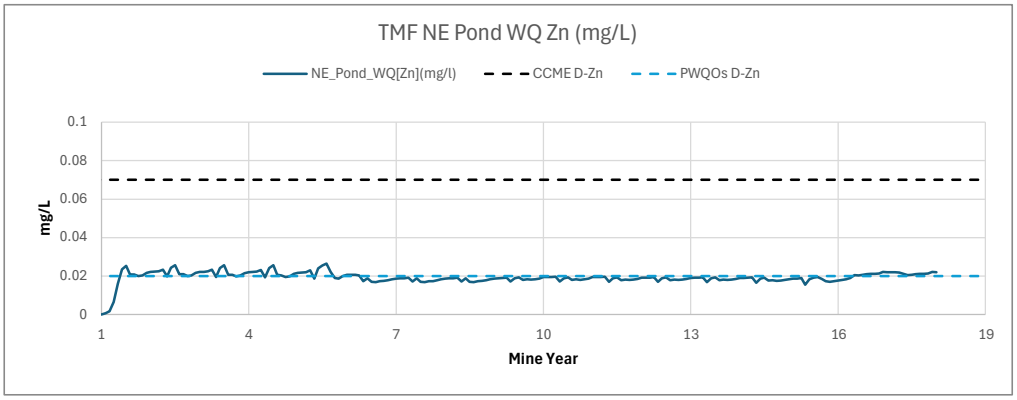

TMF_NE_Pond_WQ[Tl](mg/L)
NE_Pond_WQ[Tl](mg/l)
mg/L
0.00012
0.0001
0.00008
0.00006
0.00004
0.00002
0
1
4
7
10
13
16
19
Mine Year

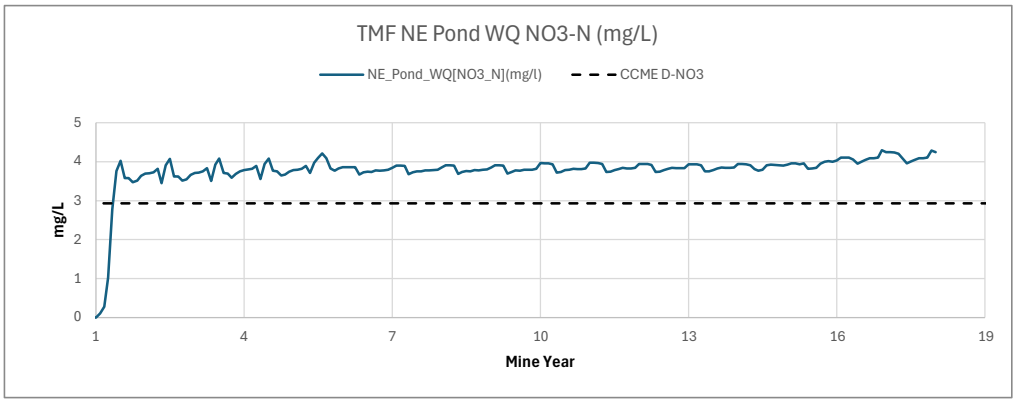

TMF NE Pond WQ U (mg/L)
NE_Pond_WQ[U](mg/l)
CCME T-U
PWQOs T-U
0.02
0.015
0.01
0.005
0
mg/L
1
4
7
10
13
16
19
Mine Year

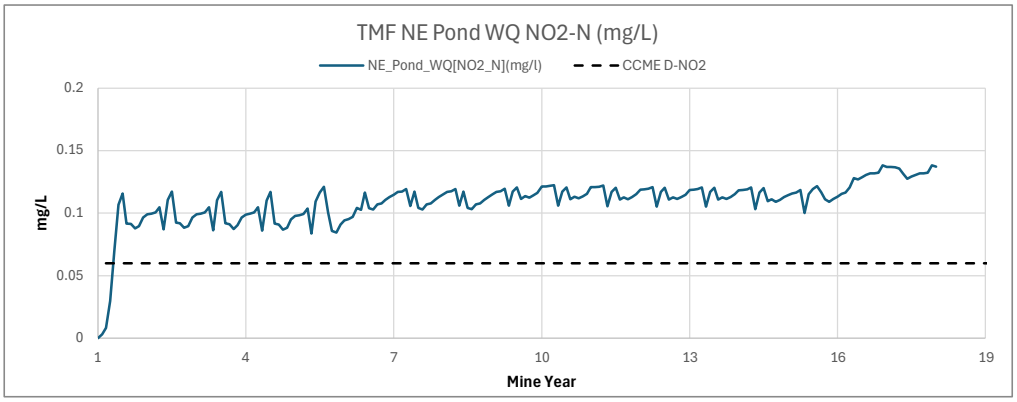

TMF NE Pond WQ V (mg/L)
NE_Pond_WQ[V](mg/l)
PWQOs T-V
0.02
0.015
0.01
0.005
0
mg/L
1
4
7
10
13
16
19
Mine Year

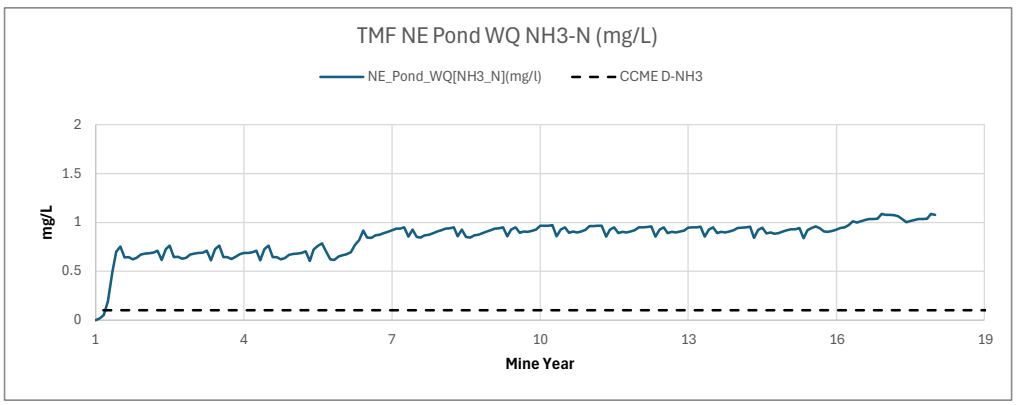

TMF_NE_Pond_WQ[W](mg/L)
NE_Pond_WQ[W](mg/l)
0.01
0.008
0.006
0.004
0.002
0
mg/L
1
4
7
10
13
16
19
Mine Year

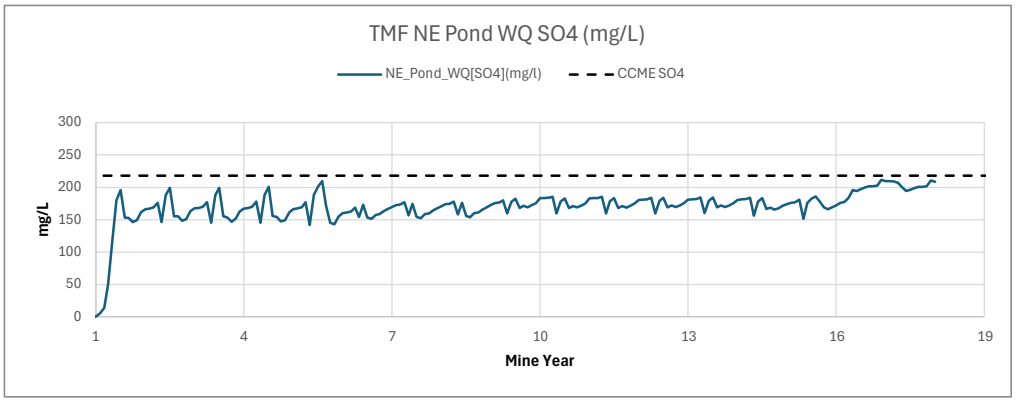

TMF_NE_Pond_WQ[Y](mg/L)
NE_Pond_WQ[Y](mg/l)
0.0018
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
mg/L
1
4
7
10
13
16
19
Mine Year

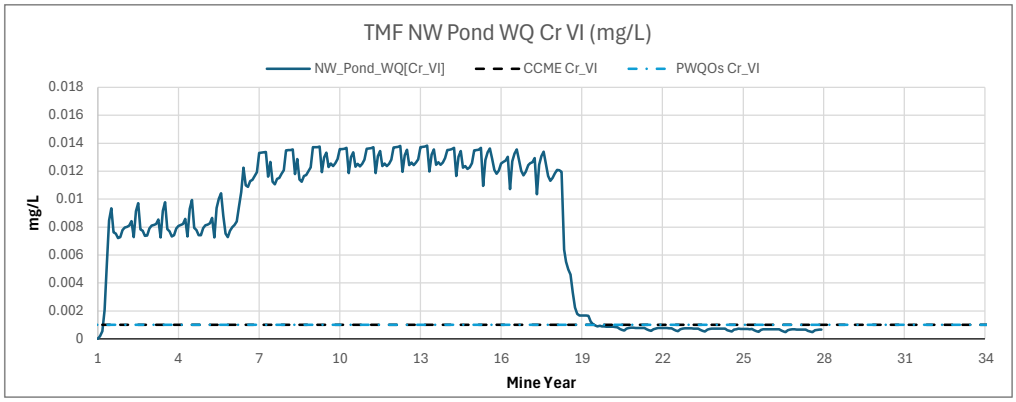

TMF NE Pond WQ Zn (mg/L)
NE_Pond_WQ[Zn](mg/l)
CCME D-Zn
PWQOs D-Zn
mg/L
0.1
0.08
0.06
0.04
0.02
0
1
4
7
10
13
16
19
Mine Year

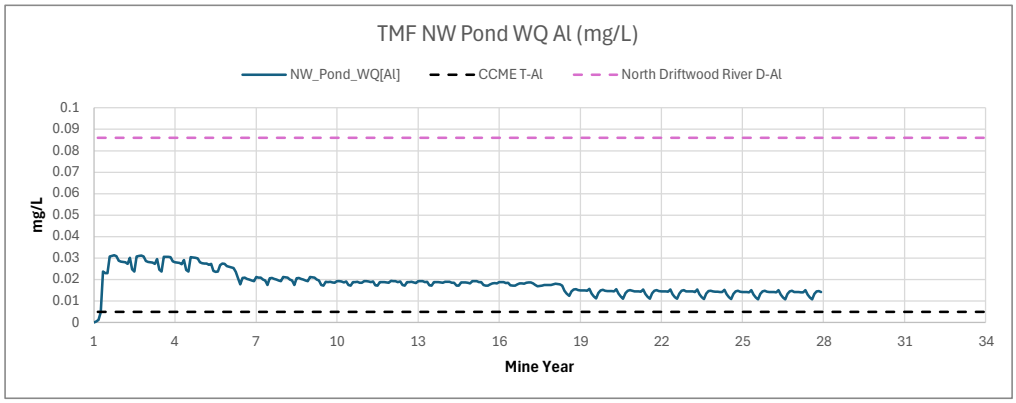

TMF NE Pond WQ NO3-N (mg/L)
NE_Pond_WQ[NO3_N](mg/l)
CCME D-NO3
mg/L
5
4
3
2
1
0
1
4
7
10
13
16
19
Mine Year

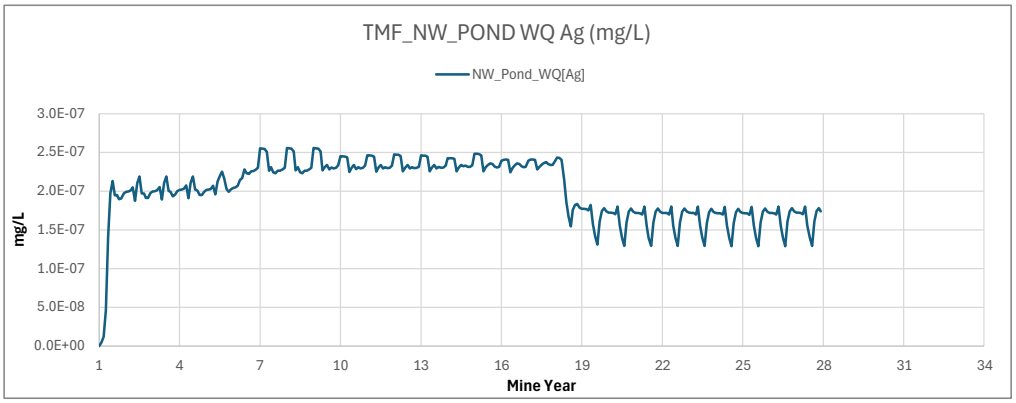

TMF NE Pond WQ NO2-N (mg/L)
NE_Pond_WQ[NO2_N](mg/l)
CCME D-NO2
mg/L
0.2
0.15
0.1
0.05
0
1
4
7
10
13
16
19
Mine Year

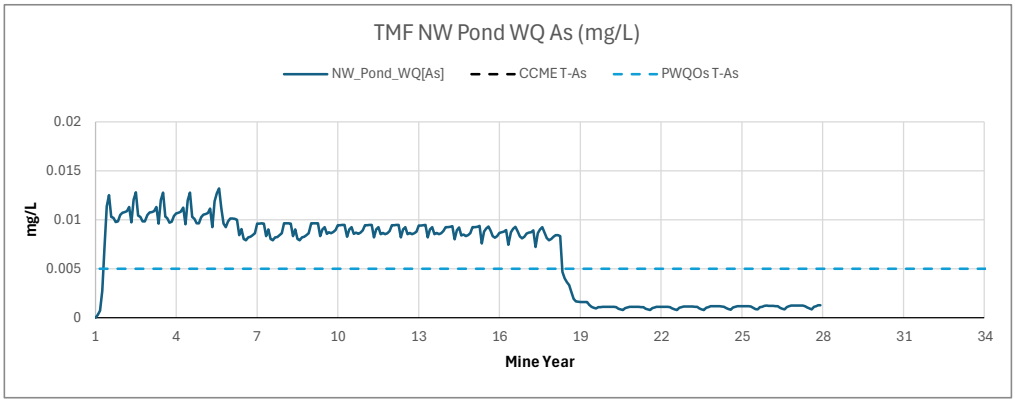

TMF NE Pond WQ NH3-N (mg/L)
NE_Pond_WQ[NH3_N](mg/l)
CCME D-NH3
mg/L
2
1.5
1
0.5
0
1
4
7
10
13
16
19
Mine Year

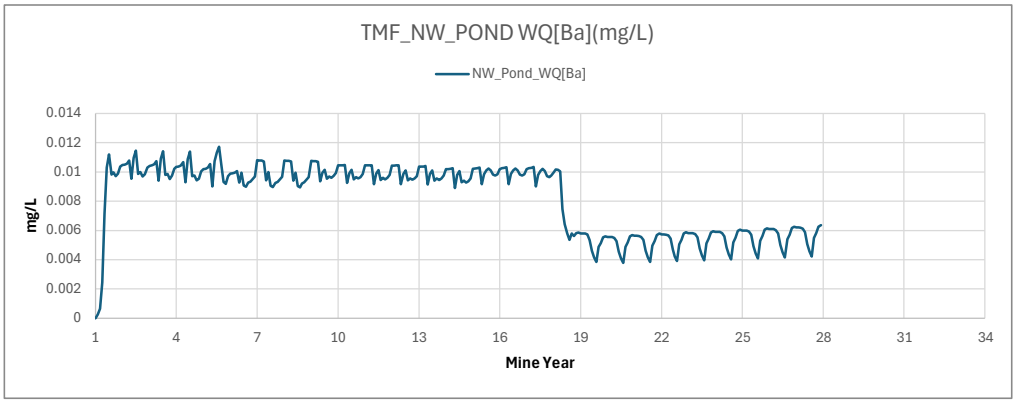

TMF NE Pond WQ SO4 (mg/L)
NE_Pond_WQ[SO4](mg/l)
CCME SO4
300
250
200
150
100
50
0
mg/L
1
4
7
10
13
16
19
Mine Year

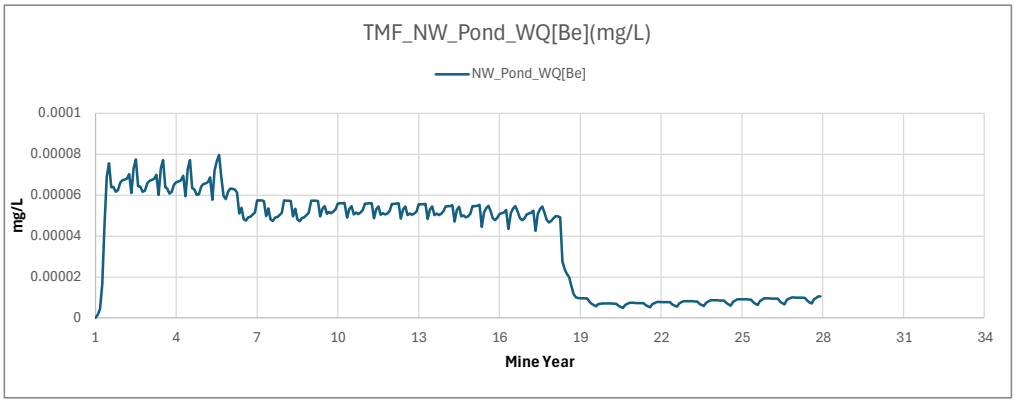

TMF NW Pond WQ Cr VI (mg/L)
NW_Pond_WQ[Cr_VI]
CCME Cr_VI
PWQOs Cr_VI
mg/L
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

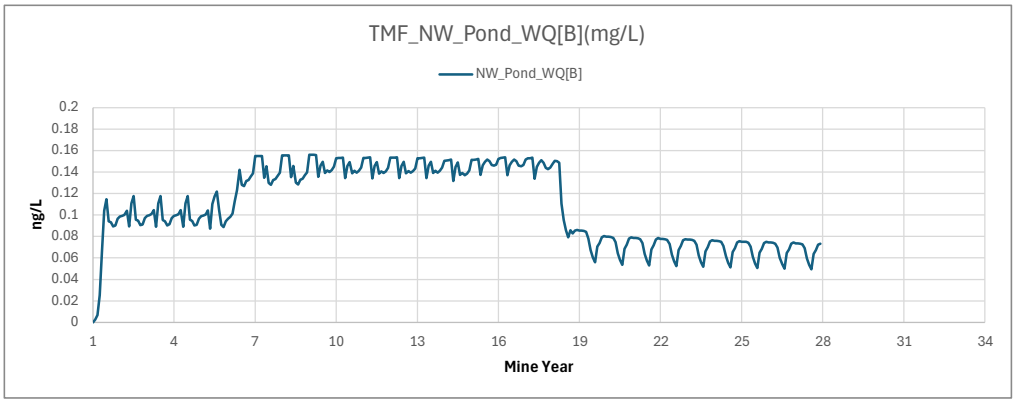

TMF NW Pond WQ Al (mg/L)
NW_Pond_WQ[Al]
CCME T-Al
North Driftwood River D-Al
mg/L
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

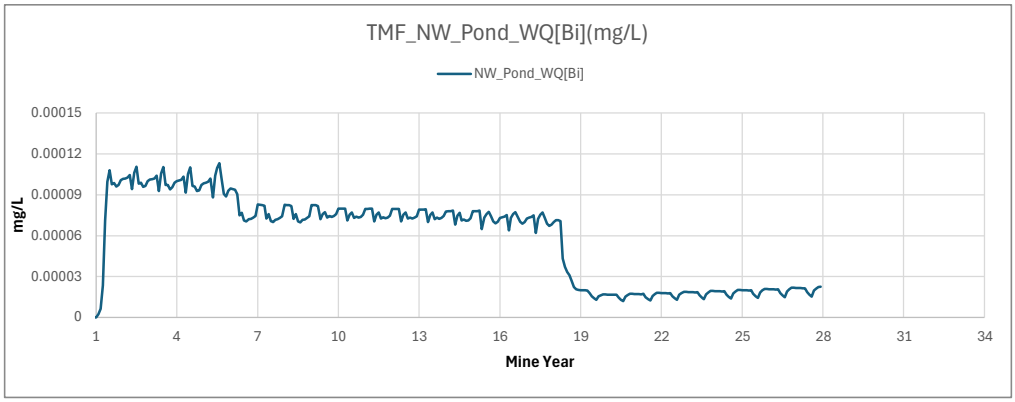

TMF_NW_POND WQ Ag (mg/L)
NW_Pond_WQ[Ag]
mg/L
3.0E-07
2.5E-07
2.0E-07
1.5E-07
1.0E-07
5.0E-08
0.0E+00
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

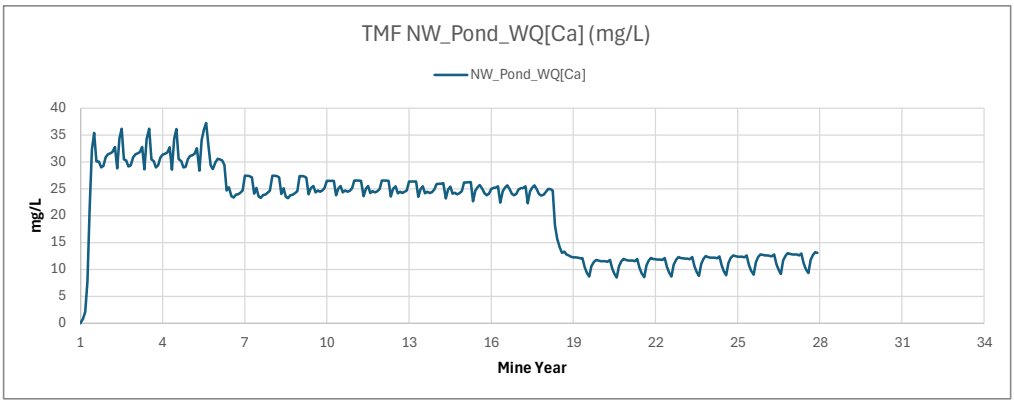

TMF NW Pond WQ As (mg/L)
NW_Pond_WQ[As]
CCME T-As
PWQOs T-As
mg/L
0.02
0.015
0.01
0.005
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

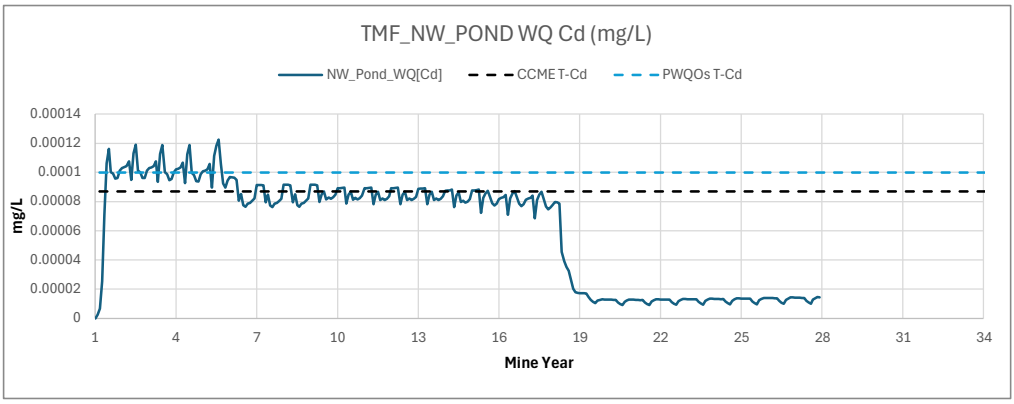

TMF_NW_POND WQ[Ba](mg/L)
NW_Pond_WQ[Ba]
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
mg/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

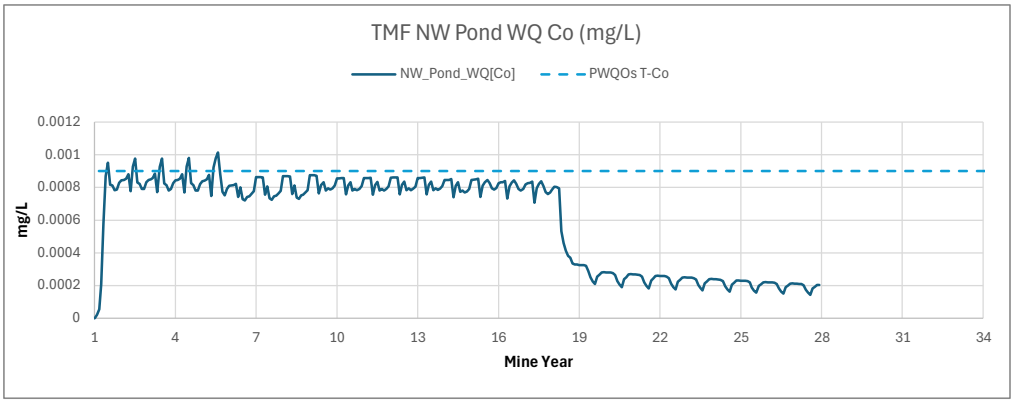

TMF_NW_Pond_WQ[Be](mg/L)
NW_Pond_WQ[Be]
0.0001
0.00008
0.00006
0.00004
0.00002
0
mg/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

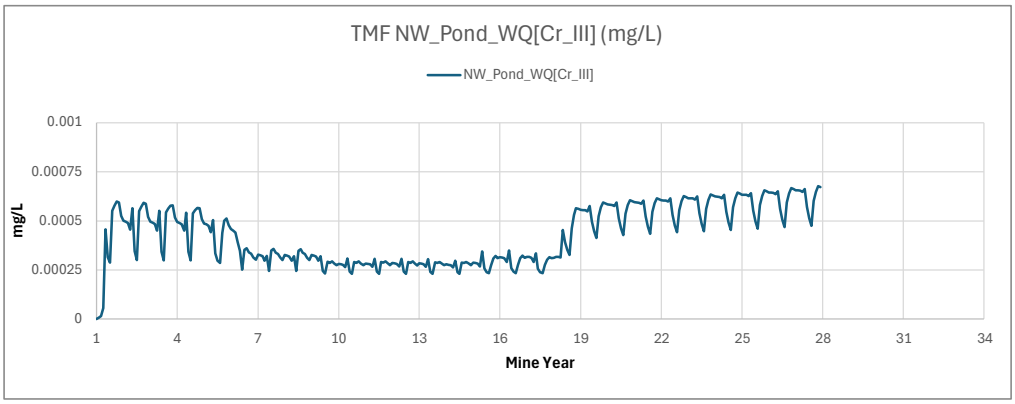

TMF_NW_Pond_WQ[B](mg/L)
NW_Pond_WQ[B]
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
ng/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

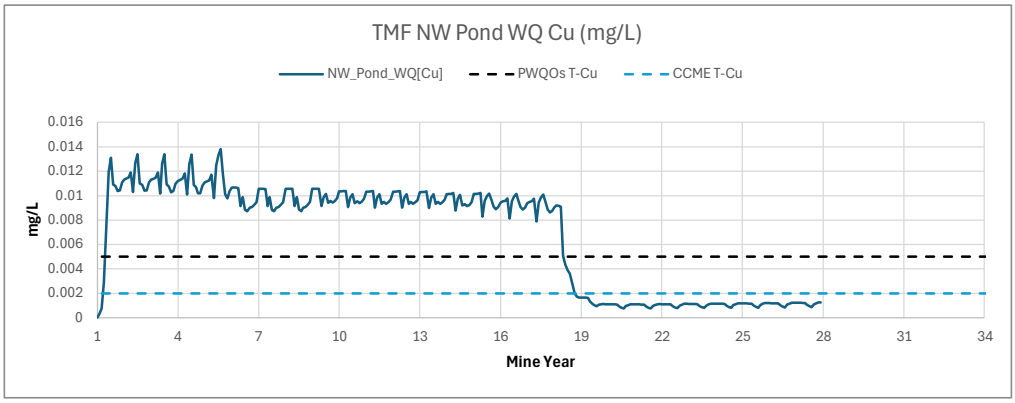

TMF_NW_Pond_WQ[Bi](mg/L)
NW_Pond_WQ[Bi]
0.00015
0.00012
0.00009
0.00006
0.00003
0
mg/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

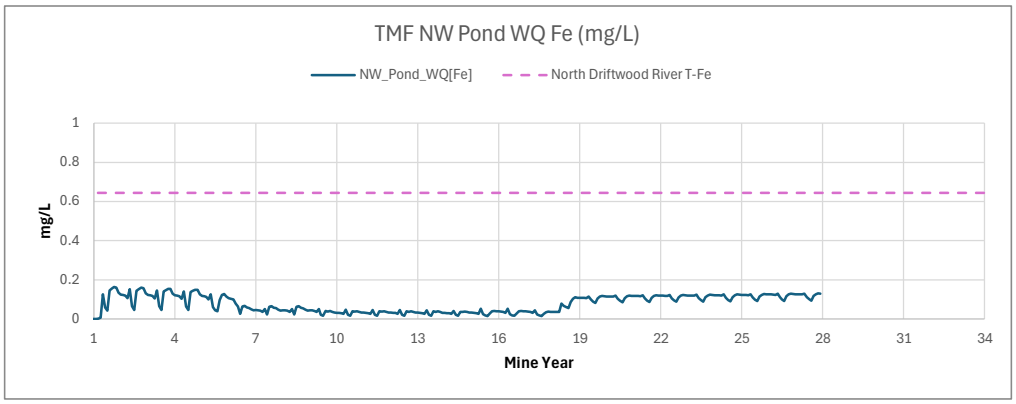

TMF NW_Pond_WQ[Ca] (mg/L)
NW_Pond_WQ[Ca]
mg/L
Mine Year

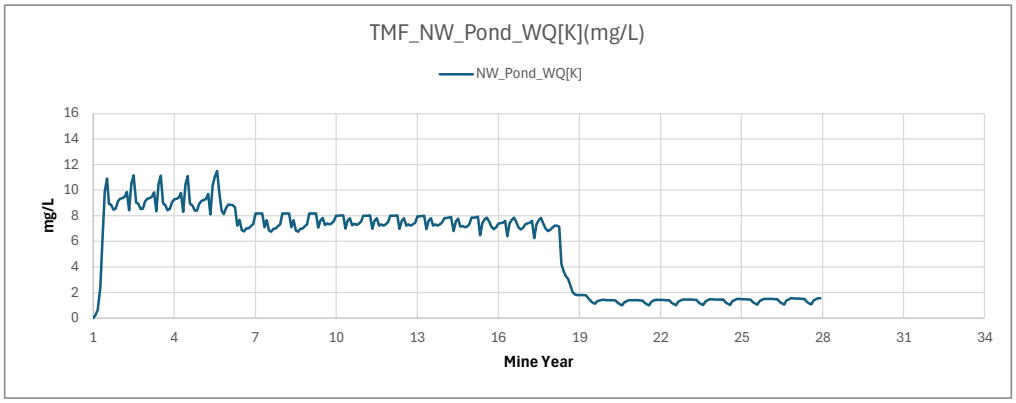

TMF_NW_POND WQ Cd (mg/L)
NW_Pond_WQ[Cd]
CCME T-Cd
PWQOs T-Cd
mg/L
Mine Year

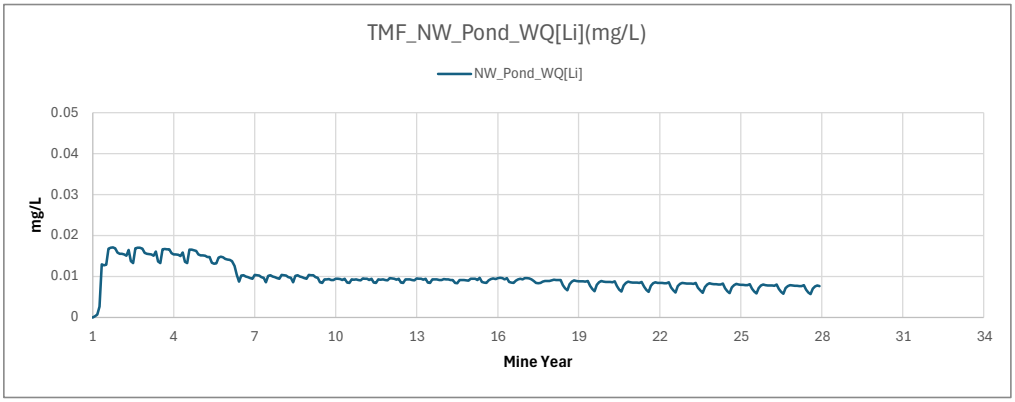

TMF NW Pond WQ Co (mg/L)
NW_Pond_WQ[Co]
PWQOs T-Co
mg/L
Mine Year

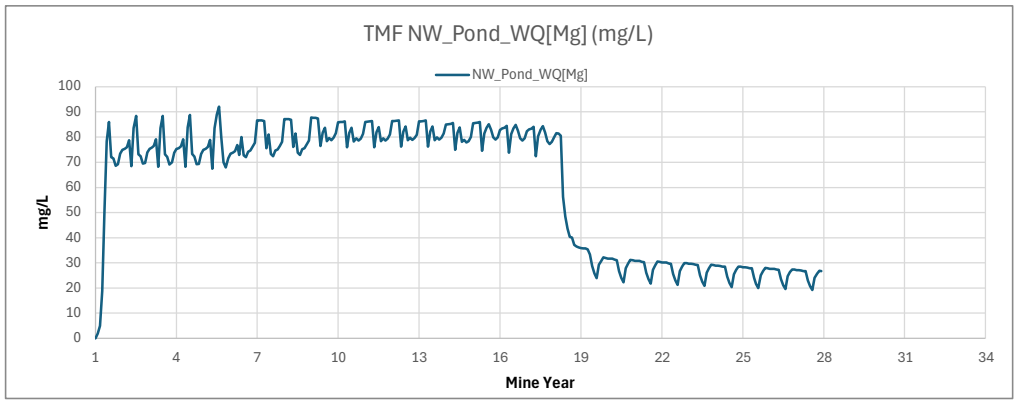

TMF NW_Pond_WQ[Cr_III] (mg/L)
NW_Pond_WQ[Cr_III]
mg/L
Mine Year

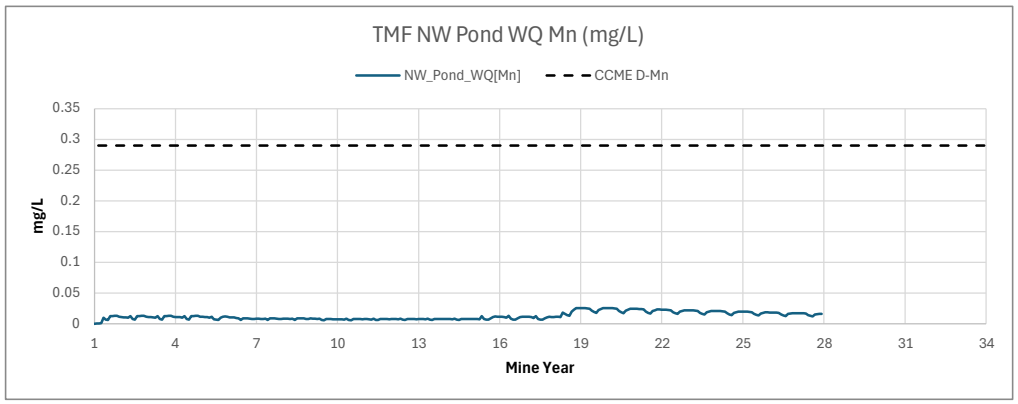

TMF NW Pond WQ Cu (mg/L)
NW_Pond_WQ[Cu]
PWQOs T-Cu
CCME T-Cu
mg/L
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

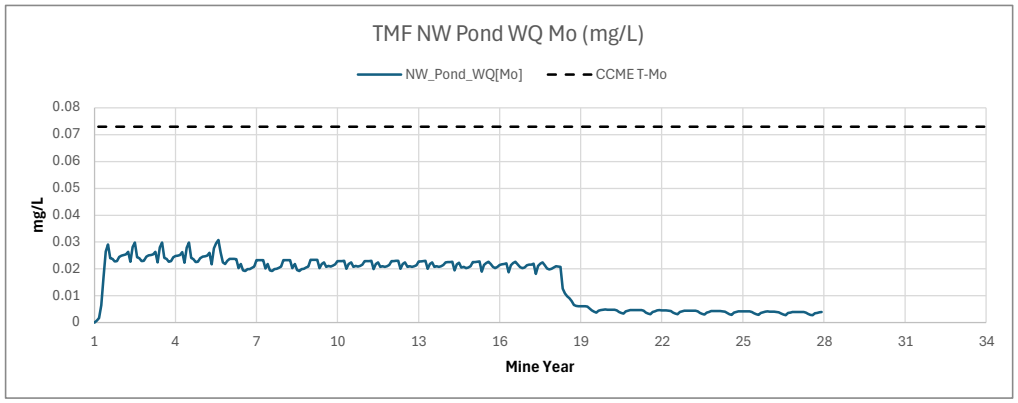

TMF NW Pond WQ Fe (mg/L)
NW_Pond_WQ[Fe]
North Driftwood River T-Fe
mg/L
1
0.8
0.6
0.4
0.2
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

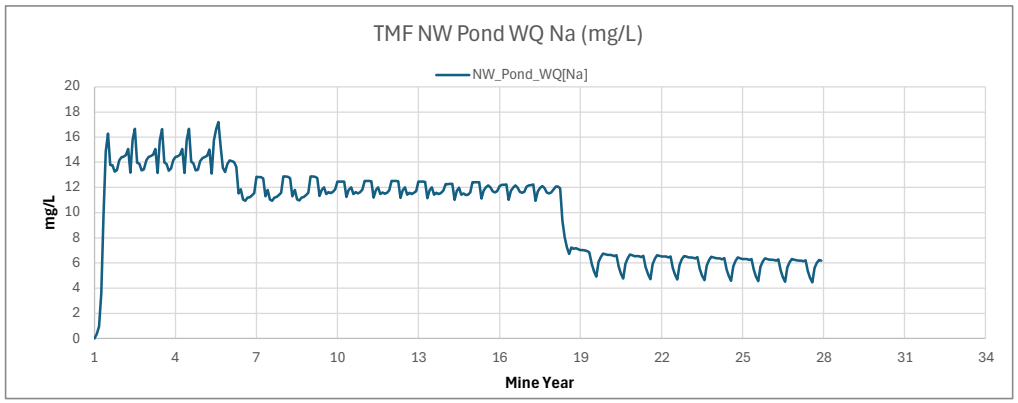

TMF_NW_Pond_WQ[K](mg/L)
NW_Pond_WQ[K]
mg/L
16
14
12
10
8
6
4
2
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

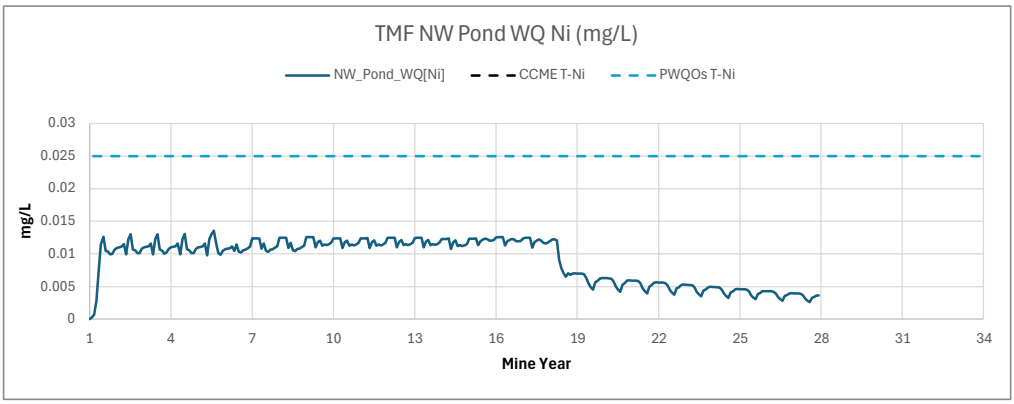

TMF_NW_Pond_WQ[Li](mg/L)
NW_Pond_WQ[Li]
mg/L
0.05
0.04
0.03
0.02
0.01
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

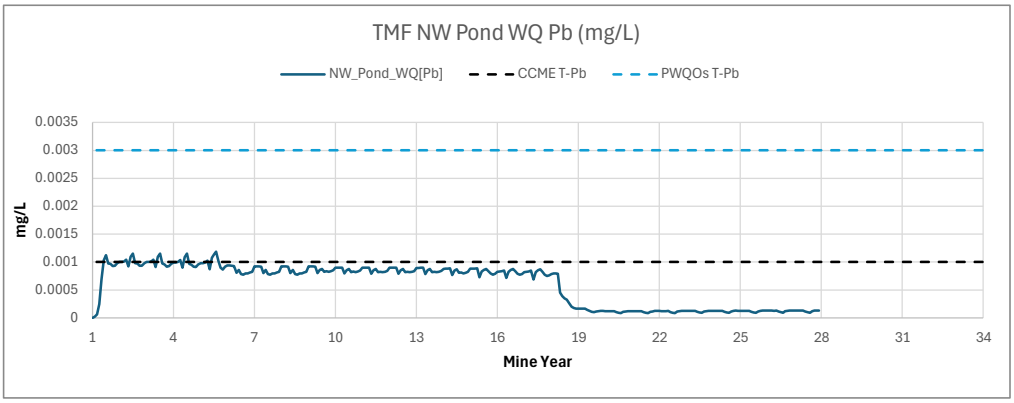

TMF NW_Pond_WQ[Mg] (mg/L)
NW_Pond_WQ[Mg]
mg/L
Mine Year

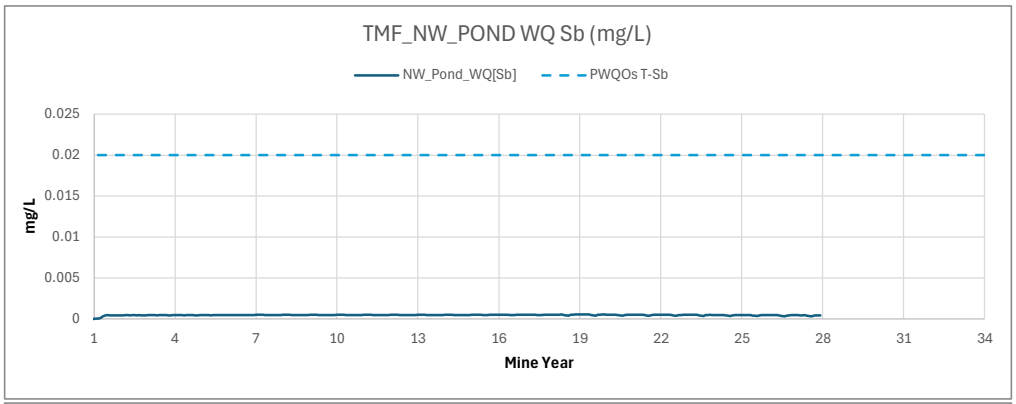

TMF NW Pond WQ Mn (mg/L)
NW_Pond_WQ[Mn]
CCME D-Mn
mg/L
Mine Year

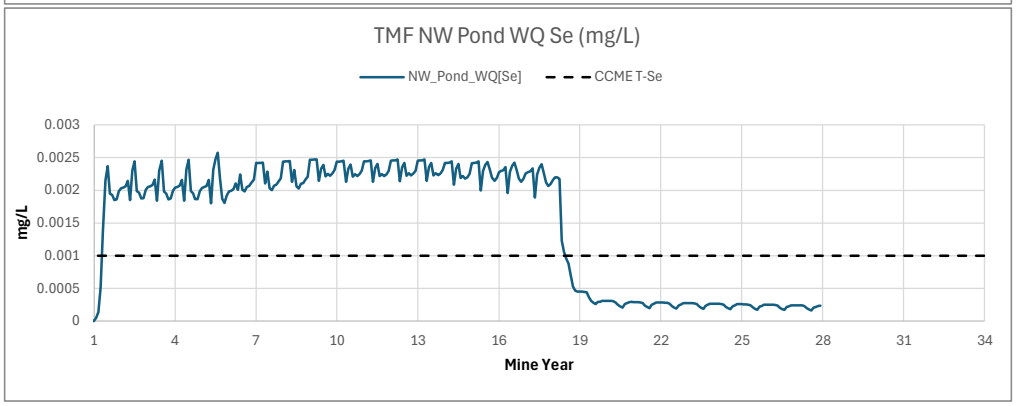

TMF NW Pond WQ Mo (mg/L)
NW_Pond_WQ[Mo]
CCME T-Mo
mg/L
Mine Year

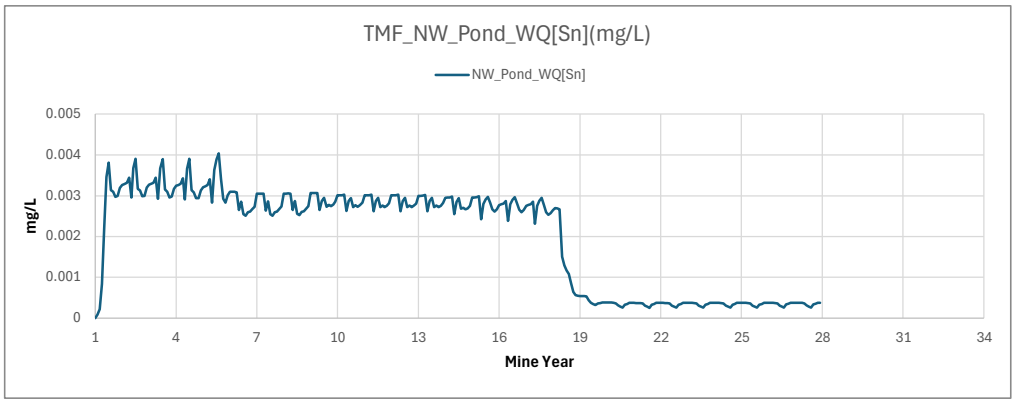

TMF NW Pond WQ Na (mg/L)
NW_Pond_WQ[Na]
mg/L
Mine Year

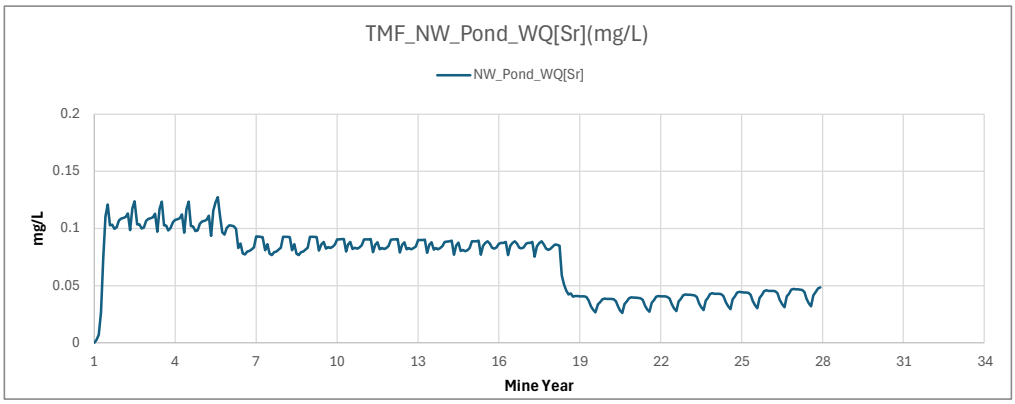

TMF NW Pond WQ Ni (mg/L)
NW_Pond_WQ[Ni]
CCME T-Ni
PWQOs T-Ni
mg/L
0.03
0.025
0.02
0.015
0.01
0.005
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

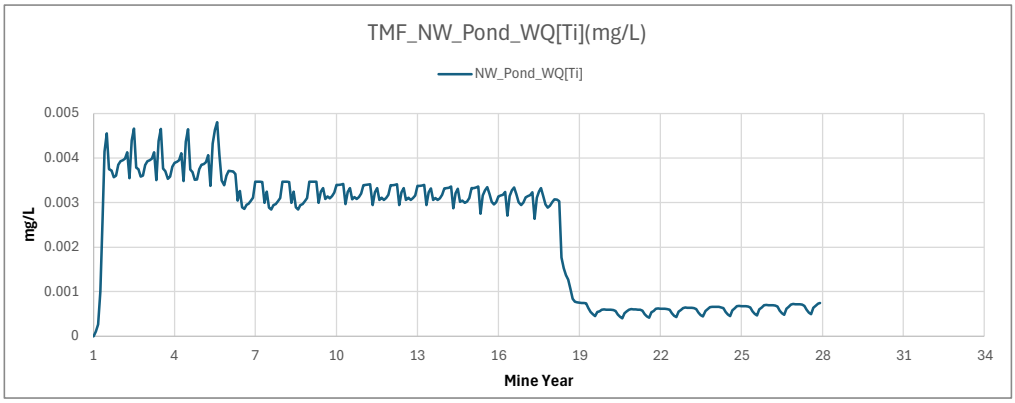

TMF NW Pond WQ Pb (mg/L)
NW_Pond_WQ[Pb]
CCME T-Pb
PWQOs T-Pb
mg/L
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

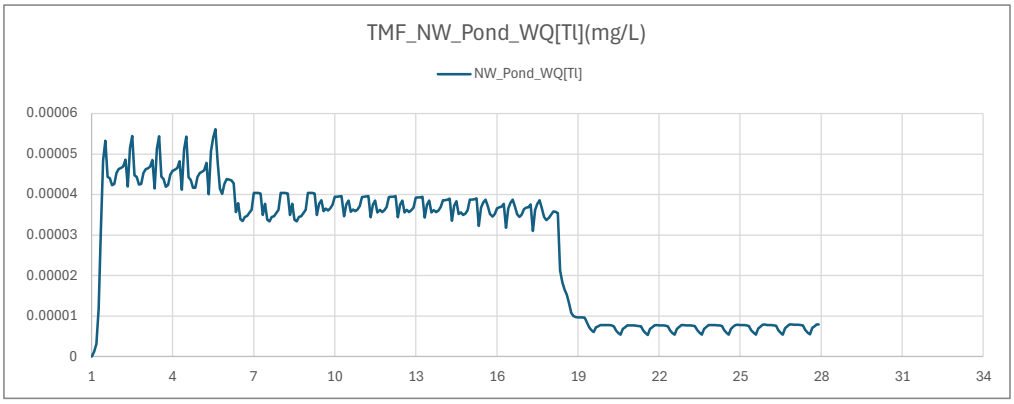

TMF_NW_POND WQ Sb (mg/L)
NW_Pond_WQ[Sb]
PWQOs T-Sb
mg/L
0.025
0.02
0.015
0.01
0.005
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

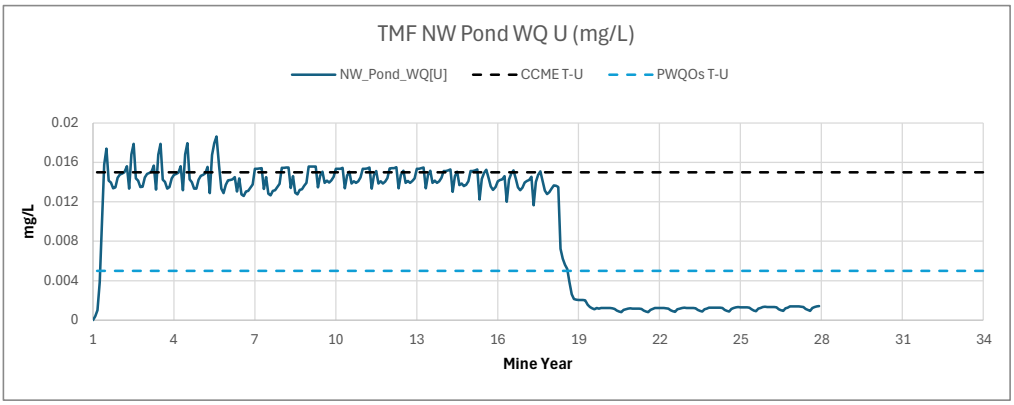

TMF NW Pond WQ Se (mg/L)
NW_Pond_WQ[Se]
CCME T-Se
mg/L
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

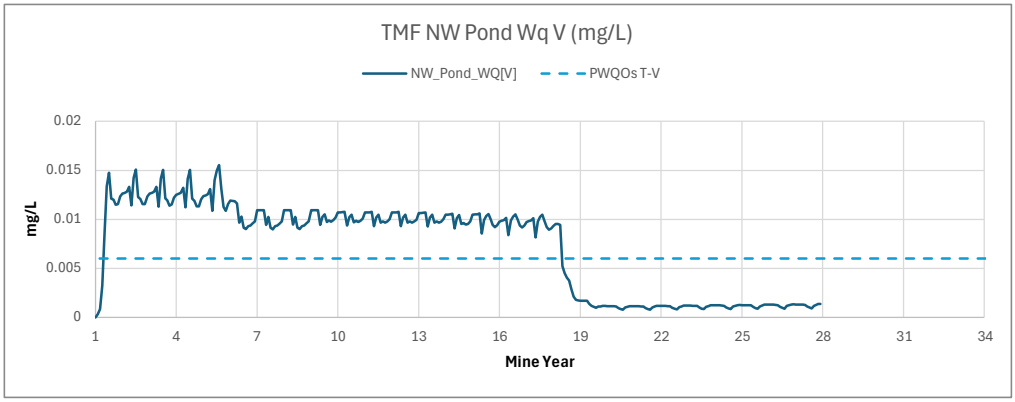

TMF_NW_Pond_WQ[Sn](mg/L)
NW_Pond_WQ[Sn]
mg/L
0.005
0.004
0.003
0.002
0.001
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

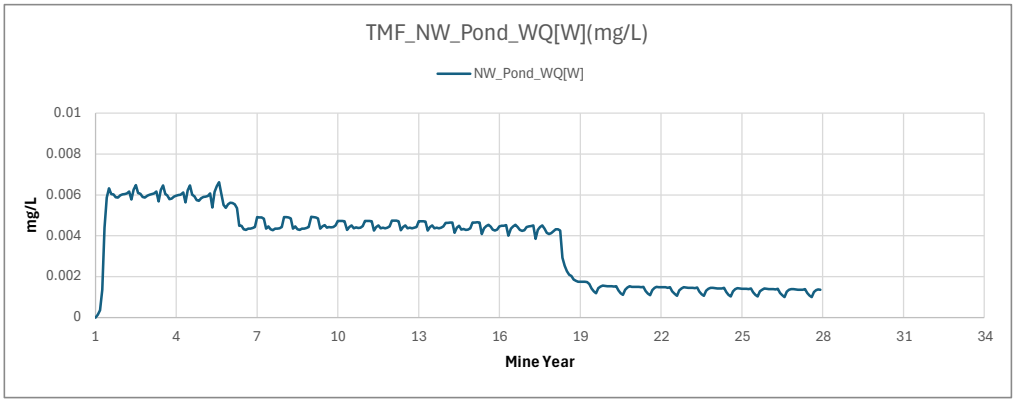

TMF_NW_Pond_WQ[Sr](mg/L)
NW_Pond_WQ[Sr]
mg/L
0.2
0.15
0.1
0.05
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

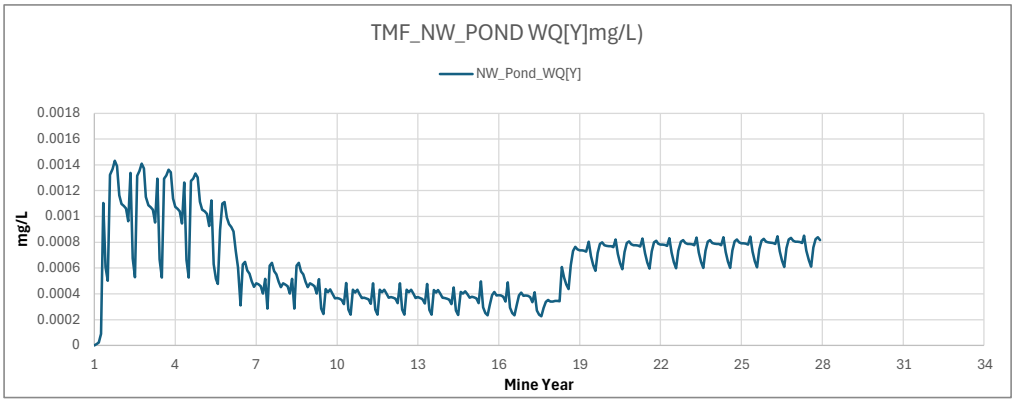

TMF_NW_Pond_WQ[Ti](mg/L)
NW_Pond_WQ[Ti]
mg/L
0.005
0.004
0.003
0.002
0.001
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

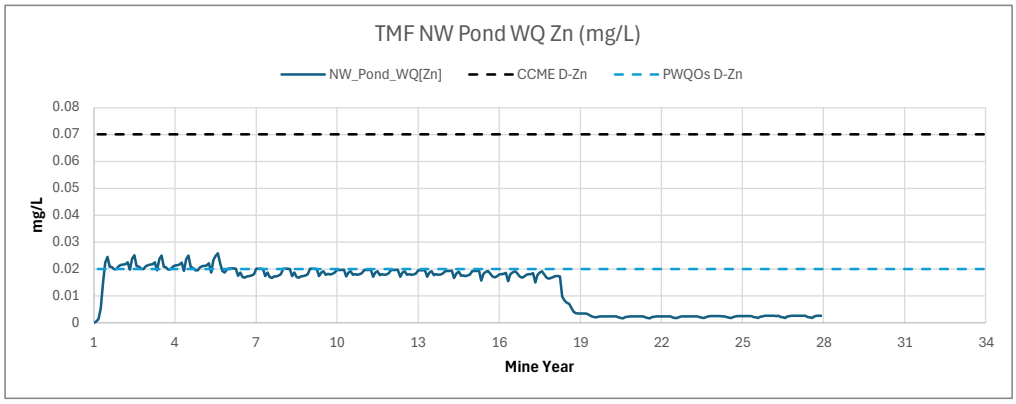

TMF_NW_Pond_WQ[Tl](mg/L)
NW_Pond_WQ[Tl]
0.00006
0.00005
0.00004
0.00003
0.00002
0.00001
0
1
4
7
10
13
16
19
22
25
28
31
34

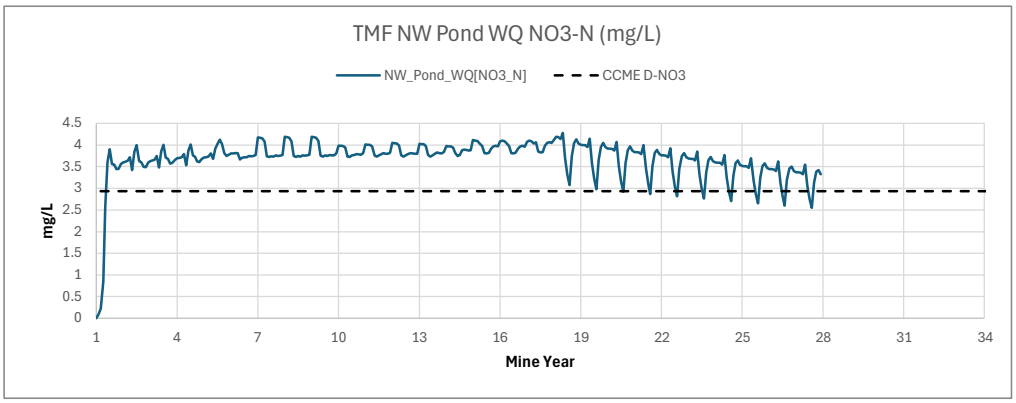

TMF NW Pond WQ U (mg/L)
NW_Pond_WQ[U]
CCME T-U
PWQOs T-U
mg/L
0.02
0.016
0.012
0.008
0.004
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

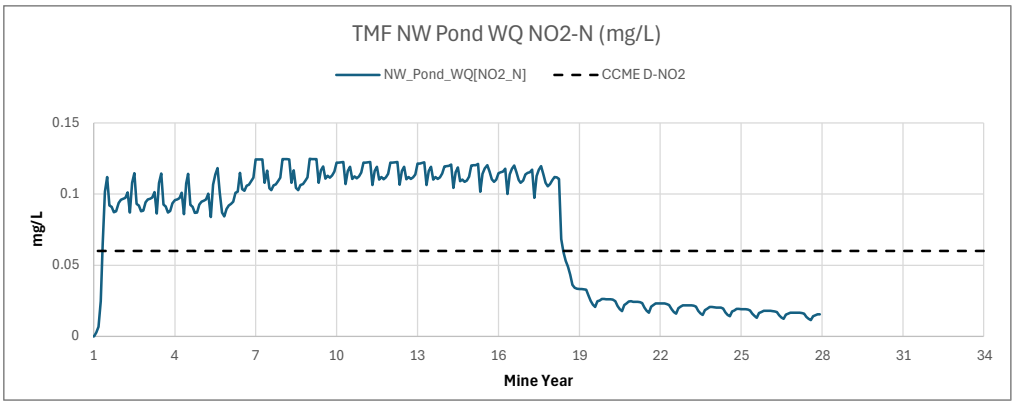

TMF NW Pond Wq V (mg/L)
NW_Pond_WQ[V]
PWQOs T-V
mg/L
0.02
0.015
0.01
0.005
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

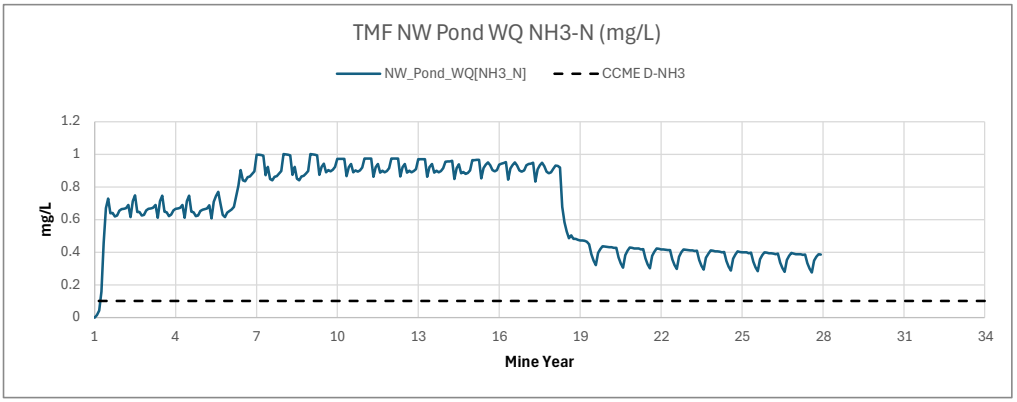

TMF_NW_Pond_WQ[W](mg/L)
NW_Pond_WQ[W]
mg/L
0.01
0.008
0.006
0.004
0.002
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

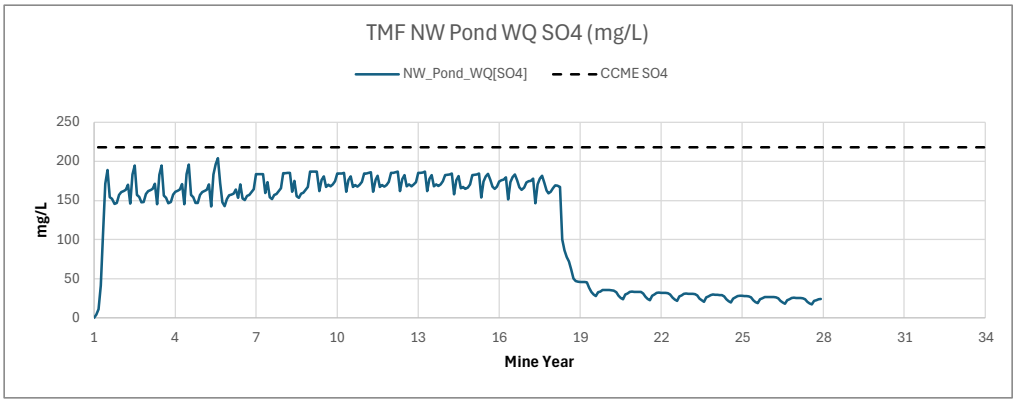

TMF_NW_POND WQ[Y]mg/L)
NW_Pond_WQ[Y]
mg/L
0.0018
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

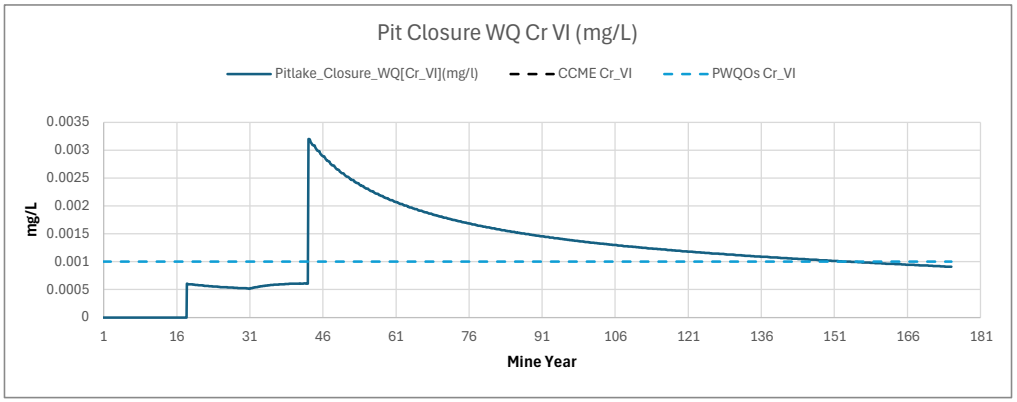

TMF NW Pond WQ Zn (mg/L)
NW_Pond_WQ[Zn]
CCME D-Zn
PWQOs D-Zn
mg/L
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

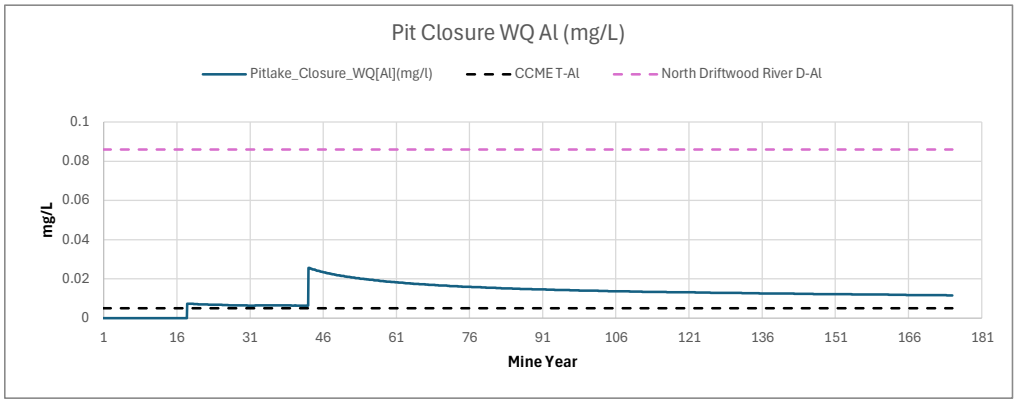

TMF NW Pond WQ NO3-N (mg/L)
NW_Pond_WQ[NO3_N]
CCME D-NO3
mg/L
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

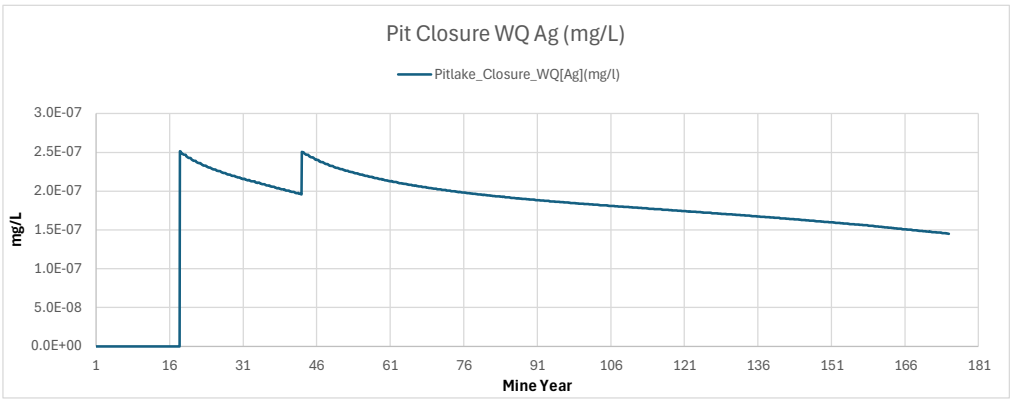

TMF NW Pond WQ NO2-N (mg/L)
NW_Pond_WQ[NO2_N]
CCME D-NO2
mg/L
0.15
0.1
0.05
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year

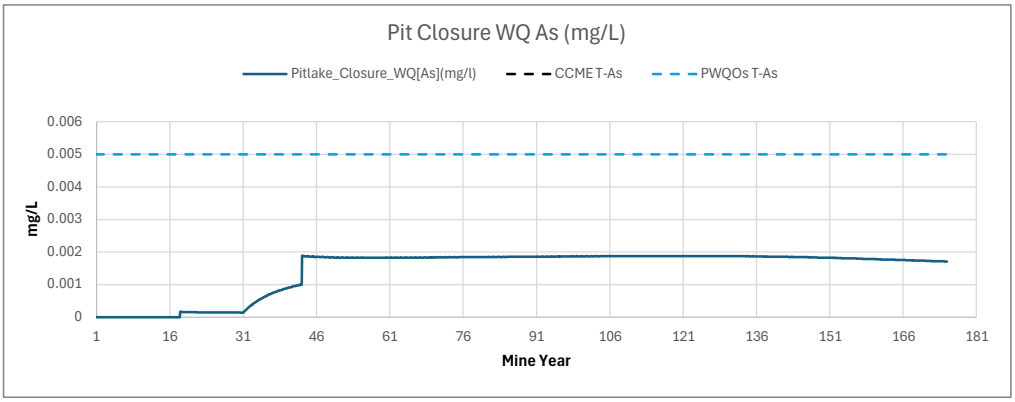

TMF NW Pond WQ NH3-N (mg/L)
NW_Pond_WQ[NH3_N]
CCME D-NH3
mg/L
1.2
1
0.8
0.6
0.4
0.2
0
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year


TMF NW Pond WQ SO4 (mg/L)
NW_Pond_WQ[SO4]
CCME SO4
250
200
150
100
50
0
mg/L
1
4
7
10
13
16
19
22
25
28
31
34
Mine Year


Pit Closure WQ Cr VI (mg/L)
Pitlake_Closure_WQ[Cr_VI](mg/l)
CCME Cr_VI
PWQOs Cr_VI
mg/L
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pit Closure WQ Al (mg/L)
Pitlake_Closure_WQ[Al](mg/l)
CCME T-Al
North Driftwood River D-Al
mg/L
0.1
0.08
0.06
0.04
0.02
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pit Closure WQ Ag (mg/L)
Pitlake_Closure_WQ[Ag](mg/l)
mg/L
3.0E-07
2.5E-07
2.0E-07
1.5E-07
1.0E-07
5.0E-08
0.0E+00
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pit Closure WQ As (mg/L)
Pitlake_Closure_WQ[As](mg/l)
CCME T-As
PWQOs T-As
mg/L
0.006
0.005
0.004
0.003
0.002
0.001
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

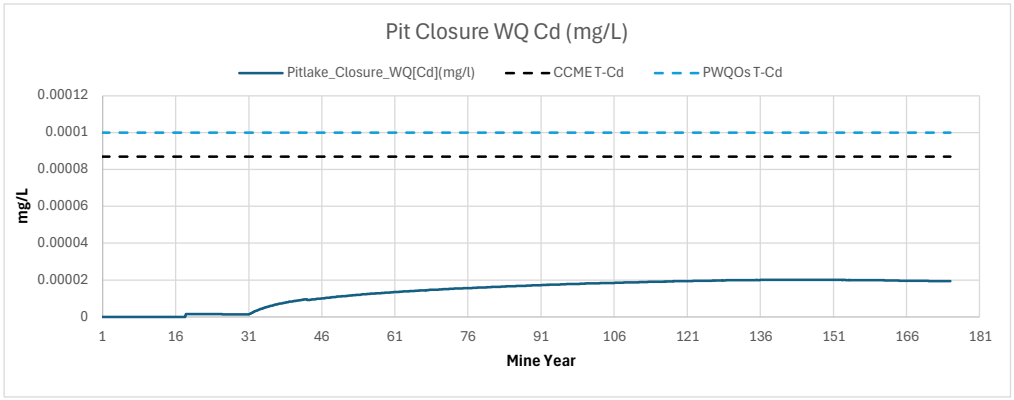

Pit Closure WQ [Ba](mg/L)
Pitlake_Closure_WQ[Ba](mg/l)
mg/L
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

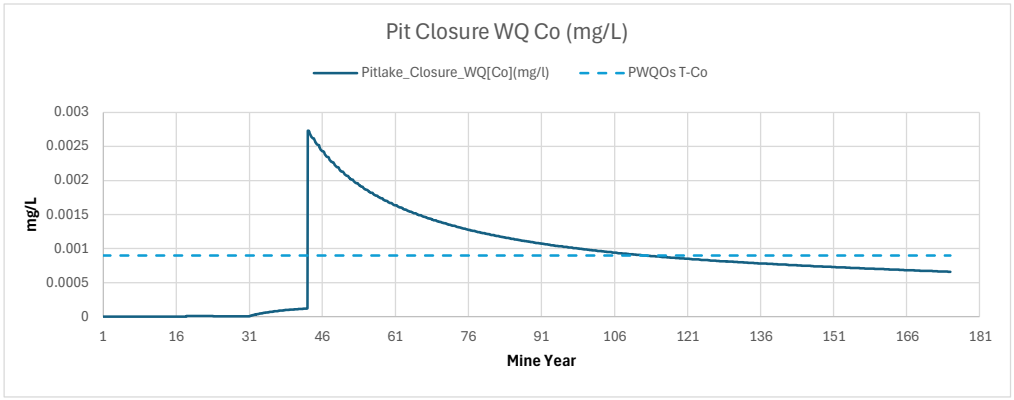

Pit Closure WQ [Be](mg/L)
Pitlake_Closure_WQ[Be](mg/l)
mg/L
0.00004
0.00003
0.00002
0.00001
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

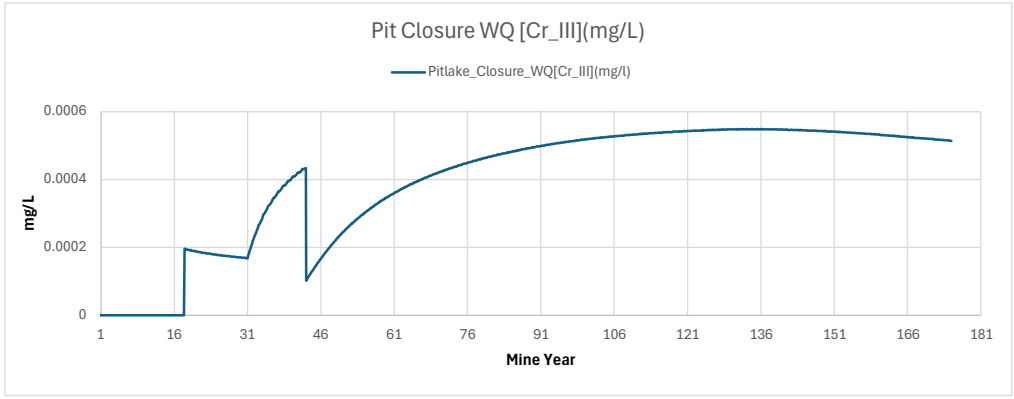

Pit Closure WQ [B](mg/L)
Pitlake_Closure_WQ[B](mg/l)
mg/L
0.5
0.4
0.3
0.2
0.1
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

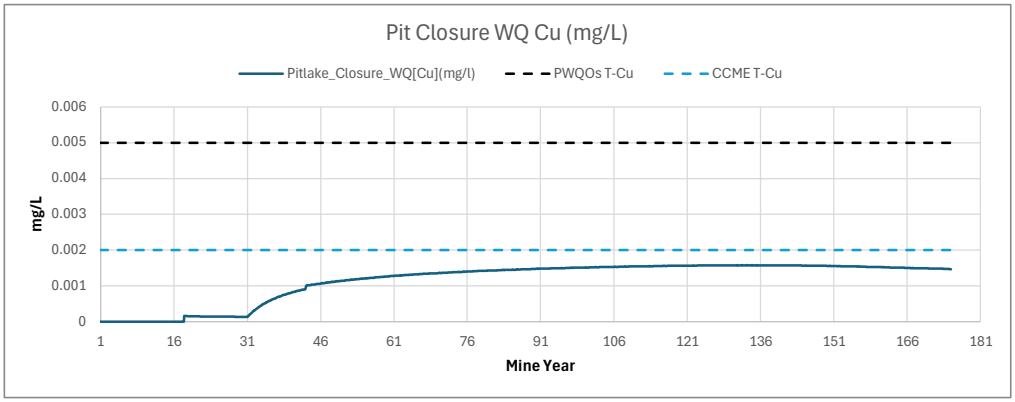

Pit Closure WQ [Bi](mg/L)
Pitlake_Closure_WQ[Bi](mg/l)
mg/L
0.00008
0.00006
0.00004
0.00002
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

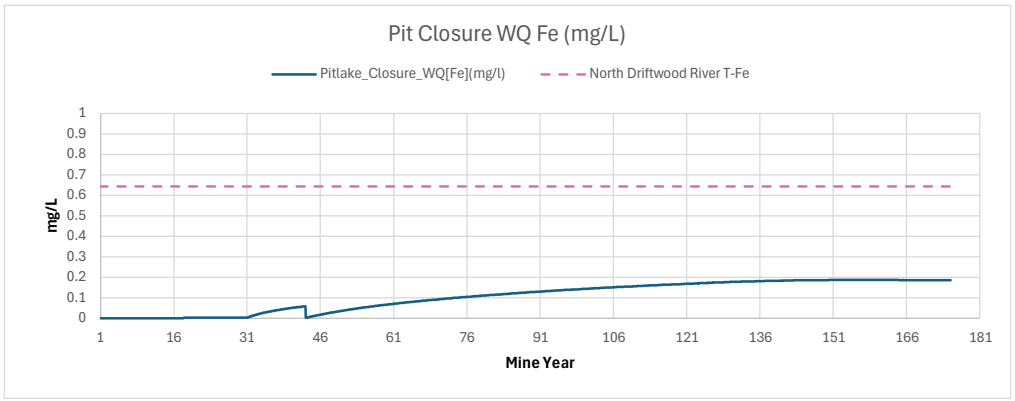

Pitlake_Closure_WQ[Ca](mg/L)
Pitlake_Closure_WQ[Ca](mg/l)
mg/L
Mine Year


Pit Closure WQ Cd (mg/L)
Pitlake_Closure_WQ[Cd](mg/l)
CCME T-Cd
PWQOs T-Cd
mg/L
Mine Year


Pit Closure WQ Co (mg/L)
Pitlake_Closure_WQ[Co](mg/l)
PWQOs T-Co
mg/L
Mine Year

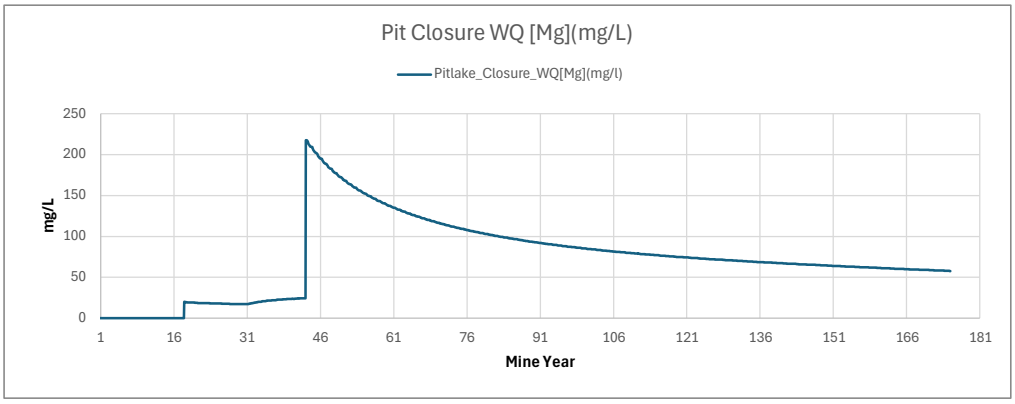

Pit Closure WQ [Cr_III](mg/L)
Pitlake_Closure_WQ[Cr_III](mg/l)
mg/L
Mine Year


Pit Closure WQ Cu (mg/L)
Pitlake_Closure_WQ[Cu](mg/l)
PWQOs T-Cu
CCME T-Cu
mg/L
0.006
0.005
0.004
0.003
0.002
0.001
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

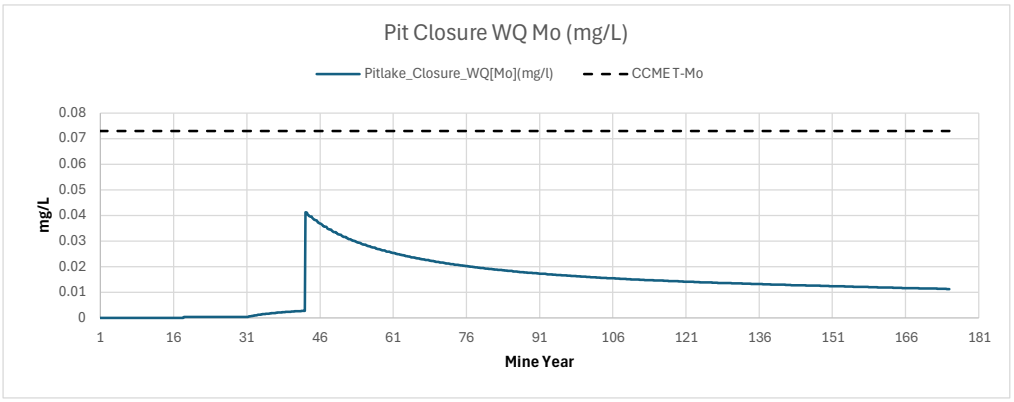

Pit Closure WQ Fe (mg/L)
Pitlake_Closure_WQ[Fe](mg/l)
North Driftwood River T-Fe
mg/L
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

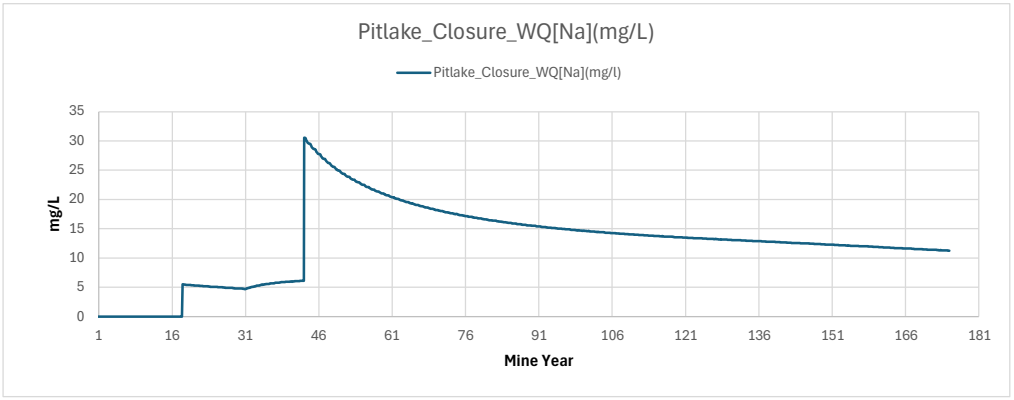

Pit Closure WQ [K](mg/L)
Pitlake_Closure_WQ[K](mg/l)
mg/L
4
3.5
3
2.5
2
1.5
1
0.5
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

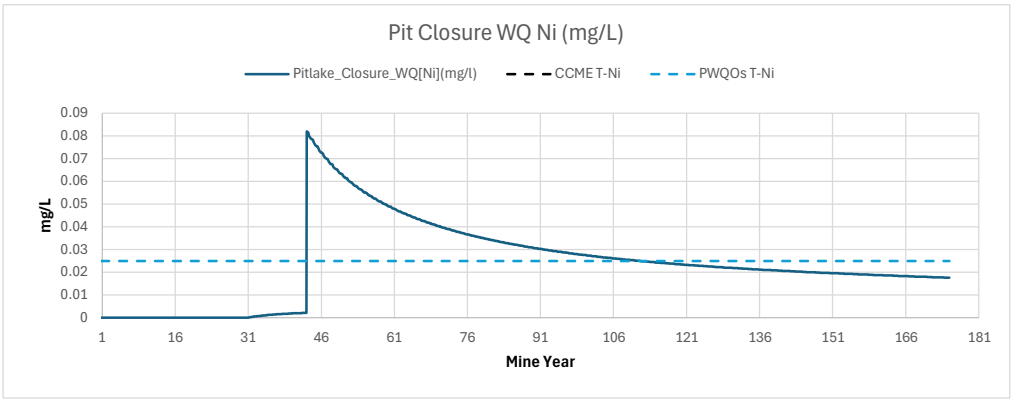

Pit Closure WQ [Li](mg/L)
Pitlake_Closure_WQ[Li](mg/l)
mg/L
0.05
0.04
0.03
0.02
0.01
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

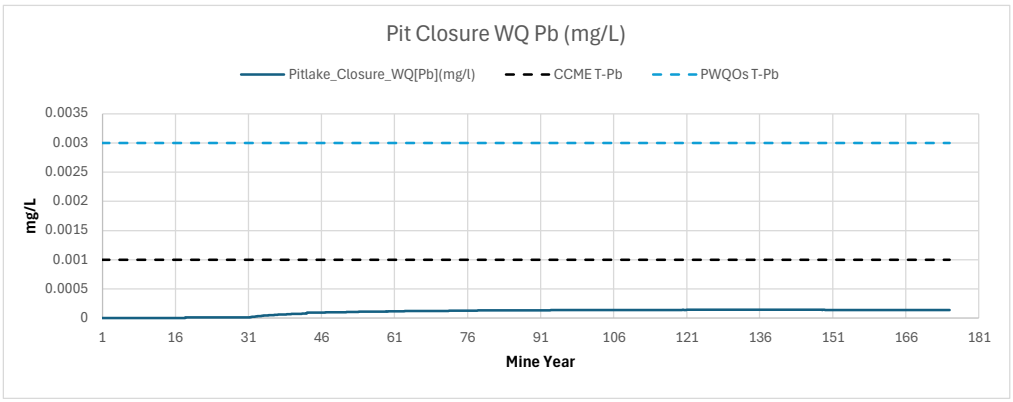

Pit Closure WQ [Mg](mg/L)
Pitlake_Closure_WQ[Mg](mg/l)
mg/L
250
200
150
100
50
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

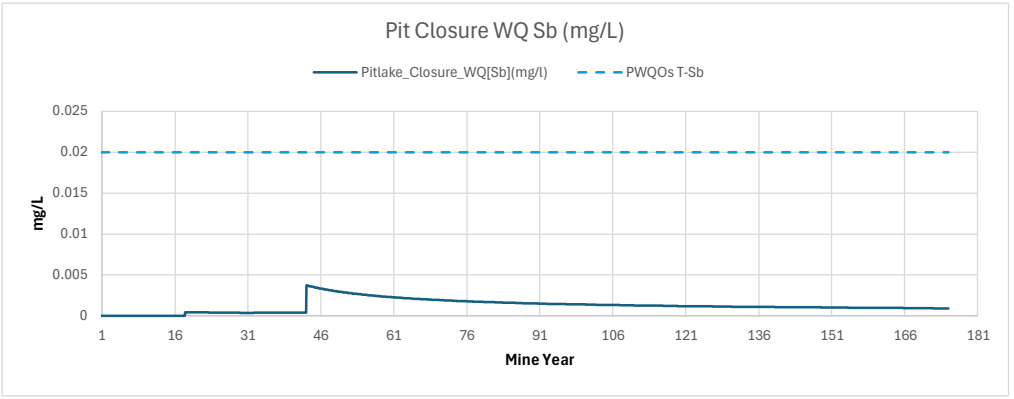

Pit Closure WQ Mn (mg/L)
Pitlake_Closure_WQ[Mn](mg/l)
CCME D-Mn
mg/L
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

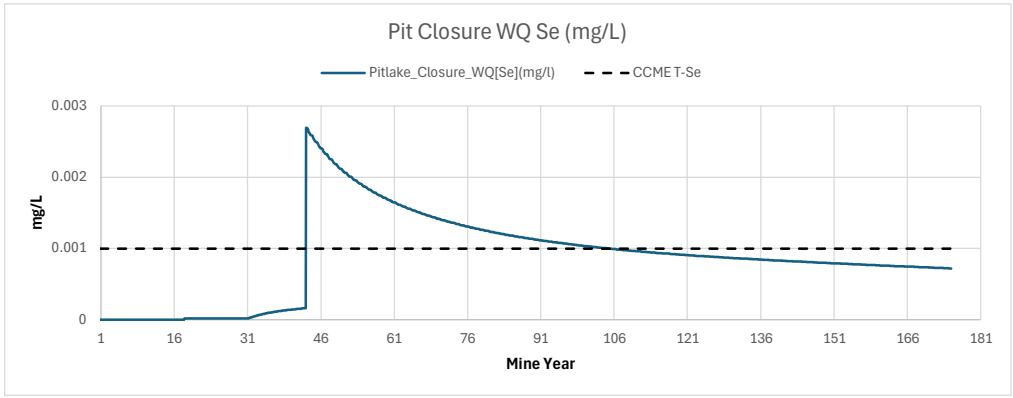

Pit Closure WQ Mo (mg/L)
Pitlake_Closure_WQ[Mo](mg/l)
CCME T-Mo
mg/L
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pitlake_Closure_WQ[Na](mg/L)
Pitlake_Closure_WQ[Na](mg/l)
mg/L
35
30
25
20
15
10
5
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pit Closure WQ Ni (mg/L)
Pitlake_Closure_WQ[Ni](mg/l)
CCME T-Ni
PWQOs T-Ni
mg/L
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

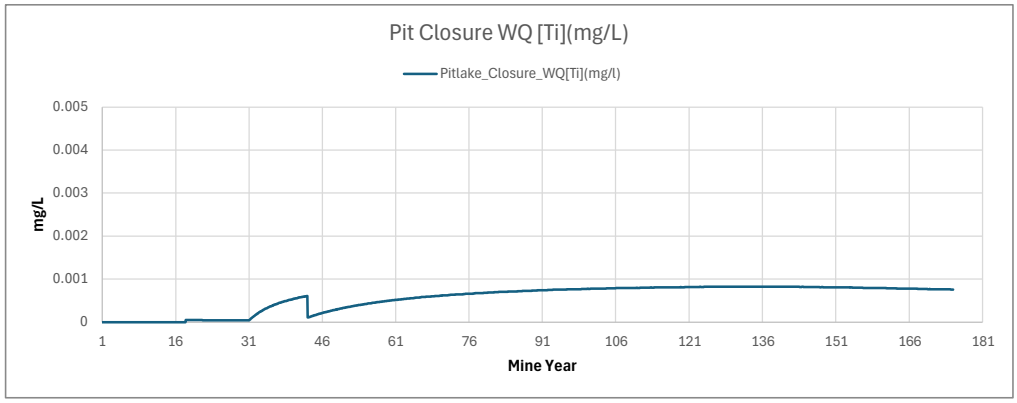

Pit Closure WQ Pb (mg/L)
Pitlake_Closure_WQ[Pb](mg/l)
CCME T-Pb
PWQOs T-Pb
mg/L
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

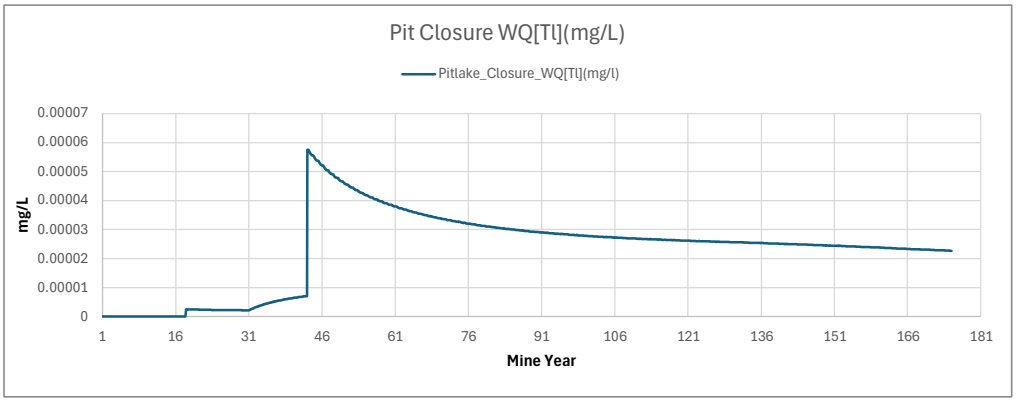

Pit Closure WQ Sb (mg/L)
Pitlake_Closure_WQ[Sb](mg/l)
PWQOs T-Sb
mg/L
0.025
0.02
0.015
0.01
0.005
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

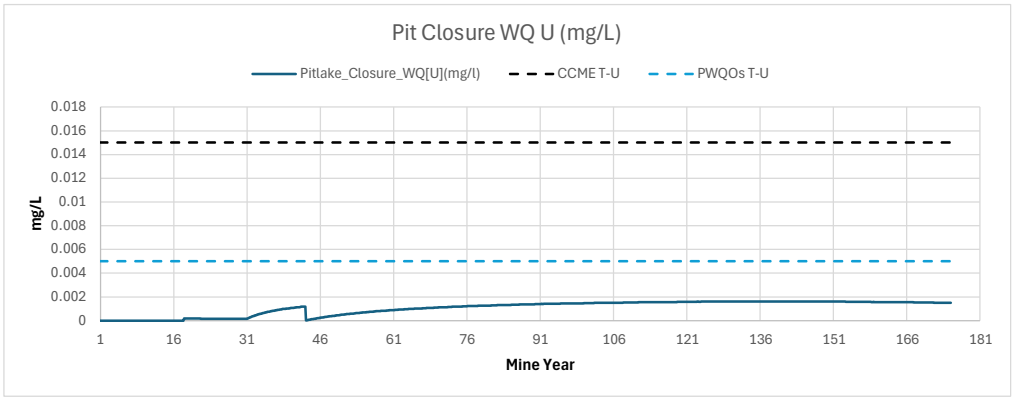

Pit Closure WQ Se (mg/L)
Pitlake_Closure_WQ[Se](mg/l)
CCME T-Se
mg/L
0.003
0.002
0.001
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

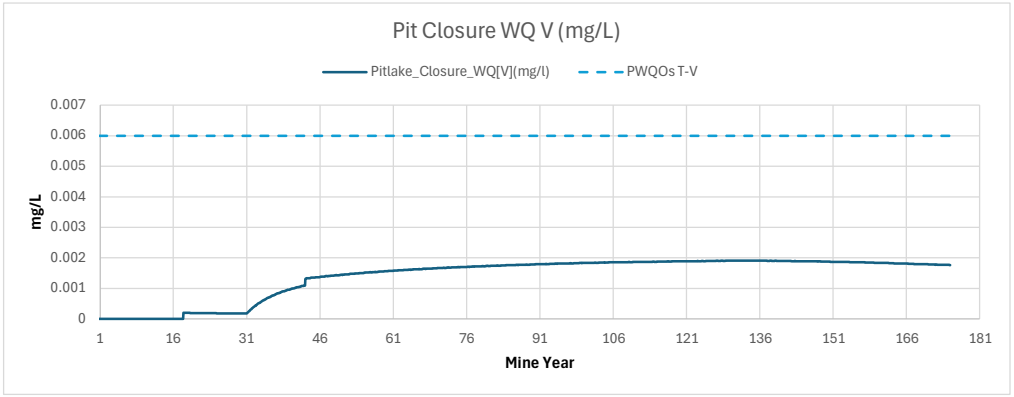

Pit Closure [Sn](mg/L)
Pitlake_Closure_WQ[Sn](mg/l)
0.002
0.0015
0.001
0.0005
0
mg/L
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

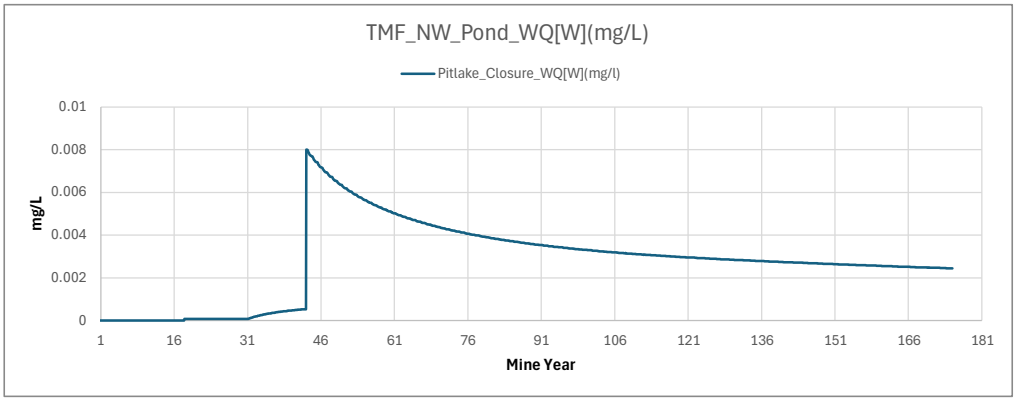

Pit Closure WQ[Sr](mg/L)
Pitlake_Closure_WQ[Sr](mg/l)
0.06
0.05
0.04
0.03
0.02
0.01
0
mg/L
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

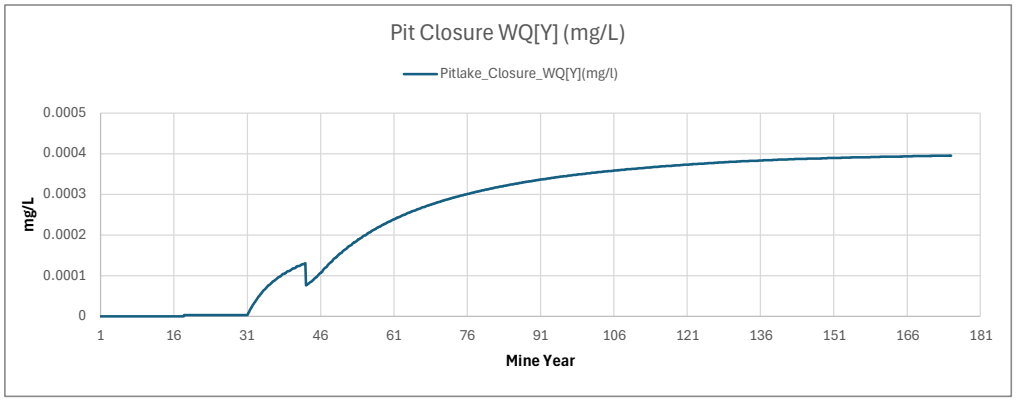

Pit Closure WQ [Ti](mg/L)
Pitlake_Closure_WQ[Ti](mg/l)
0.005
0.004
0.003
0.002
0.001
0
mg/L
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

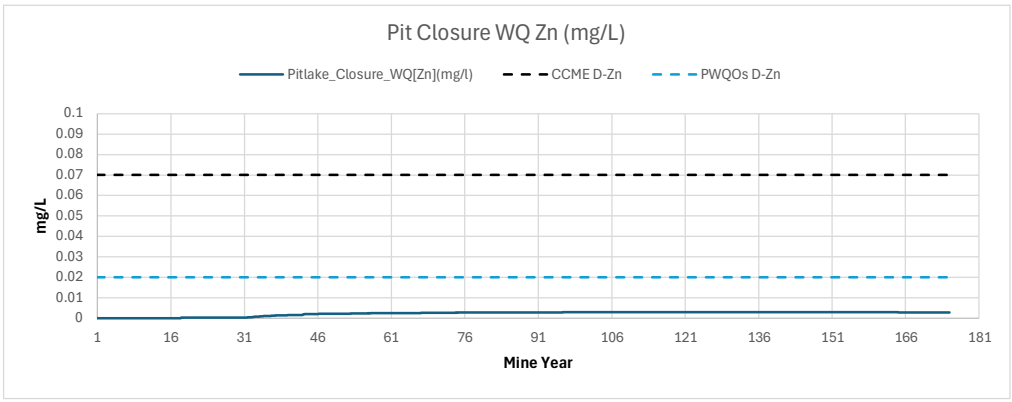

Pit Closure WQ[Tl](mg/L)
Pitlake_Closure_WQ[Tl](mg/l)
0.00007
0.00006
0.00005
0.00004
0.00003
0.00002
0.00001
0
mg/L
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

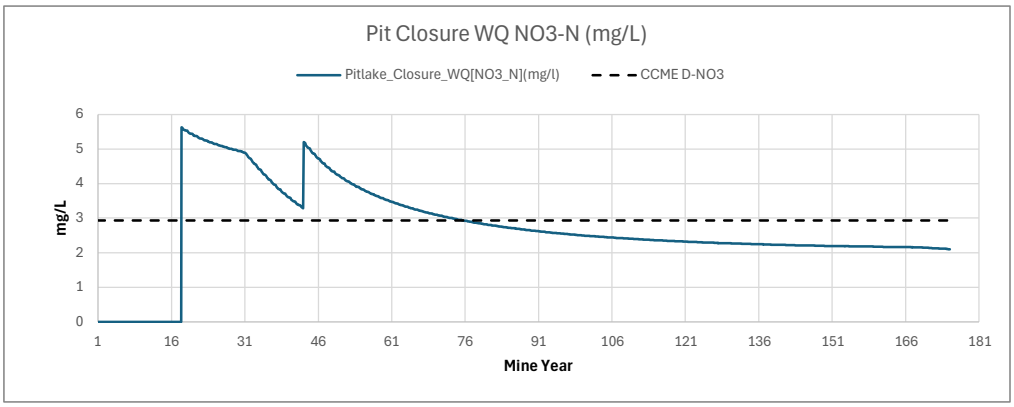

Pit Closure WQ U (mg/L)
Pitlake_Closure_WQ[U](mg/l)
CCME T-U
PWQOs T-U
mg/L
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

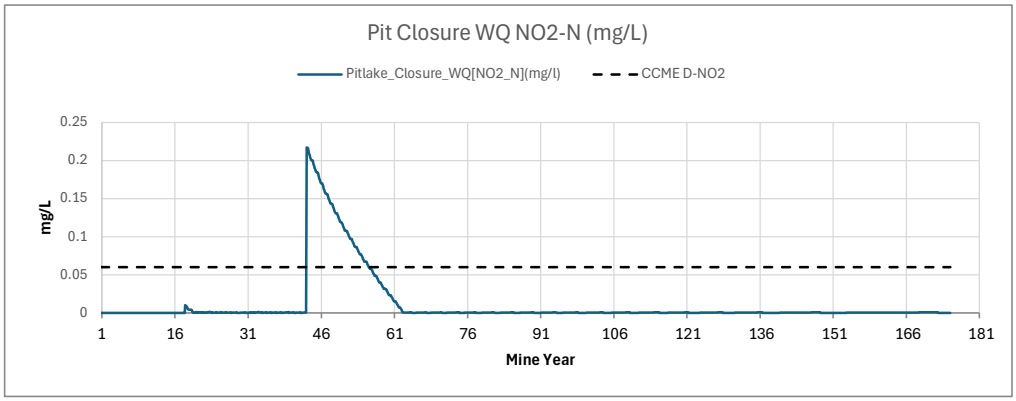

Pit Closure WQ V (mg/L)
Pitlake_Closure_WQ[V](mg/l)
PWQOs T-V
mg/L
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

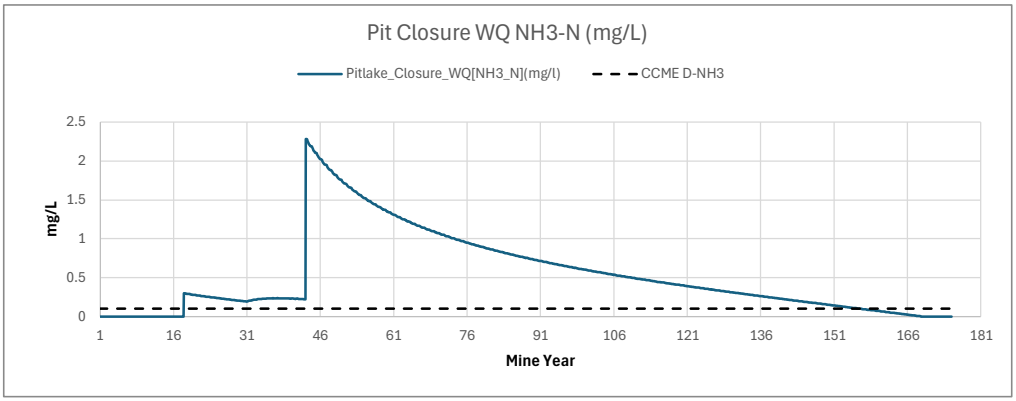

TMF_NW_Pond_WQ[W](mg/L)
Pitlake_Closure_WQ[W](mg/l)
mg/L
0.01
0.008
0.006
0.004
0.002
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

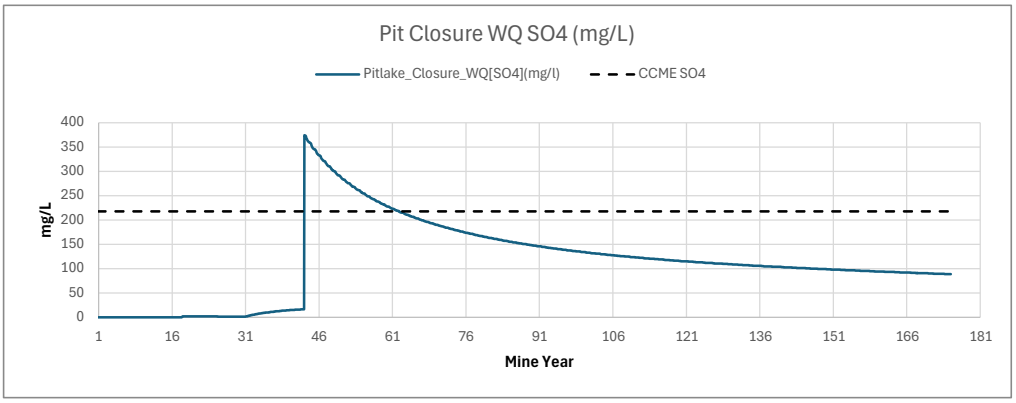

Pit Closure WQ[Y] (mg/L)
Pitlake_Closure_WQ[Y](mg/l)
mg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pit Closure WQ Zn (mg/L)
Pitlake_Closure_WQ[Zn](mg/l)
CCME D-Zn
PWQOs D-Zn
mg/L
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pit Closure WQ NO3-N (mg/L)
Pitlake_Closure_WQ[NO3_N](mg/l)
CCME D-NO3
mg/L
6
5
4
3
2
1
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pit Closure WQ NO2-N (mg/L)
Pitlake_Closure_WQ[NO2_N](mg/l)
CCME D-NO2
mg/L
0.25
0.2
0.15
0.1
0.05
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pit Closure WQ NH3-N (mg/L)
Pitlake_Closure_WQ[NH3_N](mg/l)
CCME D-NH3
mg/L
2.5
2
1.5
1
0.5
0
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year


Pit Closure WQ SO4 (mg/L)
Pitlake_Closure_WQ[SO4](mg/l)
CCME SO4
400
350
300
250
200
150
100
50
0
mg/L
1
16
31
46
61
76
91
106
121
136
151
166
181
Mine Year

CNC's Response to IAAC Comments on the Impact Statement for the Crawford Nickel Project (Recieved May 30, 2025)
Attachment GHC-02d - Revised Water Quality Model Results

Table 1: Collection Pond 1 Water Quality Model Results for Year 1 to Year 30

Parameter	Units	Mininum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO	MDMER
Total Ammonia	mg/L-N	0.000562	0.00803	0.157	0.338	0.371	2.7	76
Nitrate	mg/L-N	0.0592	0.0768	21.4	46.9	51.5	2.94	-
Nitrite	mg/L-N	0.000419	0.000544	0.151	0.332	0.364	0.06	-
Chloride	mg/L	39.9	52.9	149	155	159	120	-
Sulphate	mg/L	27.4	38.2	132	255	280	218	-
Aluminum	mg/L	0.0485	0.0505	0.0522	0.0543	0.0555	variable*	-
Arsenic	mg/L	0.00287	0.00404	0.0121	0.0235	0.0259	0.005	0.1
Barium	mg/L	0.00502	0.00609	0.0128	0.0206	0.0222	-	-
Calcium	mg/L	20.5	27.1	50	61.7	65.9	-	-
Cadmium	mg/L	0.0000227	0.0000323	0.000112	0.000216	0.000237	0.0001	-
Cobalt	mg/L	0.00017	0.000232	0.000752	0.00144	0.00159	0.0009	-
Chromium III	mg/L	0.000304	0.000447	0.000465	0.000486	0.000499	0.0089	-
Chromium VI	mg/L	0.000982	0.00112	0.00288	0.00558	0.00623	0.001	-
Copper	mg/L	0.00314	0.00437	0.0128	0.0237	0.0259	0.005	0.2
Iron	mg/L	0.0419	0.106	0.11	0.116	0.129	0.3	-
Potassium	mg/L	5.23	7.33	15.2	19	20.2	-	-
Magnesium	mg/L	25.9	30.6	68.5	90.7	98.3	-	-
Manganese	mg/L	0.0228	0.0263	0.0931	0.151	0.16	0.29	-
Molybdenum	mg/L	0.00597	0.00874	0.028	0.0533	0.0582	0.073	-
Sodium	mg/L	9.57	12.6	23.4	28.5	30.3	-	-
Nickel	mg/L	0.00165	0.00236	0.00841	0.0165	0.0182	0.025	0.25
Lead	mg/L	0.000227	0.000317	0.00104	0.00198	0.00217	0.003	0.08
Selenium	mg/L	0.000619	0.00078	0.00174	0.00301	0.00328	0.1	-
Uranium	mg/L	0.00255	0.00369	0.0138	0.0274	0.0301	0.005	-
Vanadium	mg/L	0.00349	0.00521	0.0159	0.0298	0.0324	0.006	-
Zinc	mg/L	0.00425	0.00628	0.0222	0.0429	0.047	0.02	0.4

Table 2: Collection Pond 2 Water Quality Model Results for Year 4 to Year 42

Parameter	Units	Mininum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO	MDMER
Total Ammonia	mg/L-N	0.00245	0.194	0.386	0.521	0.742	2.7	76
Nitrate	mg/L-N	0.00685	2.46	14.6	35.7	38.9	2.94	-
Nitrite	mg/L-N	0.000229	0.0421	0.0987	0.246	0.267	0.06	-
Chloride	mg/L	0.566	56.3	125	145	148	120	-
Sulphate	mg/L	0.277	50.9	161	257	280	218	-
Aluminum	mg/L	0.000325	0.013	0.0344	0.0408	0.0432	variable*	-
Arsenic	mg/L	0.0000252	0.00242	0.00691	0.0166	0.0184	0.005	0.1
Barium	mg/L	0.0000358	0.00626	0.0107	0.0166	0.0173	-	-
Calcium	mg/L	0.169	11	35.8	43.7	44.9	-	-
Cadmium	mg/L	0.000000235	0.0000313	0.0000814	0.000168	0.000182	0.0001	-
Cobalt	mg/L	0.0000018	0.00025	0.000675	0.00123	0.00136	0.0009	-
Chromium III	mg/L	0.00000437	0.000324	0.000338	0.000363	0.000438	0.0089	-
Chromium VI	mg/L	0.0000107	0.00229	0.00793	0.013	0.0168	0.001	-
Copper	mg/L	0.0000262	0.00267	0.00764	0.0173	0.0187	0.005	0.2
Iron	mg/L	0.00111	0.0568	0.0583	0.073	0.111	0.3	-
Potassium	mg/L	0.0458	2.43	10.5	12.9	13.2	-	-
Magnesium	mg/L	0.328	36	88.3	107	115	-	-
Manganese	mg/L	0.000178	0.01	0.0515	0.1	0.102	0.29	-
Molybdenum	mg/L	0.0000528	0.0061	0.0179	0.0398	0.0429	0.073	-
Sodium	mg/L	0.0745	3.57	16.3	19.4	19.8	-	-
Nickel	mg/L	0.0000186	0.0031	0.0101	0.0163	0.018	0.025	0.25
Lead	mg/L	0.00000223	0.000235	0.000625	0.00144	0.00156	0.003	0.08
Selenium	mg/L	0.00000436	0.000514	0.00134	0.00246	0.00266	0.1	-
Uranium	mg/L	0.0000285	0.00509	0.0169	0.0274	0.0301	0.005	-
Vanadium	mg/L	0.0000278	0.000687	0.00825	0.0187	0.0199	0.006	-
Zinc	mg/L	0.0000439	0.00522	0.0141	0.0318	0.0344	0.02	0.4

Notes:

CCME: Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life
PWQO: Provincial Water Quality Objectives
MDMER: Metal and Diamond Mining Effluent Regulation
Light Blue: Predicted concentration is greater than the CCME/PWQO
Dark Blue: Predicted concentration is greater than five times the CCME/PWQO
Bold: Predicted concentration is greater than the MDMER

Table 3: Collection Pond 3 Water Quality Model Results for Year 4 to Year 42

Parameter	Units	Mininum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO	MDMER
Total Ammonia	mg/L-N	0.00413	0.0533	0.156	0.193	0.195	2.7	76
Nitrate	mg/L-N	0.117	7.37	21.8	27.1	27.5	2.94	-
Nitrite	mg/L-N	0.000826	0.0522	0.154	0.192	0.194	0.06	-
Chloride	mg/L	88.1	132	133	133	134	120	-
Sulphate	mg/L	86.5	161	338	402	412	218	-
Aluminum	mg/L	0.00701	0.0071	0.0072	0.00727	0.00866	variable*	-
Arsenic	mg/L	0.0021	0.00384	0.00788	0.00944	0.00954	0.005	0.1
Barium	mg/L	0.00686	0.00854	0.00922	0.0141	0.0156	-	-
Calcium	mg/L	3.87	5.58	8.32	9.27	9.37	-	-
Cadmium	mg/L	0.0000328	0.000059	0.00012	0.000145	0.000147	0.0001	-
Cobalt	mg/L	0.000342	0.000589	0.0012	0.00145	0.00147	0.0009	-
Chromium III	mg/L	0.000182	0.000185	0.000189	0.000191	0.000214	0.0089	-
Chromium VI	mg/L	0.00568	0.0106	0.0222	0.0265	0.0271	0.001	-
Copper	mg/L	0.00252	0.00453	0.00925	0.0112	0.0113	0.005	0.2
Iron	mg/L	0.0158	0.0158	0.0159	0.016	0.043	0.3	-
Potassium	mg/L	0.437	0.634	0.917	1.04	1.06	-	-
Magnesium	mg/L	67.5	96.5	147	163	165	-	-
Manganese	mg/L	0.00678	0.012	0.0229	0.0275	0.0278	0.29	-
Molybdenum	mg/L	0.00624	0.0114	0.0236	0.0284	0.0289	0.073	-
Sodium	mg/L	0.755	1.09	1.62	1.8	1.82	-	-
Nickel	mg/L	0.00571	0.0101	0.0209	0.0252	0.0256	0.025	0.25
Lead	mg/L	0.000215	0.000386	0.000777	0.000938	0.00095	0.003	0.08
Selenium	mg/L	0.000542	0.001	0.00209	0.0025	0.00255	0.1	-
Uranium	mg/L	0.00933	0.0171	0.0354	0.0427	0.0434	0.005	-
Vanadium	mg/L	0.000344	0.000609	0.00118	0.00145	0.00147	0.006	-
Zinc	mg/L	0.00515	0.00912	0.0185	0.0223	0.0227	0.02	0.4

Table 4: TMF NE Pond Water Quality Model Results For Year 1 to Year 18

Parameter	Units	Mininum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO	MDMER
Total Ammonia	mg/L-N	0.0203	0.646	0.902	0.991	1.09	2.7	76
Nitrate	mg/L-N	0.108	3.67	3.83	4.08	4.29	2.94	-
Nitrite	mg/L-N	0.00313	0.0913	0.113	0.126	0.138	0.06	-
Chloride	mg/L	1.71	43.5	48.5	55.3	66.3	120	-
Sulphate	mg/L	5.29	152	172	198	212	218	-
Aluminum	mg/L	0.00061	0.0177	0.0191	0.0289	0.0319	variable*	-
Arsenic	mg/L	0.00035	0.00826	0.00923	0.0111	0.0135	0.005	0.1
Barium	mg/L	0.000311	0.00924	0.0101	0.0111	0.012	-	-
Calcium	mg/L	0.987	24	25.8	32.5	38.2	-	-
Cadmium	mg/L	0.00000324	0.0000792	0.0000872	0.000106	0.000126	0.0001	-
Cobalt	mg/L	0.0000265	0.00075	0.000821	0.000922	0.00104	0.0009	-
Chromium III	mg/L	0.00000701	0.000237	0.000295	0.000522	0.000615	0.0089	-
Chromium VI	mg/L	0.000262	0.00771	0.0124	0.0142	0.0157	0.001	-
Copper	mg/L	0.000366	0.00907	0.0101	0.0117	0.0142	0.005	0.2
Iron	mg/L	0.000852	0.013	0.0396	0.132	0.169	0.3	-
Potassium	mg/L	0.305	7.04	7.82	9.68	11.8	-	-
Magnesium	mg/L	2.4	72.2	80.5	90.6	97.3	-	-
Manganese	mg/L	0.000149	0.00626	0.00773	0.0122	0.0135	0.29	-
Molybdenum	mg/L	0.000813	0.02	0.0223	0.026	0.0316	0.073	-
Sodium	mg/L	0.453	11.3	12.2	14.9	17.6	-	-
Nickel	mg/L	0.000353	0.0104	0.0116	0.0132	0.014	0.025	0.25
Lead	mg/L	0.0000313	0.000796	0.000876	0.00103	0.00121	0.003	0.08
Selenium	mg/L	0.0000663	0.00195	0.00226	0.00257	0.0028	0.1	-
Uranium	mg/L	0.000487	0.0132	0.0146	0.0168	0.0191	0.005	-
Vanadium	mg/L	0.000412	0.00937	0.0105	0.013	0.0159	0.006	-
Zinc	mg/L	0.000685	0.0174	0.0191	0.0222	0.0265	0.02	0.4

Notes:

CCME: Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life
PWQO: Provincial Water Quality Objectives
MDMER: Metal and Diamond Mining Effluent Regulation
Light Blue: Predicted concentration is greater than the CCME/PWQO
Dark Blue: Predicted concentration is greater than five times the CCME/PWQO
Bold: Predicted concentration is greater than the MDMER

Table 5: TMF NW Pond Water Quality Model Results for Year 1 to Year 27

Parameter	Units	Mininum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO	MDMER
Total Ammonia	mg/L-N	0.0164	0.366	0.678	0.959	1	2.7	76
Nitrate	mg/L-N	0.0871	3.32	3.76	4.05	4.28	2.94	-
Nitrite	mg/L-N	0.00252	0.0171	0.0975	0.12	0.125	0.06	-
Chloride	mg/L	1.38	18.1	45.5	51	64.7	120	-
Sulphate	mg/L	4.26	24.9	158	184	204	218	-
Aluminum	mg/L	0.000491	0.0134	0.0183	0.0276	0.0313	variable*	-
Arsenic	mg/L	0.000282	0.00103	0.00844	0.0103	0.0132	0.005	0.1
Barium	mg/L	0.00025	0.00505	0.00949	0.0105	0.0117	-	-
Calcium	mg/L	0.795	11	24.3	30.6	37.3	-	-
Cadmium	mg/L	0.00000261	0.0000121	0.0000806	0.0001	0.000123	0.0001	-
Cobalt	mg/L	0.0000213	0.000208	0.00078	0.00086	0.00101	0.0009	-
Chromium III	mg/L	0.00000565	0.000269	0.000392	0.000623	0.000677	0.0089	-
Chromium VI	mg/L	0.000211	0.000661	0.00841	0.0135	0.0138	0.001	-
Copper	mg/L	0.000295	0.00103	0.00926	0.0109	0.0138	0.005	0.2
Iron	mg/L	0.000686	0.0262	0.0784	0.127	0.163	0.3	-
Potassium	mg/L	0.246	1.32	7.23	8.98	11.5	-	-
Magnesium	mg/L	1.94	26.1	74.6	86	92.1	-	-
Manganese	mg/L	0.00012	0.00707	0.011	0.022	0.0254	0.29	-
Molybdenum	mg/L	0.000655	0.00378	0.0207	0.0241	0.0308	0.073	-
Sodium	mg/L	0.365	5.73	11.5	14.1	17.2	-	-
Nickel	mg/L	0.000285	0.00396	0.0108	0.0124	0.0136	0.025	0.25
Lead	mg/L	0.0000252	0.000114	0.000812	0.000973	0.00118	0.003	0.08
Selenium	mg/L	0.0000534	0.000234	0.00204	0.00243	0.00257	0.1	-
Uranium	mg/L	0.000392	0.00113	0.0135	0.0154	0.0186	0.005	-
Vanadium	mg/L	0.000332	0.0011	0.00959	0.0121	0.0156	0.006	-
Zinc	mg/L	0.000552	0.00225	0.0177	0.0209	0.0259	0.02	0.4

Table 6: Pit Lake Water Quality Model Results for Flooding Period (Year 43 to Year 158)

Parameter	Units	Mininum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO	MDMER
Total Ammonia	mg/L-N	0.0797	0.173	0.592	1.54	2.28	2.7	76
Nitrate	mg/L-N	2.18	2.21	2.49	3.86	5.2	2.94	-
Nitrite	mg/L-N	0.00000923	0.000154	0.000616	0.0706	0.217	0.06	-
Chloride	mg/L	77.7	82.1	111	224	329	120	-
Sulphate	mg/L	94.8	100	133	257	374	218	-
Aluminum	mg/L	0.012	0.0123	0.0139	0.0198	0.0256	variable*	-
Arsenic	mg/L	0.00179	0.00182	0.00185	0.00187	0.00189	0.005	0.1
Barium	mg/L	0.0103	0.0106	0.0111	0.0123	0.0139	-	-
Calcium	mg/L	2.93	7.21	12.3	13.2	13.3	-	-
Cadmium	mg/L	0.00000907	0.0000122	0.0000181	0.0000201	0.0000201	0.0001	-
Cobalt	mg/L	0.000705	0.000743	0.00098	0.00188	0.00273	0.0009	-
Chromium III	mg/L	0.000103	0.000298	0.00052	0.000547	0.000549	0.0089	-
Chromium VI	mg/L	0.000978	0.00103	0.00134	0.00233	0.0032	0.001	-
Copper	mg/L	0.00101	0.0012	0.00152	0.00158	0.00158	0.005	0.2
Iron	mg/L	0.00258	0.0514	0.145	0.186	0.188	0.3	-
Potassium	mg/L	2.25	2.33	2.52	2.99	3.5	-	-
Magnesium	mg/L	61.7	65	84.5	154	218	-	-
Manganese	mg/L	0.0621	0.0653	0.0857	0.167	0.245	0.29	-
Molybdenum	mg/L	0.012	0.0126	0.016	0.0289	0.0412	0.073	-
Sodium	mg/L	11.9	12.4	14.6	22.7	30.6	-	-
Nickel	mg/L	0.0189	0.02	0.0273	0.0555	0.082	0.025	0.25
Lead	mg/L	0.0000906	0.000109	0.000138	0.000144	0.000144	0.003	0.08
Selenium	mg/L	0.000767	0.000805	0.00103	0.00188	0.0027	0.1	-
Uranium	mg/L	0.0000192	0.000685	0.00148	0.00162	0.00162	0.005	-
Vanadium	mg/L	0.00132	0.0015	0.00183	0.0019	0.00191	0.006	-
Zinc	mg/L	0.00201	0.00238	0.00296	0.00306	0.00306	0.02	0.4

Notes:

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PWQO: Provincial Water Quality Objectives
MDMER: Metal and Diamond Mining Effluent Regulation
Light Blue: Predicted concentration is greater than the CCME/PWQO
Dark Blue: Predicted concentration is greater than five times the CCME/PWQO
Bold: Predicted concentration is greater than the MDMER

Table 7: Pit Lake Water Quality Model Results After Fully Flooded (Year 159 to Year 174)

Parameter	Units	Mininum	10th Percentile	Median	90th Percentile	Maximum	CCME/PWQO	MDMER
Total Ammonia	mg/L-N	0.0000432	0.000368	0.0178	0.068	0.0799	2.7	76
Nitrate	mg/L-N	2.1	2.12	2.16	2.17	2.18	2.94	-
Nitrite	mg/L-N	0.00000253	0.000048	0.000803	0.000962	0.001	0.06	-
Chloride	mg/L	72.5	73.1	75	77.1	77.7	120	-
Sulphate	mg/L	88.7	89.4	91.6	94.1	94.8	218	-
Aluminum	mg/L	0.0115	0.0116	0.0118	0.0119	0.012	variable*	-
Arsenic	mg/L	0.00171	0.00172	0.00175	0.00178	0.00179	0.005	0.1
Barium	mg/L	0.00979	0.00985	0.01	0.0102	0.0103	-	-
Calcium	mg/L	12.3	12.3	12.6	12.8	12.9	-	-
Cadmium	mg/L	0.0000193	0.0000194	0.0000196	0.0000198	0.0000199	0.0001	-
Cobalt	mg/L	0.000661	0.000666	0.000682	0.0007	0.000705	0.0009	-
Chromium III	mg/L	0.000515	0.000517	0.000524	0.000532	0.000534	0.0089	-
Chromium VI	mg/L	0.00091	0.000917	0.000942	0.00097	0.000978	0.001	-
Copper	mg/L	0.00147	0.00148	0.0015	0.00153	0.00153	0.005	0.2
Iron	mg/L	0.185	0.185	0.186	0.187	0.187	0.3	-
Potassium	mg/L	2.13	2.15	2.19	2.24	2.25	-	-
Magnesium	mg/L	57.7	58.1	59.6	61.3	61.7	-	-
Manganese	mg/L	0.0583	0.0588	0.0601	0.0617	0.0621	0.29	-
Molybdenum	mg/L	0.0113	0.0114	0.0116	0.0119	0.012	0.073	-
Sodium	mg/L	11.3	11.3	11.6	11.9	11.9	-	-
Nickel	mg/L	0.0176	0.0178	0.0182	0.0187	0.0189	0.025	0.25
Lead	mg/L	0.000136	0.000136	0.000138	0.00014	0.000141	0.003	0.08
Selenium	mg/L	0.000721	0.000726	0.000743	0.000762	0.000767	0.1	-
Uranium	mg/L	0.00151	0.00152	0.00155	0.00157	0.00158	0.005	-
Vanadium	mg/L	0.00177	0.00178	0.0018	0.00183	0.00184	0.006	-
Zinc	mg/L	0.00286	0.00287	0.00291	0.00296	0.00297	0.02	0.4

Notes:

CCME: Canadian Council of Ministers of the Environment, Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life
PWQO: Provincial Water Quality Objectives
MDMER: Metal and Diamond Mining Effluent Regulation
Light Blue: Predicted concentration is greater than the CCME/PWQO
Dark Blue: Predicted concentration is greater than five times the CCME/PWQO
Bold: Predicted concentration is greater than the MDMER