



5 February 2025

Crawford Nickel Project
Impact Assessment Agency of Canada
600-55 York Street
Toronto, Ontario M5J 1R7

Via email Crawford@iaac-aeic.gc.ca

Re: Comments on the Crawford Nickel Project's Impact Statement (Ref No. 83857)

Dear IAAC Team:

Thank you for the opportunity to comment on the Impact Statement ("IS") for Crawford Nickel Canada's ("CNC") Crawford Nickel Project (the "Project").

Ontario Rivers Alliance (ORA) is a not-for-profit grassroots organization with a mission to protect, conserve, and restore riverine ecosystems and ensure that development affecting Ontario rivers is environmentally and socially sustainable. We are concerned with all issues affecting Ontario rivers and their connecting wetlands, lakes, creeks, springs and aquifers. Our vision is a world of healthy riverine ecosystems.

The ORA is concerned with the serious lack of details in the Impact Statement and supporting documentation regarding the cumulative and legacy effects of the Project over the short and long term with respect to:

- Climate change effects on freshwater ecosystems over the life of mine operations and beyond
- The choice of effluent receiver and its impacts on downstream freshwater ecosystems
- Specifics of the type, method and effectiveness of treatment of effluent, wastewater and contact water within, around and downstream of the Project site
- Specifics of the types, methods and effectiveness of Ore, waste rock, tailings and chemical management to ensure the protection of the immediate and surrounding environment
- Design, implementation and efficacy of the proposed new carbon sequestration process
- Fish and Fish Habitat protection, sustainability and compensations
- Indigenous communities
- Monitoring and maintenance of the decommissioned mine site

Please find enclosed our detailed comments and recommendations to the Impact Assessment Agency of Canada ("IAAC"), which were informed by an independent review and prepared in collaboration with:



1. Our legal counsel, Kerrie Blaise, MSc, JD, Blaise Law; and
2. Our environmental expert, Linda Byron, Director of Blue Heron Solutions for Environmental Management Inc., who conducted a technical review of the IS, and the findings and conclusions are incorporated into this submission. The full report, dated 27 January 2025, has been referenced throughout this submission to support our key arguments and recommendations. See Appendix A for the full expert report.

Thank you for this opportunity to comment!

Respectfully,

Linda Heron
Chair, Ontario Rivers Alliance
(705) 866-1677



I. INTRODUCTION

The ORA is pleased to submit our comments and recommendations in response to the Impact Statement (“IS”) for Crawford Nickel Canada’s (“CNC”) Crawford Nickel Project (the “Project”).¹

Our comments focus on several areas of concern, as detailed in our cover letter and below:

We are concerned with the serious lack of details in the Impact Statement and supporting documentation regarding the cumulative and legacy effects of the Project over the short and long term with respect to:

- Climate change effects on freshwater ecosystems over the life of mine operations and beyond
- The choice of effluent receiver and its impacts on downstream freshwater ecosystems
- Specifics of the type, method and effectiveness of treatment of effluent, wastewater and contact water within, around and downstream of the Project site
- Specifics of the types, methods and effectiveness of ore, waste rock, tailings and chemical management to ensure the protection of the immediate and surrounding environment
- Design, implementation and efficacy of the proposed new carbon sequestration process
- Fish and fish habitat protections and compensations
- Indigenous communities
- Monitoring and maintenance of the decommissioned mine site

In summary, after a thorough review of the IA documents, we find that CNC has not provided the necessary justification for the IAAC to confirm whether the Project will cause significant adverse environmental effects by virtue of the required factors as set out in Section 22 of the Impact Assessment Act (“IAA”). ORA submits the IS ought to be returned to the proponent for further study, justification and public participation opportunities as required.

II. SUMMARY OF PROJECT & IMPACTS

Canada Nickel Company is proposing the construction, operation, decommissioning and abandonment of an open pit nickel-cobalt mine and on-site metal mill located 43 kilometres north of Timmins, Ontario. As proposed, the Crawford Nickel Project would have a mine ore production capacity of 275,000 tonnes per day and a mill ore input capacity of 120,000 tonnes per day.² The Project would operate for about 43 years.³ The major watersheds in the area include the North Driftwood River and West Buskegau River, which ultimately discharge to the Abitibi River to the north, and Jocko Creek, a tributary of the Mattagami River.⁴

The Project would:

¹ Canada Nickel Project, *Crawford Nickel Project Impact Statement - Summary of the Impact Statement*, Nov 22, 2024 [**Impact Statement Summary**]

² Canadian Impact Assessment Registry, *Crawford Nickel Project*, Ref No. 83857

³ *Ibid*

⁴ *Impact Statement Summary*, p 36



- Extract 1,715 million tonnes of ore over 30 years⁵
- Process ore for a period of 41 years
- Cause the unavoidable and harmful alteration, disruption and destruction of approximately 147 ha of fish habitat, including the loss of all headwater streams, ponds, and mainstem channel within the Project Area (predominantly within the North Driftwood River watershed)⁶
- Result in the direct loss of 11,504 ha of land and plant species of importance to Indigenous Nations⁷
- Result in the direct loss of 8,667 ha of wetlands and 26 ha of aquatic habitats⁸
- Remove 11,785 ha of wildlife habitat
- Cause noise disturbance to 3,371 ha of habitat and audible by wildlife up to 6km away for 41 years⁹
- Cause ‘irreversible effects for Indigenous governance and decision-making capabilities, including for members of Indigenous Nations that have already experienced alienation and dispossession from harvesting areas and physical and cultural heritage sites in the region, as these experiences are likely to increase in the future rather than decrease’¹⁰

III. KEY AREAS OF CONCERN & RECOMMENDATIONS

1. Fostering Meaningful Public Participation

ORA respectfully submits the IAAC has undermined the public participation purposes the Impact Assessment Act aims to foster by limiting the ability of the public, civil society groups and impacted communities to meaningfully weigh in.¹¹ On December 9, 2024, the IAAC released its call for comments on the Project. With holiday closures, the 60-day comment period was effectively shortened by 7 business days.

Limiting the already short timeframe for public comment impedes the ability of the IAAC to ensure the public can meaningfully participate in a Project whose effects will span generations. Having time to identify gaps and deficiencies and weigh in on proposals that stand to impact the health of land, water, and air is critical if the IAAC is to maintain public trust in IA and ensure our meaningful inclusion.

RECOMMENDATION 1: Holiday closures, including statutory holidays, should not be included in the IAAC’s computation of time. 60 days is arguably already too short to review thousands of pages of documentation and facilitate meaningful public participation.

2. Cumulative and Legacy Effects Over Time

⁵ *Impact Statement Summary, p 3*

⁶ *Impact Statement Summary, p 16*

⁷ *Impact Statement Summary, p 56*

⁸ *Impact Statement Summary, p 63*

⁹ *Impact Statement Summary, p 64 and 67*

¹⁰ *Impact Statement Summary, p 93*

¹¹ *Impact Assessment Act, SC 2019, c 28, s 1 at Preamble, s 11 and 22(1)(n) [IAA]*



Among the factors the IAAC must consider in its review of the Project are any cumulative effects that are likely to result.¹² ORA submits this is a particularly significant factor that must pervade all review by the IAAC.

The thrust behind cumulative impact assessments is to address a proposed Project's impacts in a more comprehensive way so as to prevent a 'death by a thousand cuts.' As has been extensively written about from the field of environmental assessment law and policy, insights gathered from a cumulative effects assessment can shape a fuller understanding of a Project's likely impacts, including the nature, intensity, spatial and temporal distribution of the Project's effects.

At the heart of cumulative effects assessment is understanding the effects of other past, proposed, and reasonably foreseeable future activities.¹³ Based on the principles for cumulative effects assessment set out by Canadian Council of Ministers of the Environment, cumulative effects assessments ought to be 'future-focused.' As the Canadian Council of Ministers of the Environment explain:

Cumulative effects denote the combined impacts of past, present and reasonably foreseeable future human activities on the region's environmental objectives. It requires a broader, forward-looking approach to planning and management that balances environmental factors with economic and social (may include cultural and spiritual) considerations.¹⁴

While the term "cumulative effects" is not defined in the IAA, ORA submits the IAAC must ensure any cumulative effects review meet the following expectations:

- assess synergetic, compensatory, and additive effects, across spatial and temporal boundaries (e.g., at the ecosystem and watershed level) of all relevant past, present, and reasonably foreseeable future anthropogenic activities and natural processes;
- determine their implications for Project assessments; and,
- recommend steps to manage cumulative effects through decision making on Project level impact assessments and other measures.¹⁵

An adequate cumulative effects assessment is foundational to shaping the IAAC's understanding of the environmental effects of a Project and their significance and what constitutes appropriate mitigation measures that protect environmental, health, social rights and interests.

ORA submits that a number of gaps in CNC's IS impedes the ability of anyone, including the IAAC, to fully grapple with the cumulative effects of the Project. These gaps include:

- A yet-to-be-approved *Fisheries Act* approval
- A change in the discharge point, formerly the Mattagami River (having a greater assimilative capacity), without substantiating evidence as to why this change occurred
- A yet-to-be-developed Fish Habitat Offsetting Plan¹⁶

¹² IAA, s 22(1)(a)(ii)

¹³ Impact Assessment Agency of Canada, "Cumulative Effects Assessment Practitioners' Guide," (1999)

¹⁴ Canadian Council of Ministers of the Environment, *Canada-wide Definitions and Principles for Cumulative Effects*, PN 1541 (2014)

¹⁵ Adapted from Canadian Environment Network, *Submission to the IAAC regarding the Draft Policy Framework for Regional Assessment under the Impact Assessment Act* (Feb 28 2023)

¹⁶ Impact Statement Summary, p 18



- References to ‘applying industry-standard management practices’ or ‘standard mitigation measures’ without substantiating documentation or detail¹⁷
- A list of past, present and future activities that may pose cumulative effects, with no accompanying Project-specific details regarding their current status, size or impacts¹⁸
- References to plans being ‘adjusted for climate change’ without any accompanying details as to how or on what basis¹⁹
- Repeated attempts by CNC to minimize the severity effects, referring to losses as only a ‘small proportion’ of total habitats or species, for instance²⁰

RECOMMENDATION 2: All authorizations and permits accompanying the mining Project should have been completed and clearly communicated as part of the IS as they speak directly to predicted environmental impacts of the Project and their mitigation.

RECOMMENDATION 3: All past, present and future activities that may pose cumulative effects must be accompanied by Project-specific details regarding their current status, size and impacts.

RECOMMENDATION 4: References to Project plans and activities being ‘adjusted for climate change’ must be justified as to how, with accompanying evidence and explanation.

2.1 Groundwater and Surface Water - Cumulative Effects

Cumulative effects are anticipated for groundwater and surface water from mining operations in the area (Gowest’s Bradshaw Mine). It is assumed in the Summary Statement that the Bradshaw Mine is not in operation, and as such, no further assessment has been made of the cumulative effects.

Although the Summary Statement assumes that the Gowest Bradshaw Mine is not in operation, this facility is actually operating and has continued to dewater its underground facility for a number of years. The Gowest effluent discharges directly to the West Buskegau River (under high flow conditions) and passively during low flow conditions (through a wetland diffuser).²¹

RECOMMENDATION 5: Additional effort is required to assess the actual cumulative effects that include the Bradshaw operation. ²¹

3. Impacts to Indigenous Rights

The IAA was written with the United Nations Declaration on the Rights of Indigenous Peoples (“UNDRIP”) in mind. UNDRIP is hardwired into IAA processes and decision-making as seen, for example, by provisions requiring consideration of Indigenous rights and Indigenous knowledge

¹⁷ See for instance *Impact Statement Summary*, p 56 and 57

¹⁸ *Impact Statement Summary*, p 87 and 90

¹⁹ See for instance *Impact Statement Summary*, p 101

²⁰ *Impact Statement Summary*, p 99

²¹ *Blue Heron Environmental – Appendix A, 3.6 – Cumulative Effects, 3.6.1 Risks Identified, 3.6.2 Additional Risks to Consider. P-11/16*



and affirmations of Canada's commitment to seek the free, prior and informed consent (FPIC) of Indigenous peoples in relation to decisions under the IAA.

Despite this foundation, there is no reference in the IS by CNC demonstrating their commitment to implementing UNDRIP, the United Nations Declaration on the Rights of Indigenous Peoples Act ("UNDA"), nor its principles, including FPIC. We are deeply disappointed by this shortfall by the CNC when they recognize the Project will cause 'irreversible effects for Indigenous governance and decision-making capabilities, including for members of Indigenous Nations that have already experienced alienation and dispossession from harvesting areas and physical and cultural heritage sites in the region, as these experiences are likely to increase in the future rather than decrease.'²²

RECOMMENDATION 6: The IS must commit to upholding UNDRIP. UNDRIP is a key to enabling Indigenous peoples to participate in decisions when Projects occurring in their territory may adversely impact them. UNDRIP sets out the minimum threshold that ought to be met if Indigenous communities are to exercise a fair degree of decision-making authority over their lands and exercise assessment powers flowing from their inherent rights.

4. Alternatives to the Project

In its review of the Project, the IAAC must take into account alternative means of carrying out the Project as well as alternatives to the designated Project.²³

4.1 Choice of Effluent Receiver

The alternatives considered in the IS for effluent discharge locations are the Mattagami River and other locations or distributed (multiple) discharge locations to the North Driftwood River and the West Buskegau River. The chosen alternative for effluent release was to multiple discharge locations of the smaller receivers.

The reasons offered in the IS were public and Indigenous concerns regarding "the potential effects of effluent discharge on the Mattagami River from a water quality and aquatic biota perspective. Concerns were also expressed regarding the loss of natural water bodies, including impacts to water levels and flow rates due to landscape alteration and excavation. The Summary Statement goes on to say that "Based on feedback and ongoing design work, the Project design was changed from the original concept "to avoid any direct impacts to Mattagami River," and this discharge point was removed from the alternatives."²⁴

Discharging to the Mattagami River was "seen as a disadvantage since it would reduce flows in the upper reaches of the north Driftwood and West Buskegau Rivers...; however, it is acknowledged that discharge to the Mattagami River directly would result in increased dilution of effluent and a smaller mixing zone than discharging to the smaller receivers on multiple points.

²² *Impact Statement Summary*, p 93

²³ IAA, s 22(1)(e) and (f)

²⁴ *Blue Heron Environmental – Appendix A, 3.1.1 Risks Identified, i. Alternatives Assessment – Receiving Water. P 3/16.*



Discharging to the Mattagami River is also stated as a disadvantage due to potential effects on Lake Sturgeon.²⁵

ORA is extremely concerned with the toll this Project will inflict on the aquatic ecosystems of these smaller receivers and their connecting lakes over the 41-year life of this Project.

The presence of Lake Sturgeon and/or costs should not be a reason to exclude the Mattagami River as a potential effluent receiver from the mining and milling operations at Crawford Nickel. ORA considers the Mattagami River as the preferred effluent receiver due to its significantly greater assimilative capacity compared to the North Driftwood and West Buskegau Rivers. The environmental costs resulting from 41 years of mining effluent released into these smaller rivers could be far greater than anticipated.

Additional supporting information is required to fully assess the advantages of discharging to the smaller receivers rather than the original design of the Mattagami River location. Individual impacts have been assessed, however, a more comprehensive, cumulative effects approach should be conducted to determine if the overall impact of discharging to North Driftwood and West Buskegau Rivers is indeed the most protective alternative. Consideration should be given to long-term impacts to the receivers, the effects of climate change (in particular, drought and flood conditions), as well as the potential for impacts related to emergency discharges in both scenarios. The IS also expressed concern regarding the dewatering and diversion of any bodies of water, including the Mattagami River.

RECOMMENDATION 7: Provide a more comprehensive risk assessment, considering all potential risks cumulatively, and more effectively assess the effects of climate change on the Mattagami River, the North Driftwood and West Buskegau Rivers as potential receivers.²⁶ The Mattagami River should remain under consideration as an effluent receiver during all stages of production.

RECOMMENDATION 8: Whichever river is chosen as an effluent receiver, the Project must ensure robust, leading-edge treatment and protection measures are defined to ensure all effluent and contact water are treated effectively to support and sustain all life stages of aquatic life.

4.2 Climate Change - Drought Conditions

The North Driftwood River and Buskegau Rivers are relatively small receivers, which will be more susceptible to climate change effects than the alternative Mattagami River location, and in drought conditions, effluent discharged to these smaller receivers could pose a significant risk to the water quality and aquatic organisms.

RECOMMENDATION 9: Additional information must be provided regarding how the project will prepare for and mitigate the potential for the effects of climate change, specifically drought, on the flows and modelled assimilative capacity in the proposed effluent discharge receivers.²⁷

²⁵ Blue Heron Environmental – Appendix A, 3.1.1 Risks Identified, i. Alternatives Assessment – Receiving Water. P 3,4/16.

²⁶ Blue Heron Environmental - Appendix A, 3.1.2 – Additional Risks to Consider, i Alternatives Assessment for Effluent Discharge. P-4/16

²⁷ Blue Heron Environmental – Appendix A, (iv) Climate Change – Drought Conditions. P-5/16



4.3 Waste Water Treatment & Management

No information is provided regarding the treatment system to be installed for contact water treatment. As such, an assessment of the risk and effectiveness of this proposed infrastructure could not be conducted. Crawford should consider the best available technology, in particular, due to the significant risks posed by discharging to the small receivers that have limited assimilative capacity. In addition, it has been stated that local water quality immediately downstream of some final discharge points (within the mixing zones) will experience increases in parameters of potential concern above baseline levels and above the Provincial Water Quality Objectives and/or the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life. No additional information has been provided regarding what parameters exceed the objectives.

Crawford should provide Information related to what parameters will exceed the stated objectives, what treatment methodologies were considered, and if additional treatment technologies could be employed to further reduce the parameters to achieve the least effect to surface and groundwater.²⁸

RECOMMENDATION 10: Significant redundancy, remote operation and other emergency contingency plans must be built into the plant design to ensure that unplanned downtime or emergencies do not pose a risk to surface water.²⁸

RECOMMENDATION 11: More information is required regarding waste water treatment technologies employed to reduce effluent parameters to as low as is technologically achievable, in particular, consideration of the sensitivities related to low assimilative capacity in the smaller receivers.²⁸

RECOMMENDATION 12: Additional information is required regarding waste water treatment contingency measures that are to be incorporated (including contingencies related to snow and ice storms that could likely affect treatment chemical delivery and treatment processes).²⁸

ORA is deeply concerned with the North Driftwood River's significantly limited assimilative capacity; therefore, the treatment, control and retention factor must be robust.

RECOMMENDATION 13: A section of the North Driftwood River diversion should be designed to add retention capacity when required, as well as a final monitored sluice gate to control release.

RECOMMENDATION 14: Martin Lake and the upstream headwater lakes and streams must be effectively isolated from any site waters.

ORA is concerned with the potential for contamination of the West Buskegau River watershed.

RECOMMENDATION 15: To best control its potential for contamination, only non-contact water should be released beyond all capture ponds and treatment locations on the east side of the Project footprint.

²⁸ Blue Heron Environmental – Appendix A, 3.1.2 – Additional Risks to Consider, ii Wastewater Treatment. P-4-5/16



ORA is concerned about the lack of detail regarding tailings treatment and control management.

RECOMMENDATION 16: All Tailings Management Facility (TMF) contact water must be captured, contained and rigorously processed in one treatment facility before being released into the watershed.

RECOMMENDATION 17: The tailings cone depositing central location should have a final stage thickener station to increase tailing density before pumping to the cone.

RECOMMENDATION 18: TMF distribution, beyond the final thickener, must have progressive relocation ability to maximize cone formation progress.

RECOMMENDATION 19: During advanced milling operations and the expansion of the TMF cone perimeter, it is essential to construct a road around its entire perimeter to enable continuous monitoring and provide access for the prompt rescue of any wildlife that may enter the TMF zone.

5. Contribution to Sustainability

In its review of the Project, the IAAC must consider to what extent the Project contributes to sustainability.²⁹ Climate change, we submit, is an issue inherent to sustainability and to achieve sustainability, requires meeting climate commitments and preserving a viable legacy for future generations.

5.1 Climate Change Impacts

ORA submits CNC's one-page statement professing a commitment to sustainability, which falls vastly short of what is needed for defensible decision-making by the IAAC. Considering climate change within IA is more than simply assessing whether a Project aids in meeting Canada's climate objectives; it requires the IAAC to query whether the Project itself is aligned with sustainability.

Extreme rainfall, rain, snow and rapid melting events pose specific risks to mine sites because they can overwhelm site drainage and diversion structures, thereby causing excess runoff to tailings impoundment areas. This, in turn, can lead to erosion, slope instability and the rapid increase of water levels and threaten releases of metals, solids and other contaminants into the environment. Changes in temperatures can also affect mine sites by altering the availability of water (i.e., due to prolonged droughts) and triggering increased evaporation from tailings ponds and potentially exposing or re-exposing metals and contaminants below.

We submit it is necessary for defensible decision-making that the IAAC must fully interrogate the findings made by CNC, recognizing that mining infrastructure, including tailings ponds and waste management areas, have been designed on the assumption that the climate is stable. Therefore, the risk of structural failure due to the forces of climatic changes in all stages, from construction, operations, and post-closure, is of grave concern.³⁰

²⁹ IAA, s 22(1)(h)

³⁰ Gibson R (2005) *Sustainability Assessment: Criteria and Process*. Earthscan, London, P-97



RECOMMENDATION 20: All environmental effects of the Project and the veracity of proposed mitigation measures must be assessed in light of climate impacts.

RECOMMENDATION 21: We recommend the following questions be answered by CNC, with corroborating evidence, to gauge whether the Project is aligned with contributing to sustainability:

- Does the project cause, induce, or exacerbate extreme weather events or slow-onset events?
- Does it irreversibly alter an ecosystem?
- Does it make a community less resilient?
- Does it affect its life support systems?
- Does it sustain nature, life support systems and the community?

5.2 Carbon Capture and Storage

CNC is proposing a form of carbon capture and storage (“CCS”) called the In-Process Tailings (“IPT”) Carbonation technology. They state that the tailings are thickened to a target 40% density and are then processed using CNC’s IPT carbonation process, which permanently fixes carbon dioxide (CO₂) in solid mineral form within the tailings. The carbonated tailings from the IPT process are discharged and stored within the tailings management facility as a “permanent” repository for CO₂.³¹ They state they have undertaken “extensive research” with regards to the IPT process, and it is “supported by laboratory testing and pilot plant studies.”³²

ORA submits the IAAC should not accept CNC’s assertions regarding the reliability, effectiveness, or veracity of the IPT process. Adopting CCS as a stand-in for reducing pollution in the first place encourages dangerous climate emissions to be generated. As a general rule for any carbon and GHG emitter, the IAAC must not permit a proponent to create and emit more instead of less. We submit the IAAC must prioritize environmental consequences being avoided (by not emitting CO₂) as compared to emitting CO₂ and subsequently removing it.

We have a number of information requests that we submit must be answered before any determination of the Project’s net-zero or climate neutrality status can be made. For instance:

- How will climate events, such as forest fires and rainfall events, affect the so-called permanence of IPT storage?
- As IPT only exists in a lab, what is the long-term financial viability of the proposal on the scale proposed?
- How does CNC’s financial guarantee account for any additional accident risk to water sources caused by ruptures and leaks of the tailings ponds?

ORA was also provided a number of supporting references by CNC in support of their IPT method. Upon review, we determined that the majority of authors (despite academic affiliations in the published journal articles) are from mineral exploration or mining service companies. Literature

³⁰ T Pearce et al. “Climate change and mining in Canada” (*Mitigation and Adaptation Strategies for Global Change*, 2011), P-12

³¹ See *Crawford Nickel Sulphide Project NI 43-101 Technical Report and Feasibility Study*, Oct 1 2023, P-9

³² Email correspondence from Lauri Corlett dated 17 Jan 2025



which is not independent of the industry should not be relied upon by the IAAC when reviewing the veracity of claims of net-zero benefits or supposed climate neutrality.

RECOMMENDATION 22: As a novel, yet-to-be-developed technology, the IAAC should not allow CNC to rely on IPT (or any form of CCS) when there is a lack of scientific basis to justify outcomes and assess risks.

5.3 Carbon Sequestration

The risks identified in the impact statement surrounding carbon sequestration include:

- Scaling of the IPT Carbonation process to align with the future mine operating plan has not been completed;
- The CO₂ used in the sequestration process must come from an external source; and
- Active carbonation achieved the maximum sequestration potential that the pilot study documented.

While these risks are identified in the impact statement, their significance may be underestimated. It appears that the technology is not complex and can be incorporated into the water treatment and tailings management facility design. It is critical to prove the scalability and that the sequestration capacity is possible and aligned with the proposed mine operating plan. However, this appears to be accounted for in other technical documents and feasibility studies.

Relying on external industrial partnerships for a consistent supply of concentrated CO₂ at the scale required to achieve the targeted sequestration potential may prove challenging, especially in the near term, depending on the evolving political and regulatory landscape discussed below.

It appears that the IPT Carbonation process resulted in an average CO₂ utilization of 74%; therefore, 26% of the CO₂ that external parties capture and transport to the site will be released into the atmosphere.

There is also additional degassing occurring after the process. These losses reduce the benefit of third-party decarbonization investments. Additionally, CO₂ may be released from the magnesium carbonate if exposed to acid.³³

RECOMMENDATION 23: “There must be cownsideration for the safeguarding of pH stability in the design of the tailings management facility to ensure the permanence of the sequestered carbon. To officially validate the CO₂ sequestration, a quantification and verification methodology will need to be established and approved by regulators.³³”

5.4 Political and Regulatory Landscape

External factors have the potential to add substantial risk to the carbon sequestration portion of the Project. The current political and geopolitical environment introduces considerable uncertainty to climate-related project support, policy, regulation and feasibility, especially when the new

³³ Blue Heron Environmental – Appendix A, 3.7.1 Risks Identified – 3.7.2 Additional Risk Considerations. P-12-/16



leadership in Canada and the USA are considered; however, it is our opinion that long-term climate policy will likely evolve in favour of carbon sequestration given the projected duration of the Project.

In the near term, the primary concern is the unpredictability surrounding the federal and provincial carbon pricing systems, which are central to Canada and Ontario's climate policies. Carbon pricing places a cost on carbon emissions, incentivizing businesses to reduce emissions or invest in carbon capture technologies. If the carbon pricing system is subject to changes through shifts in policy, regulatory adjustments, and/or fluctuating pricing levels, companies may struggle to achieve the investment certainty required for decarbonization initiatives.

This project's success largely relies on external industrial business partners investing in carbon capture technologies at their facilities and transporting the CO₂ to the site. This places uncertainty on the cost/benefit of the IPT Carbonation process.

If the overall project were to proceed, the carbon sequestration component offers a substantial societal benefit in creating a mechanism for large scale industrial decarbonization. Creating that potential removes barriers for local industrial facilities to decarbonize their own operations.³⁴

RECOMMENDATION 24: Pursue potential partnerships with other large industrial emitters to ensure a supply of CO₂ can be available for sequestration should the project proceed. Additionally, consultation with provincial and federal government officials must be completed to create pathways to recognize and support this form of carbon capture technology.³⁴

6. Impacts to Fish and Fish Habitat

6.1 Fisheries Act Authorizations

One particular area significantly lacking critical information in the IS is information pertaining to *Fisheries Act* reviews. As we summarized in Part II above, the IS notes the Project will cause the unavoidable and harmful alteration, disruption and destruction of approximately 147 ha of fish habitat, including the loss of all headwater streams, ponds, and mainstem channels within the Project Area (predominantly within the North Driftwood River watershed) and result in the direct loss of 8,667 ha of wetlands, and 26 ha of aquatic habitats.

While the IS briefly discusses offsets, it does not include any detailed discussion of *Fisheries Act* permits for drilling, blasting/use of explosives, excavating and grading activities. Rather, it assures that a *Fisheries Act* authorization will be sought and plans followed.

Section 35 of the *Fisheries Act* prohibits anyone from carrying on any work, undertaking, or activity that results in the harmful alteration, disruption, or destruction of fish habitat unless it has been approved by permit or Ministerial authorization. Other notable protection measures include section 36(3) of the *Fisheries Act* which prohibits the release of "deleterious substances" into waters frequented by fish and section 4 of the *Metal and Diamond Mine Effluent Regulations* ("Regulation"), which prohibits the release of acutely lethal effluent. Deleterious substances are defined broadly as anything that would degrade or alter water quality to such an extent that it

³⁴ Blue Heron Environmental – Appendix A, 3.7 – Carbon Sequestration, 3.7.1-3.7.3 Additional Risks Considerations. P-13/16



could harm fish or fish habitat and the test for acutely lethal defined in the Regulation.³⁵ Throughout the Act and the Regulation, there are toxicity thresholds established for various species for reference.

RECOMMENDATION 25: It remains unclear from the IS how much work has been undertaken to determine whether Fisheries Act authorizations for all of the Project activities will be pursued. All reviews under the Fisheries Act should have been completed and clearly communicated as part of the studies informing the IS and determinations of predicted environmental impacts and proposed mitigation measures.

6.2 Risks to Fish and Fish Habitat

Canada Nickel has made some changes to their project plans in an effort to mitigate potential effects on the lake sturgeon (e.g., moving the proposed discharge location). Baseline monitoring has concluded that lake sturgeon do not utilize the Local Study Area. Therefore, provided that baseline monitoring was adequate and the assessment of effects predicting no fish or fish habitat effects beyond the Local Study Area is correct, there should be no measurable negative effect on lake sturgeon from project activities.³⁶

Aquatic ecosystems are dynamic and subject to ever-changing conditions that can be either natural and/or human-induced. These ecosystems and the biota within them are subject to many variables and complex interactions that are often interconnected and interdependent. Monitoring of these systems provides considerable useful data on the biota and physical conditions that are present. However, due to the dynamic and complex characteristics of these ecosystems, monitoring results often provide a representation of conditions at a given “snapshot” in time. As such, there is always a certain amount of risk to habitats and species around the robustness and soundness of the monitoring program and the subsequent ability to make sound predictions on potential effects.

These predictions are increasingly difficult when cumulative effects are present. Aside from the direct effects caused by project activities, one of the potential additional risks is that baseline monitoring programs and the associated assessment of effects are not robust enough to accurately characterize baseline conditions and predict and offset the project effects. Whether the baseline monitoring and predicted effects for the Crawford project were sufficient is beyond the scope of this review; it is merely mentioned here as a potential risk factor.³⁷

RECOMMENDATION 26: Focused long-term monitoring programs to confirm the scope and scale of the predicted effects and to make changes to mitigation measures if required.³⁷

6.3 Mitigation and Contingency Measures

The primary mitigation measure to deal with predicted fish and fish habitat effects is through offsetting measures required as part of the Fisheries Act Authorization. In order for mitigations to be successful they will need to be well planned, executed properly and monitored for success.

³⁵ *Fisheries Act, RSC 1985, c F-14, s 34(a); Metal and Diamond Mining Effluent Regulations (SOR/2002-222), s 1(1)*

³⁶ *Blue Heron Environmental - Appendix A, 3.3.1 – Risks Identified. P-8/16*

³⁷ *Blue Heron Environmental - Appendix A, 3.3.2 – Additional Risks to Consider. P-8/16*



The proposed mitigations will help to reduce the effects on fish and fish habitat. However, these effects will not be completely eliminated, and residual effects are expected in the local study area. Regulatory monitoring programs are in place to assess the predicted effects.³⁸

RECOMMENDATION 27: Monitoring reports must be used to assess and adjust mitigations in response to the predicted outcomes (e.g., additional mitigations in response to effects greater than predicted).³⁸

7. Risks to Wildlife, Birds and Their Habitat

During the process for determining the need for an Overall Benefit Permit (OBP), offsetting plans will need to be determined for relevant SAR. It is unclear whether an OBP will be sought for protected SAR confirmed present, such as Lesser Yellowlegs.

While reasonable mitigation measures are offered to minimize impacts to bat maternity roosts, it is unclear what mitigation measures have been considered for bat hibernacula that were identified in the LSA.³⁹

RECOMMENDATION 28: An additional mitigation measure is the “monitoring of bird and bat mortality along the transmission corridor.”³⁹

8. Risks to Surface Water & Groundwater

8.1 Explosives Management

The use of explosives in mining activities results in residual ammonia being pumped to surface during dewatering activities. Excess ammonia typically results from the lack of control of explosives management within the mine (through overblasting, improper disposal, etc).

Although contact water, including water removed from the mine, will be directed to the Water Management System for storage, re-use, treatment and/or discharge, it should be noted that the plans are for a “closed loop” process plant water supply, recycling pit water for process use. The recycling of water that is anticipated to contain elevated ammonia levels (from blasting activities) will pose a risk of concentrating ammonia levels, further increasing residual nitrogen in receiving water, should treatment not be effective in ammonia reduction.⁴⁰

RECOMMENDATION 29: Implementation of an explosives management plan to control the release of ammonia within the mining environment, reducing the need to rely on treatment alone for acceptable ammonia and nitrogen release in effluent.⁴⁰

8.2 Storage of Waste Rock and Ore

³⁸ Blue Heron Environmental - Appendix A, 3.3.3 – Mitigation and Contingency Measures Assessment. P-8-9/16

³⁹ Blue Heron Environmental - Appendix A, 3.5.3 – Mitigation and Contingency Measures Assessment. P-11/16

⁴⁰ Blue Heron Environmental - Appendix A, 3.1.2 – Additional Risks to Consider, iii Explosives Management. P-5/16



The Summary Statement indicates that runoff from ore and waste rock stockpiles impounded will be collected in ditches for treatment. There is no mention of the need to line the stockpiles with impermeable membranes.⁴¹

RECOMMENDATION 30: Additional information is required to determine if there is a risk to surface water and groundwater associated with infiltration from the ore and waste rock stockpiles.⁴¹

RECOMMENDATION 31: Waste rock and ore storage stockpiles must be lined with impermeable materials.

8.3 Effluent Treatment

Effluent discharge criteria was determined using assimilative capacity studies, and effluent quality is anticipated to meet effluent quality limits imposed by the Metal and Diamond Mining Effluent Regulations, as well as site-specific limits derived from the assimilative capacity calculations. The Local Study Area is expected to “completely accommodate change to surface water quality” for all stages of the mine life.⁴²

RECOMMENDATION 32: As discussed above, the need for an ammonia/explosives management plan from the start of construction through production and into closure has not been identified. This will be critical to consider, in combination with treatment, to ensure ammonia is within acceptable levels for release to the receivers.⁴²

RECOMMENDATION 33: Additional measures not mentioned in the Summary Statement must include the development and implementation of a comprehensive surface water monitoring program, with action-level triggers to identify trends in a timely fashion. In particular, monitoring the quality of recycled water to be used in the process plant will be critical to identify if recycling is causing additional loading to the water management system.⁴²

RECOMMENDATION 34: Contingency plans should be prepared in the event that recycling of process water is paused due to quality concerns (e.g. elevated ammonia) and the need for freshwater increased. Contingency plans should also include measures to react to drought conditions as well as snow and ice storm effects on water treatment processes.⁴²

8.4 Risks to Groundwater

No impacts to groundwater users were identified since no groundwater users are known to exist within the drawdown areas. Residual effects of the project on groundwater quality are incorporated into the assessment of effects on surface water, and no additional groundwater risks were identified.⁴³

RECOMMENDATION 35: Additional measures not mentioned in the Summary Statement should include the development and implementation of a comprehensive groundwater monitoring

⁴¹ Blue Heron Environmental - Appendix A, v. Storage of Waste Rock and Ore. P-5/16

⁴² Blue Heron Environmental - Appendix A, 3.1.3 Mitigation and Contingency Measures Assessment. P-5-6/16



program with action-level triggers to identify trends with respect to groundwater levels and quality in a timely fashion.⁴³

9. Other Environmental Risks

9.1 Power Sources During Construction

Expert review: The Summary Statement specifies that, during construction activities and until such time as connection to the power grid is complete, power will be generated using diesel.⁴⁴

RECOMMENDATION 36: Canada Nickel should consider the use of Liquefied Natural Gas as an alternative to diesel power, as this form of power would reduce the risks associated with transportation, management and storage of diesel fuel at the site.⁴⁴

9.2 Rail Line Operation

Although the rail spur line is proposed to be constructed by Canada Nickel but operated by Ontario Northland Railway, it does not appear that the effects of the operation of the rail line (including risks of spills to water, atmospheric emissions, and closure measures) have been considered in the Impact Statement Summary.⁴⁵

RECOMMENDATION 37: The operation and ultimate closure of the rail line should undergo risk analysis and emergency preparedness considerations and planning.⁴⁵

9.3 Waste Disposal

The Summary Statement indicates that non-hazardous waste generated at the mine will be removed and landfilled at an approved off-site facility.⁴⁶

RECOMMENDATION 38: Additional consideration and planning are required to ensure that the local municipal landfill site is able to accept mine waste and has the capacity to accept construction, operational and closure waste. Should the local landfill not be able to accommodate the mine's waste, additional impacts will be incurred to either expand the municipal landfill or provide for on-site landfilling.⁴⁶

9.4 Chemical Storage

Additional information is required with respect to methods to be employed to prevent spills of chemicals and fuels.⁴⁷

⁴³ Blue Heron Environmental - Appendix A, 3.2.1 – Risks Identified. P-6/16

⁴⁴ Blue Heron Environmental - Appendix A, 3.8 (i) Power Sources during Construction. P-13/16

⁴⁵ Blue Heron Environmental – Appendix A, 3.8 (ii) Rail Line Operation. P-13/16

⁴⁶ Blue Heron Environmental – Appendix A, 3.8 (iii) Waste Disposal. P-13/16



RECOMMENDATION 39: Best practice would ensure chemicals and hazardous wastes are stored in confined areas that are protected from weather (covered). In addition, procedures and controls for the handling, management and storage of chemicals should be developed, implemented, maintained and enforced.⁴⁷

9.5 Accidents and Malfunctions

Accidents and Malfunctions considered include a number of scenarios; however, it appears that excessive snow and ice storms have not been included in the assessment.⁴⁸

RECOMMENDATION 40: Given the location of the project (Northern Ontario), additional considerations should be given to the real potential for a significant snow or ice storm restricting or delaying access to the sites several times each year. Specifically, the following should be considered:

- The risk of the inability of site personnel to access the site or components of the site to continue effluent treatment. Specifically, what measures will be put in place to remotely monitor and control the effluent treatment plants until such time as personnel are able to access the site;
- The risk of the delivery of effluent treatment chemicals being interrupted during a snowstorm/ice storm.⁴⁸

10. Mitigation measures and post-closure considerations

The IAAC is required to assess the mitigation measures that would mitigate adverse effects of the Project and the proposed follow-up and monitoring program.⁴⁹

ORA submits that robust, demonstrable mitigation efforts to buffer environmental effects must be of the highest importance in the IAAC's review.

See **RECOMMENDATIONS 30, 37 and 38** above for closure comments.

11. Conclusion

While the Crawford Nickel Project represents a pivotal opportunity for economic growth and partnership with Indigenous communities, it also carries profound environmental responsibilities for these same communities. Canada Nickel Company touts its core principles embedded in its operations and commits to genuine partnerships with Indigenous peoples. However, the long-term health of freshwater ecosystems and the surrounding environment that they rely on must remain paramount in its priorities.

⁴⁷ Blue Heron Environmental – Appendix A, 3.8 (iv) Chemical Storage. P-14/16

⁴⁸ Blue Heron Environmental – Appendix A, 3.8 (v) Accidents and Malfunctions. P-14/16

⁴⁹ IAA, s 22(1)(k)



ORA urges the adoption of the most advanced, rigorous, and adaptive environmental protections to ensure that today's progress does not come at the expense of tomorrow's ecosystems. The decisions we make now will echo for generations. Let us ensure that they are rooted in sustainability, accountability, and respect for the land and water that sustain us all.

Respectfully,

Linda Heron
Chair, Ontario Rivers Alliance
(705) 866-1677



APPENDIX A

TECHNICAL MEMORANDUM

Date: 27 January 2025

To: Linda Heron, Chair and Chief Administrative Officer
Ontario Rivers Alliance
379 Ronka Rd Worthington Ontario, P0M 3H0

From: Blue Heron Solutions for Environmental Management Inc.

Subject: 25-2537 Crawford Project Impact Statement Summary Review

1 INTRODUCTION

Canada Nickel Company (Canada Nickel) proposes to develop, operate and progressively reclaim and close the Crawford Nickel Project, a new open-pit nickel mine near Timmins, Ontario.

The project is planned to cover an area of 11,785 hectares (ha) and will include the relocation of a provincial highway and a power transmission line. The following key components are planned:

- Open Pit, approximately 4,400 m by 2,100 m in size and up to 690 m deep;
- Material impoundment facility for storage of excess rock, sand, till and clay (3,140 ha and 34-115m high);
- Smaller stockpile areas for ore, overburden and rock;
- Crushing and concentrator facilities. The process plant will produce magnetite concentrates that will be shipped by rail to a third-party off-site for further refining;
- Tailings Management Facility approximately 2,300 ha in size, with thickened tailings surrounded by a dam varying in height from 9-23m (ultimately);
- Water Management System, consisting of ditching and collection ponds, designed to separate and manage contact and non-contact water. Water within the ponds will be recirculated for use in the Process Plant or discharged to the environment via 4 water treatment plants and effluent points (2 effluent discharge locations on the North Driftwood River and 2 on the Buskegau River);
- Other mining-related infrastructure such as offices, shops, warehouses, etc), internal roadways, a fuel farm power supply and distribution and waste management facilities;
- Ancillary facilities are to be owned and operated by others, including a 25km rail spur line, a 29km 500 kV transmission line, and the realignment of a provincial highway.

In addition to several municipal, provincial and federal permit requirements, including provincial environmental assessments, the project is subject to the federal impact assessment process under the *Impact Assessment Act*.



Blue Heron was asked by the Ontario Rivers Alliance to conduct a review of the Crawford Nickel Project – Impact Statement to identify any gaps in the information provided in the Summary of the Impact Statement, including the environmental risks identified, and mitigation and contingency plans. Recommendations to improve the Impact Assessment have also been provided below.

2 SCOPE OF REVIEW

Blue Heron completed a review of the “Crawford Nickel Project – Impact Statement - Summary of the Impact Statement” prepared by Stantec Consulting Limited on November 22, 2024. The scope of our review was limited to:

- Surface Water;
- Groundwater;
- Fish and Fish Habitat;
- Vegetation, Riparian and Wetlands;
- Wildlife, Birds and their Habitat;
- Closure and Decommissioning;
- Cumulative Effects; and
- Carbon Sequestration.

The results of our review are summarized below. Note that closure and decommissioning-related comments are incorporated in each of the sections below, as appropriate.

3 RESULTS

3.1 Risks to Surface Water

3.1.1 Risks Identified

The Impact Summary identifies risks related to changes in surface water quantity and quality posed by the project, prior to mitigation. Specifically, surface water quantity could be affected by:

- Climate change;
- Alteration of watershed areas and flow paths during construction;
- Site runoff;
- Evaporation and evapotranspiration;
- Infiltration;
- Creation of 6-point source discharges (4 operational discharge points, 2 emergency release points);
- Mine dewatering;
- Installation of water management infrastructure;
- Water re-use and extraction.



Surface water quality could be affected by:

- Erosion and sedimentation;
- Contact water management, treatment and release;
- Spills of chemicals and fuels outside of the contact water management system; and
- Blasting activities during mining and construction phases.

Surface water quality is planned to meet regulatory requirements at the final discharge points. However, local water quality immediately downstream of some discharge points, within mixing zones, is anticipated to have some parameters elevated above baseline and standard objectives (Provincial Water Quality Objectives and Canadian Water Quality Guidelines for the Protection of Aquatic Life. Under “worst case scenario”, elevated parameters are anticipated significantly downstream of the discharge points. The effects of these elevated parameters on fish is discussed further in the Summary Statement.

i. Alternatives Assessment – Receiving Water:

Alternatives considered for effluent discharge locations are:

- Single discharge location – Mattagami River and other locations; or
- Distributed (multiple) discharge locations to the North Driftwood River and West Buskegau River.

The chosen alternative for effluent was to multiple discharge locations of the smaller receivers.

Concerns were expressed by the public or Indigenous Communities regarding the potential effects of effluent discharge on the Mattagami River from a water quality and aquatic biota perspective. Concerns were also expressed regarding the loss of natural water bodies, including impacts to water levels and flow rates due to landscape alteration and excavation. The Summary Statement goes on to say that “Based on feedback and ongoing design work, the Project design was changed from the original concept “to avoid any direct impacts to Mattagami River” and this discharge point was removed from the alternatives.

No further details to support the preferred decision are provided in the Summary Statement.

The Impact Statement – Chapter 5 Alternatives Assessment states that Indigenous communities expressed concern regarding the dewatering and diversion of any bodies of water, including the Mattagami River.

A comparison of the two alternatives (single discharge point to the Mattagami River vs. multiple discharge points to smaller receivers) is also summarized. Within the “Examination of Potential Effects on Valued Components”, it is stated that “changes in topography and catchment areas resulting from mine development will alter the existing water balance and contribution of flows to receiving water bodies”. The Impact Assessment further states that the Mattagami River benefits from the higher assimilative capacity rather than discharging to the small bodies of water.

Discharging to the Mattagami River is seen as a disadvantage since it would reduce flows in the upper reaches of the North Driftwood and West Buskegau Rivers. Within the same assessment,



however, it is acknowledged that discharge to the Mattagami River directly would result in increased dilution and a smaller mixing zone than discharging to the smaller receivers on multiple points. Discharging to the Mattagami River is also stated as a disadvantage due to potential effects on Lake Sturgeon.

ii. Climate Change

The Summary Statement includes consideration of the effects of climate change on the project design. The statement specifies that climate risks are considered throughout the life of the project, and lists a number of strategies to manage risks, including but not limited to:

- Engineering designs that account for predicted changes in climate;
- Adaptive management and emergency preparedness and response measures;
- Considering the use of climate-adjusted design criteria in mine design to develop an elevated level of resilience to extreme temperatures;
- Developing and implementing a Site-Wide Water Management Plan designed to manage major storm events (100-year return period, 24-hour duration storm event) adjusted for climate change;
- Developing an Emergency Preparedness Response Plan for implementation during environmental events, such as wildfires or floods.

3.1.2 *Additional Risks to Consider*

i. Alternatives Assessment for Effluent Discharge

Additional supporting information is required to fully assess the advantages of discharging to the smaller receivers rather than the original design of the Mattagami River location. Individual impacts have been assessed, however, a more comprehensive, cumulative effects approach should be conducted to determine if the overall impact of discharging to North Driftwood and West Buskegau Rivers is indeed the most protective alternative. Consideration should be given to long-term impacts to the receivers, the effects of climate change (in particular, drought and flood conditions), as well as the potential for impacts related to emergency discharges in both scenarios.

ii. Wastewater Treatment

No information is provided regarding the treatment system to be installed for contact water treatment. As such, an assessment of the risk and effectiveness of this proposed infrastructure could not be conducted. Crawford should consider the best available technology, in particular, due to the significant risks posed by discharging to the small receivers that have limited assimilative capacity. In addition, it has been stated that local water quality immediately downstream of some final discharge points (within the mixing zones) will experience increases in parameters of potential concern above baseline levels and above the Provincial Water Quality Objectives and/or the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life. No additional information has been provided regarding what parameters exceed the objectives.



Crawford should provide information related to what parameters will exceed the stated objectives, what treatment methodologies were considered, and if additional treatment technologies could be employed to further reduce the parameters to achieve the least effect to surface and groundwater.

Significant redundancy, remote operation and other emergency contingency plans should be built into the plant design to ensure that unplanned down time or emergencies do not pose a risk to surface water.

iii. Explosives Management

The use of explosives in mining activities results in residual ammonia being pumped to surface during dewatering activities. Excess ammonia typically results from the lack of control of explosives management within the mine (through overblasting, improper disposal, etc).

Although contact water, including water removed from the mine, will be directed to the Water Management System for storage, re-use, treatment and/or discharge, it should be noted that the plans are for a “closed loop” process plant water supply, recycling pit water for process use. The recycling of water that is anticipated to contain elevated ammonia levels (from blasting activities) will pose a risk of concentrating ammonia levels, further increasing residual nitrogen in receiving water, should treatment not be effective in ammonia reduction. Consideration should be given to implementing an “explosives management plan” to control the release of ammonia within the mining environment, reducing the need to rely on treatment alone for acceptable ammonia and nitrogen release in effluent.

iv. Climate Change – Drought Conditions

Additional information should be provided regarding how the project will prepare for and mitigate the potential for the effects of climate change, specifically drought, on the flows and modelled assimilative capacity in the proposed effluent discharge receivers. The small receivers will be more susceptible to climate change effects than the alternative Mattagami River location, and in drought conditions, effluent discharged to these smaller receivers could pose a significant risk to the water quality and aquatic organisms.

v. Storage of Waste Rock and Ore

The Summary Statement indicates that runoff from ore and waste rock stockpiles impounded will be collected in ditches for treatment. There is no mention of the need to line the stockpiles with impermeable membranes. Additional information is required to determine if there is a risk to surface water (and groundwater) associated with infiltration from the ore and waste rock stockpiles.

3.1.3 Mitigation and Contingency Measures Assessment

Effluent discharge criteria have been determined using assimilative capacity studies, and effluent quality is anticipated to meet effluent quality limits imposed by the Metal and Diamond Mining Effluent Regulations, as well as site-specific limits derived from the assimilative capacity



calculations. The Local Study Area is expected to “completely accommodate change to surface water quality” for all stages of the mine life.

As discussed above, the need for an ammonia/explosives management plan from the start of construction, through production and into closure, has not been identified. This will be critical to consider, in combination with treatment, to ensure ammonia is within acceptable levels for release to the receivers.

Additional measures not mentioned in the Summary Statement should include the development and implementation of a comprehensive surface water monitoring program, with action-level triggers, to identify trends in a timely fashion. In particular, monitoring the quality of recycled water to be used in the process plant will be critical to identify if recycling is causing additional loading to the water management system.

Contingency plans should be prepared in the event that recycling of process water is paused due to quality concerns (e.g. elevated ammonia) and the need for freshwater increased. The effects of the need to implement these contingency measures should be assessed. Contingency plans should also include measures to react to drought conditions, as well as snow and ice storm effects on water treatment processes.

3.2 Risks to Groundwater

3.2.1 Risks Identified

The potential effects of the project on groundwater (prior to mitigation) are changes in groundwater quantity and quality.

Groundwater quantity and flow could be affected by:

- Dewatering activities during construction and throughout operations;
- Construction of roads and various project components that affect infiltration;
- Rehabilitation of the Tailings Management Facility;
- Flooding of the Open Pit during closure activities.

Groundwater quality may be affected by:

- Runoff from roads and infrastructure, including stockpiles;
- Seepage from infrastructure, including stockpiles, Tailings Management Facility, and chemical or fuel spills.

No impacts to groundwater users were identified since no groundwater users are known to exist within the drawdown areas.

Residual effects of the project on groundwater quality are incorporated into the assessment of effects on surface water.



3.2.2 Additional Risks to Consider

No additional groundwater risks were identified in this review.

3.2.3 Mitigation and Contingency Measures Assessment

Additional measures not mentioned in the Summary Statement should include the development and implementation of a comprehensive groundwater monitoring program, with action-level triggers, to identify trends with respect to groundwater levels and quality in a timely fashion.

3.3 Risks to Fish and Fish Habitat

3.3.1 Risks Identified

The Summary of the Impact Statement (Stantec 2024) identified the following potential effects on fish and fish habitat (page 58):

- Change in fish habitat; and
- Change in fish health, growth, or survival.

The above bullet points are identified as potential impacts prior to the implementation of mitigation measures. The Summary document does not identify the loss of fish habitat as a potential effect or risk. This is based on the idea that the project will “offset” the predicted habitat losses to compensate for (i.e., offset) the predicted effects.

Offsetting is a requirement under the *Fisheries Act, (Canada 1985)* when an Authorization of the Act is required. Authorizations are typically required when there are anticipated impacts to fish and fish habitat that cannot be fully mitigated without offsetting measures. The Summary has stated the Crawford Project will require an Authorization for the project. The predicted fish habitat harmful alteration, disturbance and destruction (HADD) for the project is identified in the Summary as 147 hectares (ha). The principle behind offsetting is that habitat creation and/or habitat enhancement will be designed to offset or compensate for the predicted fish productivity losses caused by the project activities. Offsetting is the responsibility of the project proponent (i.e., Canada Nickel) and is administered through Fisheries and Oceans Canada (DFO).

Some key concerns about fish and fish habitat that were raised by federal and provincial agencies, Indigenous groups and other stakeholders included:

- The methods used for baseline assessments, including quantifying fish habitat, defining the study area, sampling effort and monitoring plans;
- The location of a fish sanctuary;
- Impacts to lake sturgeon (*Acipenser fulvescens*);
- Methods used to assess the use of fish habitat by various life stages;
- Impacts to fish species of cultural importance and associated traditional practices (e.g., food sources);
- Fish useability (i.e., consumption); and
- Considerations for fish offsetting measures.



The Summary predicts that after applying the mitigation measures the project will have a moderate level residual effect on fish and fish habitat. These effects are interpreted to be limited to the Local Study Area (LSA) and will be long-term in duration. Changes in habitat are predicted to be irreversible, while effects on fish health, growth, or survival are predicted to be reversible at some unspecified time following closure.

Considerable interest/concern has been expressed by stakeholders with respect to the lake sturgeon. A long-lived fish species that often has special importance to Indigenous communities and has experienced considerable decline in the province in the post-European settlement period.

Canada Nickel has made some changes to their project plans in an effort to mitigate potential effects on the lake sturgeon (e.g., moving the proposed discharge location). Baseline monitoring has concluded that lake sturgeon do not utilize the Local Study Area. Therefore, provided that baseline monitoring was adequate and the assessment of effects predicting no fish or fish habitat effects beyond the Local Study Area is correct, there should be no measurable negative effect on lake sturgeon from project activities.

3.3.2 Additional Risks to Consider

Aquatic ecosystems are dynamic and subject to ever-changing conditions that can be either natural and/or human-induced. These ecosystems and the biota within them are subject to many variables and complex interactions that are often interconnected and interdependent. Monitoring of these systems provides considerable useful data on the biota and physical conditions that are present. However, due to the dynamic and complex characteristics of these ecosystems, monitoring results often provide a representation of conditions at a given “snapshot” in time. As such, there is always a certain amount of risk to habitats and species around the robustness and soundness of the monitoring program and the subsequent ability to make sound predictions on potential effects.

These predictions are increasingly difficult when cumulative effects are present. Aside from the direct effects caused by project activities, one of the potential additional risks is that baseline monitoring programs and the associated assessment of effects are not robust enough to accurately characterize baseline conditions and predict and offset the project effects. Whether the baseline monitoring and predicted effects for the Crawford project was sufficient is beyond the scope of this review, it is merely mentioned here as a potential risk factor. Focused long term monitoring programs will be important to confirm the scope and scale of the predicted effects and to make changes to mitigations, if required.

3.3.3 Mitigation and Contingency Measures Assessment

The primary mitigation measure to deal with predicted fish and fish habitat effects is through offsetting measures required as part of the Fisheries Act Authorization. In order for mitigations to be successful they will need to be well planned, executed properly and monitored for success.

Challenges involved in offsetting for habitat losses often relate to difficulties in creating new habitat that is as productive as the original habitat. For this reason, offsetting is often required at a ratio, where more new habitat is created to account for productivity differences and for time lags



between the loss and the establishment of the offsetting measures. As such, offsetting might need to be greater than a 1 to 1 ratio of habitat lost to habitat replaced.

Other challenges with developing offsetting measures can include:

- “Like for like” offsetting is not always possible, therefore, the newly created habitat may not be replacing the same type of habitat that was originally lost. Stakeholder participation can play a role in what offsetting measures are eventually approved.
- It is not always possible to apply compensation measures in proximity to the habitat losses, therefore, some offsetting may be applied at a location that is not particularly close to or ecologically connected to the area where the loss occurs.

Monitoring of offsetting measures is a requirement, as part of the Fisheries Act Authorization process. Contingencies are required in the event that offsetting does not perform as expected.

The proposed mitigations will help to reduce the effects on fish and fish habitat. These effects will not be completely eliminated, and residual effects are expected in the local study area. Regulatory monitoring programs are in place to assess the predicted effects. This monitoring should be used to assess and adjust mitigations in response to the predicted outcomes (e.g., additional mitigations, in response to effects greater than predicted).

3.4 Risks to Vegetation, Riparian and Wetlands

3.4.1 Risks Identified

The Summary of the Impact Statement (Stantec 2024) identified the following potential effects to Vegetation, Riparian and Wetland Environments:

- Change in vegetation communities and species diversity;
- Change in riparian form and function; and
- Change in wetland form and function.

The above bullet points are identified as potential impacts prior to the implementation of mitigation measures.

The presence of black ash, designated as threatened under the ESA, was noted. However, the protection for this species is based on geographic location, and the Project is outside of the black ash protection areas cited in O.Reg. 6/24. While mitigation measures and follow-up programs recommended for this species are exemplary, they are not necessary per O.Reg. 6/24.

3.4.2 Additional Risks to Consider

Changes to Critical Landform-Vegetation Associations were not included in the Impact Statement.

3.4.3 Mitigation and Contingency Measures Assessment

The mitigation measures, follow-up programs and adaptive mitigation included in the Impact Statement are reasonable and reflect current industry best management practices. Species-specific habitat rehabilitation measures, if required, should be included in the Vegetation Management Plan.



3.5 Risks to Wildlife, Birds and Their Habitat

3.5.1 Risks Identified

The Summary of the Impact Statement (Stantec 2024) identified the following potential effects to Wildlife and Bird Habitat:

- Change in bird and wildlife habitat;
- Change in wildlife movement;
- Change in bird and wildlife mortality risk; and
- Change in wildlife health.

The above bullet points are identified as potential impacts prior to the implementation of mitigation measures. There will be a direct loss of 11,875 ha of bird and wildlife habitat, representing a 22% decrease in habitat from the existing conditions in the Local Study Area. Direct habitat loss within Regional Study Area is predicted to be between 1% to 6% of the available habitat.

Indirect impacts to bird habitat (e.g., changes to water levels in wetland habitats, movement impediments, sensory disturbance) were also considered in the Impact Statement.

Additional key concerns expressed by the federal and provincial agencies include:

- The importance of baseline conditions in determining range-level recovery goals and appropriate mitigation measures (e.g., habitat compensation); and
- The influence of provincial conservation efforts, such as the Abitibi River Forest Management Plan, on impacts to boreal caribou habitat.

3.5.2 Additional Risks to Consider

The impact Statement indicates that species distribution will shift to undisturbed areas where suitable habitat is available, and diversity abundance of SAR will remain stable. In many cases, habitat availability for SAR is one of the reasons cited for the decline in their populations. For protected SAR (i.e., those designated as threatened and endangered under the *Endangered Species Act* [ESA]), in Information Gathering Form (IGF) should be submitted to the Ministry of the Environment, Conservation and Parks (MECP) to determine whether permitting under the ESA is required prior to removing impacting known protected SAR habitat. Obtaining a permit under the ESA is a lengthy process. The current MECP service standard for reviewing the IGF, a precursor for determining whether an ESA permit is required, is 12 to 15 months. The report specifies obtaining an Overall Benefit Permit (OBP), if required, for impacts to Category 2 Blanding's turtle habitat, Category 3 caribou habitat and bat roosting habitat within the PA. In the commitments section of the Impact Study, the permits that might be required under the ESA are outlined. During the process for determining the need for an OBP, offsetting plans will need to be determined for relevant SAR. It is unclear whether an OBP will be sought for other protected SAR confirmed present such as Lesser Yellowlegs.

While reasonable mitigation measures are offered to minimize impacts to bat maternity roosts, it is unclear what mitigation measures have been considered for bat hibernacula that were identified



in the LSA. The Impact Statement does acknowledge that further consultation is required with the MECP to determine if any permitting is required to address impacts to bat habitat in the LSA.

The Impact Study includes an assessment of change in mortality risk for birds and wildlife. An assessment of changes to health (and consequently to reproduction/recruitment) was considered for wildlife and should also be included for birds to provide a fulsome understanding of Project-related impacts to the bird populations.

3.5.3 Mitigation and Contingency Measures Assessment

The mitigation measures, follow-up programs and adaptive mitigation included in the Impact Statement are reasonable and reflect current industry best management practices.

Additional mitigation measures recommended include:

- Bird mortality monitoring along the transmission corridor.

3.6 Cumulative Effects Summary

3.6.1 Risks Identified

The Summary Statement considered past, present and future physical activities that could interact cumulatively with the effects of the project. Activities such as mining operations, transportation and power infrastructure were identified as having potential cumulative effects. Residual cumulative effects for valued ecosystem components are listed in the Summary Statement. In particular, cumulative effects are anticipated for groundwater and surface water from mining operations in the area (Gowest's Bradshaw Mine). It is assumed in the Summary Statement that the Bradshaw Mine is not in operation, and as such, no further assessment has been made of the cumulative effects.

3.6.2 Additional Risks to Consider

Although the Summary Statement assumes that the Gowest Bradshaw Mine is not in operation, this facility is actually operating and has continued to dewater its underground facility for a number of years. The Gowest effluent discharges directly to the West Buskegau River (under high flow conditions) and passively during low flow conditions (through a wetland diffuser). As such, additional effort is required to assess the actual cumulative effects from the Bradshaw operation.

3.7 Carbon Sequestration

The project boasts of a large-scale carbon sequestration potential of approximately 54 million tonnes of carbon dioxide (CO₂) over the project life and will consist of the active carbonation of tailings material prior to discharge into the tailings management facility. The project proposes the use of a novel In-Process Tailings (IPT) Carbonation process which chemically reacts the tailings with a concentrated source of CO₂, forming a stable mineral which sequesters CO₂. Specifically,



magnesium in the tailings reacts with CO₂ to form magnesium carbonate. A preliminary pilot scale test demonstrated that the process was technically feasible for the capture of 32 kilograms (kg) of CO₂ per tonne of tailings.

3.7.1 Risks Identified

The risks identified in the impact statement surrounding carbon sequestration include:

- Scaling of the IPT Carbonation process to align with the future mine operating plan has not been completed;
- The CO₂ used in the sequestration process must come from an external source; and
- Active carbonation achieved the maximum sequestration potential that the pilot study documented.

While these risks are identified in the impact statement, their significance may be underestimated. It appears that the technology is not complex and can be incorporated into the water treatment and tailings management facility design. It is critical to prove the scalability and that the sequestration capacity is possible and aligned with the proposed mine operating plan. However, this appears to be accounted for in other technical documents and feasibility studies.

Relying on external industrial partnerships for a consistent supply of concentrated CO₂ at the scale required to achieve the targeted sequestration potential may prove challenging, especially in the near term, depending on the evolving political and regulatory landscape discussed below.

3.7.2 Additional Risk Considerations

i. Process Efficiency

It appears that the IPT Carbonation process resulted in an average CO₂ utilization of 74%; therefore, 26% of the CO₂ that external parties capture and transport to the site will be released into the atmosphere.

There is also additional degassing occurring after the process. These losses reduce the benefit of third-party decarbonization investments. Additionally, CO₂ may be released from the magnesium carbonate if exposed to acid. Although this is unlikely, there must be consideration for the safeguarding of pH stability in the design of the tailings management facility to ensure the permanence of the sequestered carbon. To officially validate the CO₂ sequestration, a quantification and verification methodology will need to be established and approved by regulators.

ii. Political and Regulatory Landscape

External factors have the potential to add substantial risk to the carbon sequestration portion of the Project. The current political and geopolitical environment introduces considerable uncertainty to climate-related project support, policy, regulation and feasibility, especially when the new leadership in Canada and the USA are considered; however, it is our opinion that long-term climate policy will likely evolve in favour of carbon sequestration given the projected duration of the Project.



In the near term, the primary concern is the unpredictability surrounding the federal and provincial carbon pricing systems, which are central to Canada and Ontario's climate policies. Carbon pricing places a cost on carbon emissions, incentivizing businesses to reduce emissions or invest in carbon capture technologies. If the carbon pricing system is subject to changes through shifts in policy, regulatory adjustments, and/or fluctuating pricing levels, companies may struggle to achieve the investment certainty required for decarbonization initiatives.

This project's success largely relies on external industrial business partners investing in carbon capture technologies at their facilities and transporting the CO₂ to the site. This places uncertainty on the cost/benefit of the IPT Carbonation process.

3.7.3 Mitigation and Contingency Measures

Despite the risks and challenges of navigating the evolving political and regulatory environment, the mineralization process is a secure and stable means of carbon sequestration. If the overall project were to proceed, the carbon sequestration component offers a substantial societal benefit in creating a mechanism for large scale industrial decarbonization. Creating that potential removes barriers for local industrial facilities to decarbonize their own operations. It is recommended to pursue potential partnerships with other large industrial emitters to ensure a supply of CO₂ can be available for sequestration should the project proceed. Additionally, consultation with provincial and federal government officials must be completed to create pathways to recognize and support this form of carbon capture technology.

3.8 Other Environmental Risks

i. Power Sources during Construction

The Summary Statement specifies that, during construction activities and until such time as connection to the power grid is complete, power will be generated using diesel. Canada Nickel should consider the use of Liquefied Natural Gas as an alternative to diesel power, as this form of power would reduce the risks associated with transportation, management and storage of diesel fuel at the site.

ii. Rail Line Operation

Although the rail spur line is proposed to be constructed by Canada Nickel but operated by Ontario Northland Railway, it does not appear that the effects of the operation of the rail line (including risks of spills to water, atmospheric emissions, and closure measures) have been considered in the Impact Statement Summary. The effect of the operation and ultimate closure of the rail line should be further considered.

iii. Waste Disposal

The Summary Statement indicates that non-hazardous waste generated at the mine will be removed and landfilled at an approved off-site facility. However, additional consideration and planning are required to ensure that the local municipal landfill site is able to accept mine waste and has the capacity to accept construction, operational and closure waste. Should the local



landfill not be able to accommodate the mine's waste, additional impacts will be incurred to either expand the municipal landfill or provide for on-site landfiling.

iv. Chemical Storage

Additional information is required with respect to methods to be employed to prevent spills of chemicals and fuels. Best practice would be to ensure chemicals and hazardous wastes are stored not only in confined areas, but in areas that are protected from weather (covered). In addition, procedures and controls for the handling, management and storage of chemicals should be developed, implemented, maintained and enforced.

v. Accidents and Malfunctions

Accidents and Malfunctions considered include a number of scenarios; however, it appears that excessive snow and ice storms have not been included in the assessment. Given the location of the project (Northern Ontario), additional considerations should be given to the real potential for a significant snow or ice storm restricting or delaying access to the sites several times each year. Specifically, the following should be considered:

- The risk of the inability of site personnel to access the site or components of the site to continue effluent treatment. Specifically, what measures will be put in place to remotely monitor and control the effluent treatment plants until such time as personnel are able to access the site;
- The risk of the delivery of effluent treatment chemicals being interrupted during a snowstorm/ice storm.

4 CLOSING

The Crawford Nickel Project Impact Statement – Summary of the Impact Statement has identified environmental risks of the project, and has proposed mitigation and contingency measures. However, some gaps have been identified in the effects considered in the Summary Statement, as well as in the proposed mitigation and contingency measures, as outlined above. In order to determine if the risks identified and others that may have been omitted have sufficiently been addressed, additional information is required with respect to the following key risks:

- Preferred option to discharge to West Buskegau and North Driftwood Rivers, rather than the Mattagami River (a more comprehensive risk assessment should be conducted and presented, considering all potential risks cumulatively, and should also more effectively assess the effects of climate change on the proposed locations);
- Waste water treatment technologies proposed, ensuring the best available technologies are employed to reduce effluent parameters to as low as is technologically achievable, in particular, consideration to the sensitivities related to low assimilative capacity in the smaller receivers.
- Waste water treatment contingency measures that are to be incorporated (including contingencies related to snow and ice storms that could likely affect treatment chemical delivery and treatment processes);



- Waste rock and ore storage risks, and consideration for the need of stockpiles lined with impermeable materials;
- The effects of climate change, specifically drought, on the preferred discharge scenario to the smaller receivers;
- Chemical and fuel storage standards and procedures;

We trust that the information presented in this report meets your needs and expectations. Should you have any questions, comments or concerns, please do not hesitate to contact the undersigned.

Sincerely,

BLUE HERON SOLUTIONS FOR ENVIRONMENTAL MANAGEMENT INC.

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5 REFERENCES

Crawford Nickel Project, Assimilative Capacity Study, September 30, 2024

Crawford Nickel Project, Impact Statement, Appendix 15, September 30, 2024

Crawford Nickel Project, Impact Statement Summary, November 22, 2024

Fisheries Act. (R.S.C.), 1985, c F-14. Accessed at: <https://laws-lois.justice.gc.ca/eng/acts/f-14/>.
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