Minago Nickel Project

Notice of Alteration to Environment Act Licence No. 2981

Submitted By:

Flying Nickel Mining Corp.
Suite 1610
409 Granville Street
Vancouver, BC
V6C 1T2 Canada

Submitted To:

Environmental Approvals Branch
Manitoba Environment, Climate and Parks
1007 Century Street
Winnipeg, MB
R3H 0W4 Canada

21 July 2022

FLYING NICKEL
Mining Corp.

Table of Contents

List of Tables

List of Figures

1.0 Introduction

The proposed Minago Nickel Project is an open pit mining project to produce nickel concentrate and frac sand. Manitoba issued Environment Act License (EAL) No. 2981 on 23 August 2011, following review of the 2010 Environment Act Proposal (2010 EAP) submitted by Victory Nickel Inc., the owner of the property at that time. Norway House Cree Nation appealed issuance of the EAL based on unresolved environmental concerns related to the location of the proposed Tailings and Waste Rock Management Facility (TWRMF) within the watershed of Limestone Bay on Lake Winnipeg and the plan to discharge approximately 30% of all mine contact water to Oakley Creek during the open water season. Oakley Creek drains to the William River, which flows into Limestone Bay on Lake Winnipeg. Limestone Bay is recognized as an important spawning and rearing area for Lake Winnipeg fish stocks.

Victory Nickel responded to this concern by altering their development plan to relocate the proposed TWRMF approximately 4 km northwest of the previously proposed location, out of the Limestone Bay watershed and into the Minago River watershed, and by committing to direct all mine contact water north to the Minago River. The Minago River flows into the westernmost end of Cross Lake, on the Nelson River downstream of Lake Winnipeg. Victory Nickel submitted a Notice of Alteration (2014 NOA) to EAL No. 2981 on 28 March 2014 to request amendment of the EAL to allow for construction of the TWRMF in the alternative location and to allow the discharge of all mine contact water to the Minago River. This proposed project change was determined to be a major alteration to the proposed project by Manitoba Environmental Approvals. Review of the NOA by the Environmental Approvals Branch progressed but was not completed, subject to the receipt of additional information from Victory Nickel.

Silver Elephant Mining acquired the Minago property from Victory Nickel in 2021. Silver Elephant completed a corporate reorganization in late 2021, spinning out 3 companies, each with a specific commodity focus. The Minago property transferred to Flying Nickel Mining Ltd. as part of this reorganization and Flying Nickel is now the 100% owner of the project.

The purpose of the present submission is to address the additional information requirements that remain outstanding related to the 2014 NOA submitted by Victory Nickel and to detail any additional changes to the development and operating plan that Flying Nickel may wish to implement. In this regard, Flying Nickel is planning to keep any additional project changes to an absolute minimum, as detailed in the following sections.

2.0 Project Overview

The Minago Nickel Project is located in Manitoba's Thompson Nickel belt adjacent to Highway 6, approximately 225 km south of Thompson and 100 km north of Grand Rapids, Manitoba, Canada (Figure 1). The property comprises 94 mining claims totaling 19,236 ha (192.36 km^2), two mining leases totaling 425 ha (4.25 km^2), and 6 Quarry Leases (Figure 2).

The deposit has potential as a large tonnage, low-grade nickel sulphide deposit (31 Mt at 0.43% nickel (Ni), 0.20% cut-off grade) and contains 14.8 Mt million tons of marketable frac sand. In the 2010 EAP, the tonnage was 25.4 Mt. The potential of the Project is supported by previous metallurgical test programs, which produced very high-grade nickel concentrate.

The deposit is overlain by approximately 80 m of overburden, comprising 2.5 m peat, 13 m clay, 50 m limestone (dolomite), and 10 m of sandstone, with a high open pit strip ratio. However, the 7.5 to 10 m thick sand layer above the ultramafic ore bearing rock contains marketable hydraulic fracturing sand (frac sand), which will offset the cost of the stripping. The sandstone unit is amenable for use as a frac sand in the oil and gas industry being comprised of small, round, uniformly sized silica sand particles. The sand also is useful for other industrial applications.

In the 2010 EAP/EIS, the mine life was estimated to be seven full years and two partial years, with concentrate production mirroring ore production. In the 2014 NOA, the mine life was estimated to be 10 years based on the increased nickel resource, involving 8 years during which both nickel ore and frac sand would be processed followed by 2 years of frac sand processing. The first partial year of ore production (Year 1) will be processed pending commissioning of the ore processing plant in Year 1.

The Project features an open pit bulk tonnage mining method, a 3.6 Mt/a nickel ore processing plant, and 1.5 Mt/a sand processing plant producing various sand products, including 20/40 and 40/70 frac sand, and other finer sized sands. The sandstone mined in Year -2 will be stockpiled until the frac sand plant is commissioned. The Project is planned to be built over a three-year period at a capital cost (2010 CAD$) of $596.3 million based on the 2010 feasibility study (Wardrop 2010). The feasibility study for the project is currently being updated, scheduled for completion in November 2022, and this study will provide a current capital cost estimate

The nickel ore processing plant is scheduled to come online in the spring of Year 1 and the frac sand plant to come online in the spring of Year -1.

The Minago mine site is favorably located close to existing infrastructure, including Manitoba Provincial Trunk Highway (PTH) 6, a 230 kV high voltage transmission line running directly beside Highway 6 on the east side of the road, and a planned future concentrate load-out facility to the Hudson Bay Railway Line at Ponton, 65 km north of the Project on PTH 6.

The major components of the proposed Project include:

- Open pit mine,
- Ore concentrating plant,
- Frac sand plant,
- Tailings and Waste Rock Management Facility (TWRMF) for the co-deposition of nickel tailings, frac sand process tailings, and ultramafic waste rock
- Stockpiles for non-acid-generating waste rock (limestone(dolomite) and country rock) and for overburden (clay and peat) removed from the pit area
- Supporting infrastructure, including:

- an explosives storage facility;
- water treatment facilities;
- de-watering systems with associated pipelines and pumping stations;
- roads and laydown areas;
- staff accommodations for 300 people and facilities;
- open pit mining equipment, including trucks, shovels, loaders, and drills;
- truck repair and maintenance facilities; and
- associated electrical and mechanical systems.

All major components (open pit mine, ore processing plant, frac sand processing plant, and supporting infrastructure, with the exception of the proposed TWRMF are permitted under EAL No. 2981. All these facilities, including the proposed TWRMF, are located in the Local Study Area (LSA) as presented in the 2010 EAP.

3.0 Proposed Project Changes

3.1 2014 NOA

The 2014 NOA identified and described the following changes to the development and operating plan for the project and assessed the potential environmental impacts of these changes:

- Relocation of the TWRMF approximately 4 km northwest of the originally planned location
- Increased area of the TWRMF polishing pond from 75 ha to 120 ha, and relocation of this pond north of the TWRMF
- Collection of surface runoff from all site facilities and direction of the collected surface runoff, along with water pumped from the open pit and the dewatering wells, to the larger TWRMF polishing pond
- Pumped discharge from the TWRMF polishing pond north to the Minago River
- No discharge of any mine-influenced water at all south to Oakley Creek
- Change to method of overburden (clay and peat) removal and storage, from hydraulic dredging and placement in a bermed containment cell to mechanical (truck and shovel) removal and separate stockpiling of the clay and peat on surface pads. With this change, the containment cell is no longer required, replaced by two stockpile pads
- Increased mineable nickel resource from the 25.4 Mt indicated in the 2010 EAP to 31 Mt, with a corresponding increase in mine life to 10 years from the 7 full years and two partial years identified in the 2010 EAP.
- Increased length of the construction phase from the 2 years indicated in the 2010 EAP to 3 years.

The remainder of the development and operating plan for the project was unchanged from that proposed in the 2010 EAP. The site layout for the project as originally proposed in the 2010 EAP is shown in Figure 3. The site layout as proposed in the 2014 NOA is shown in Figure 4.

The 2010 EAP assessed the potential environmental and socio-economic effects of the project as then proposed. The 2014 NOA assessed the potential environmental effects of the proposed project changes. The present document describes and assesses the potential environmental effects of the project changes prosed by Flying Nickel.

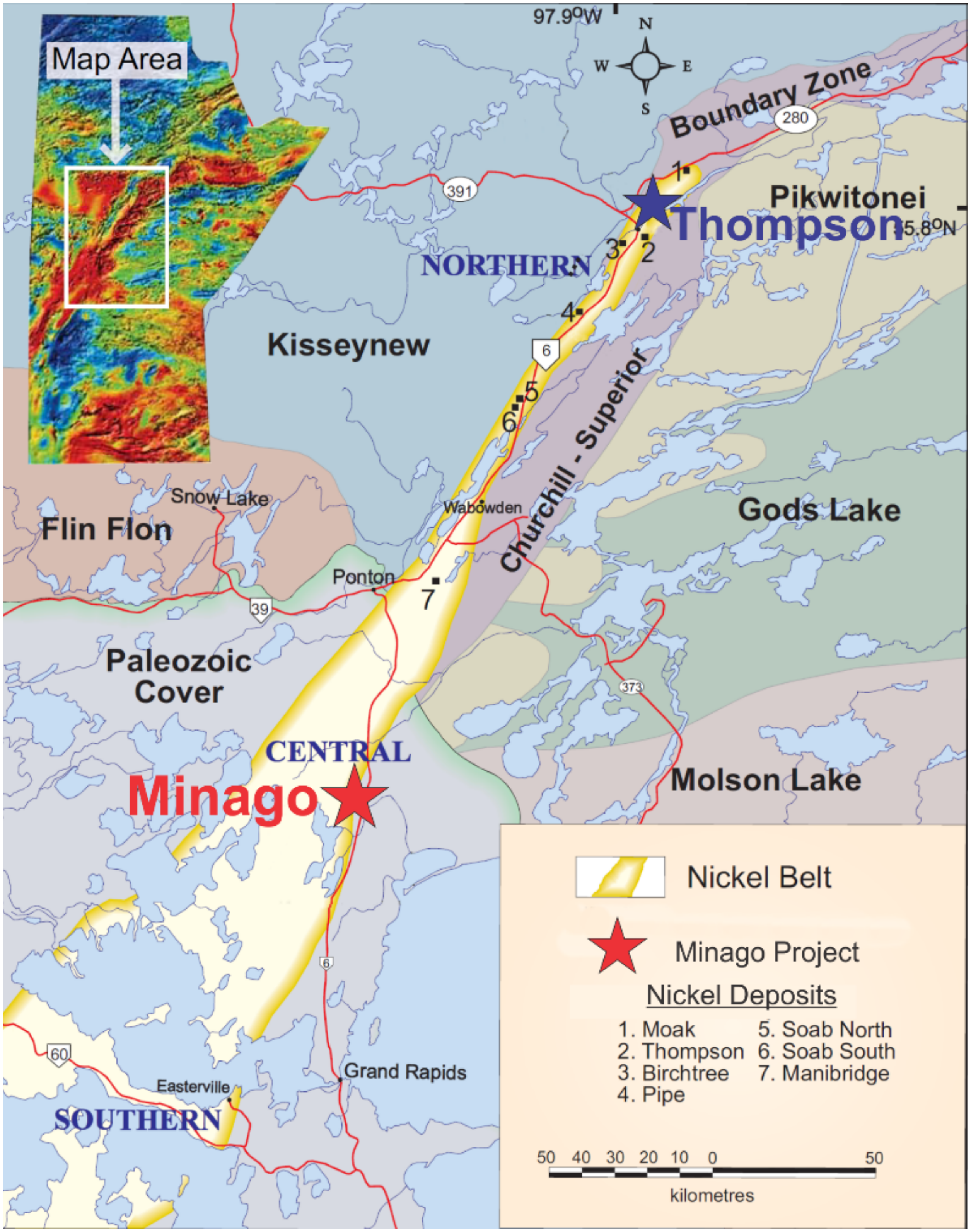

Figure 1. Location of the Minago Nickel Project in Manitoba.

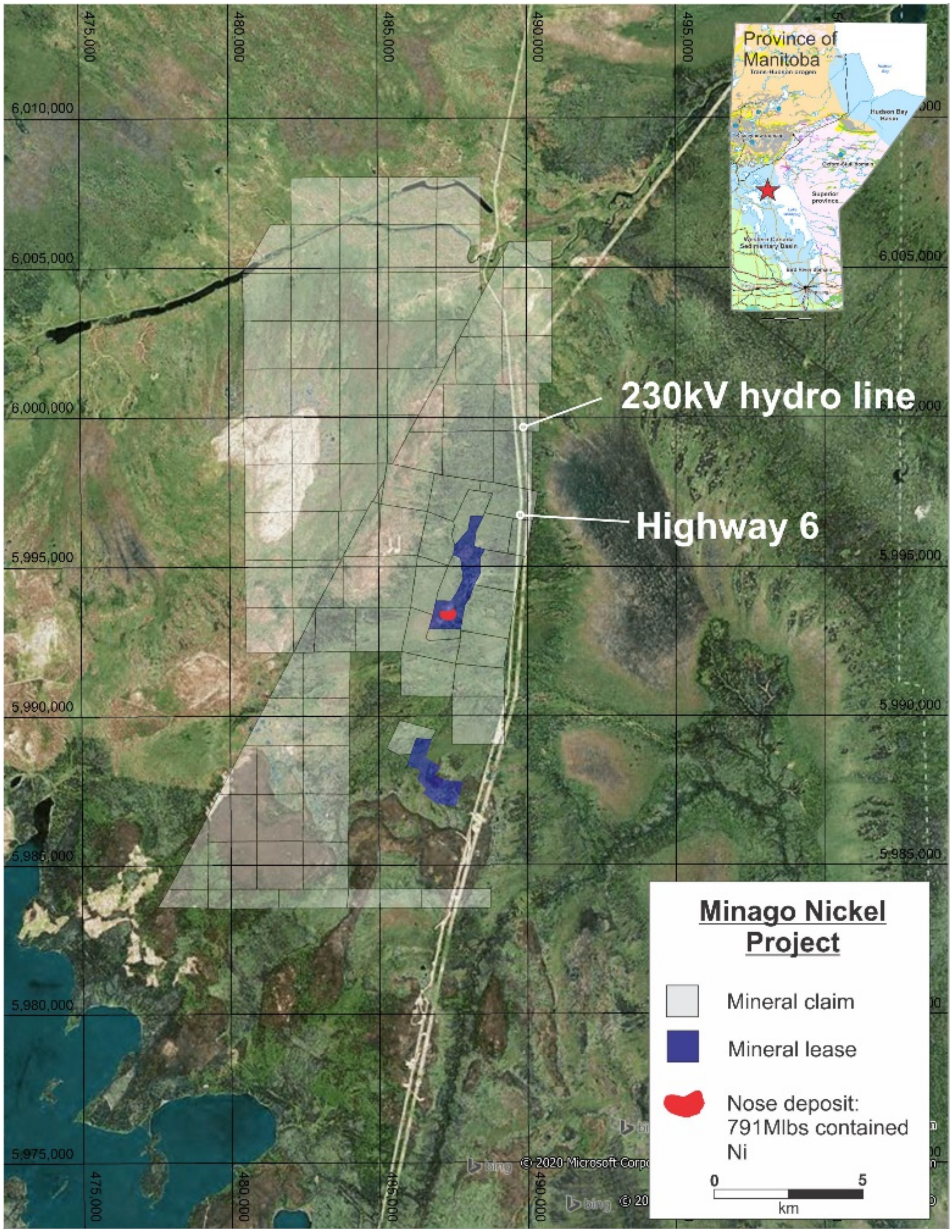

Figure 2. Minago Nickel Project Mineral Claims and Leases.

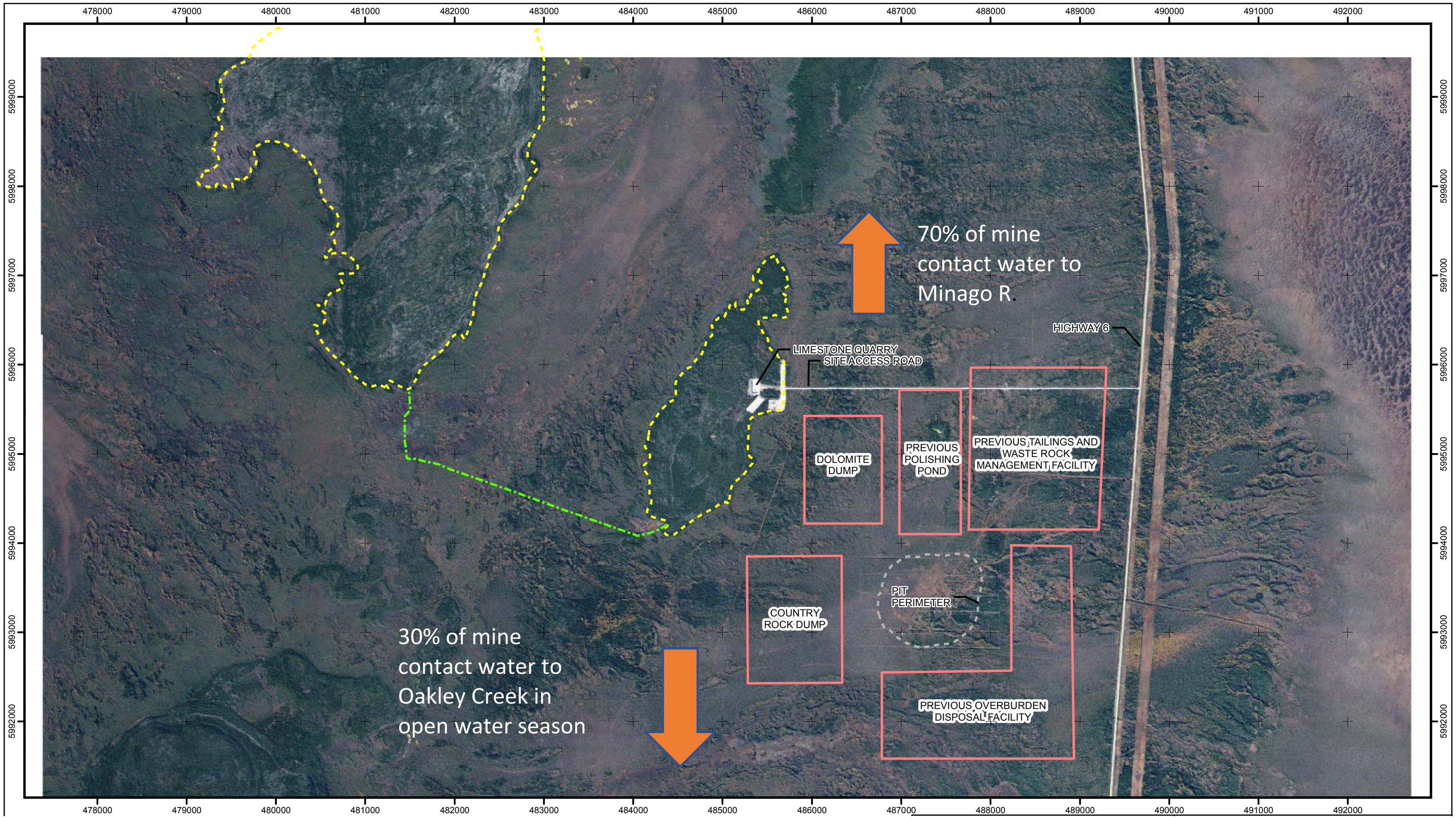

Figure 3. Minago Project site layout as proposed in the 2010 EAP and licenced in EAL No. 2981 in 2011.

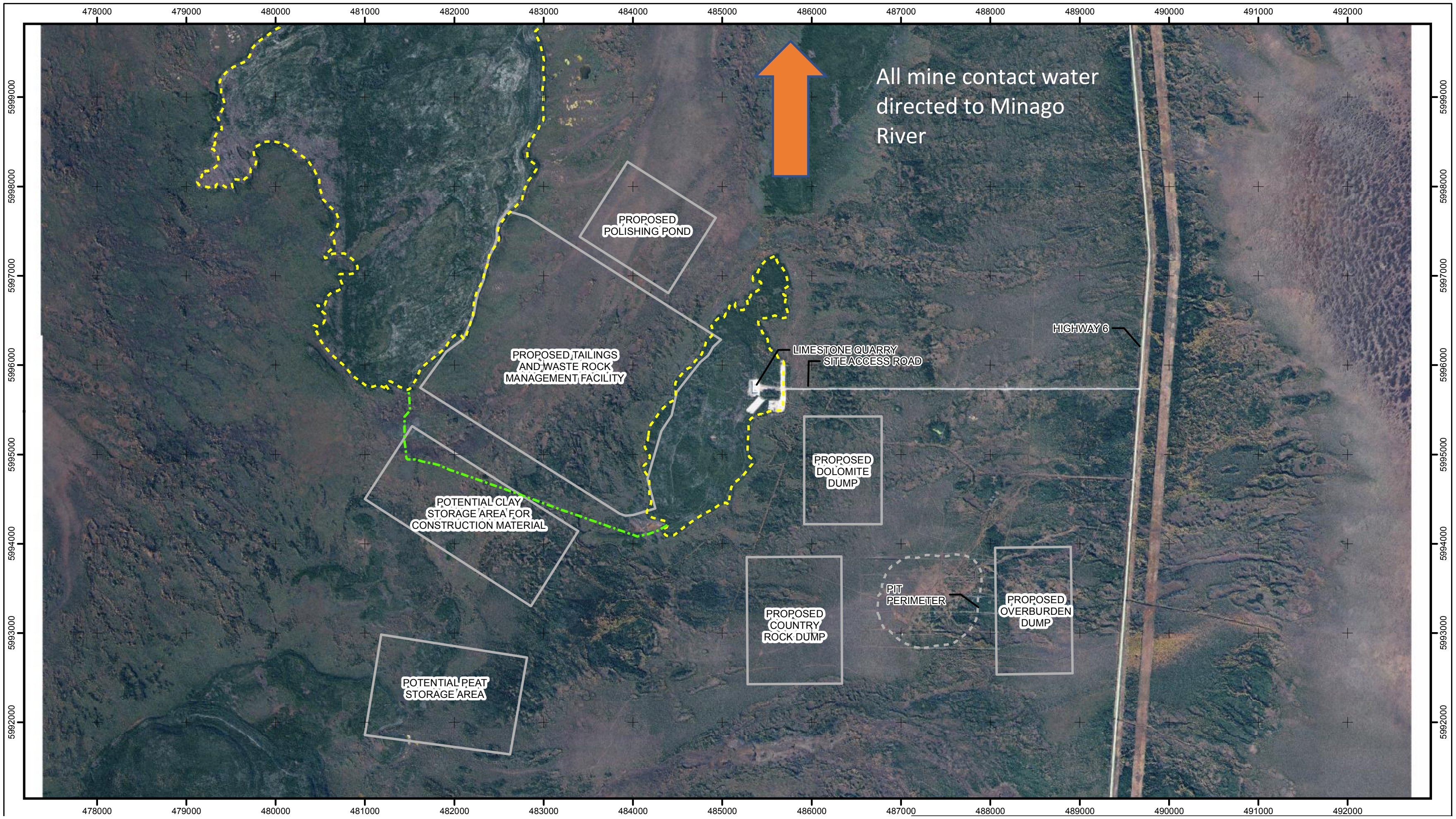

Figure 4. Minago Project site layout as proposed in the 2014 NOA.

3.2 Project Design Reviews by Flying Nickel

3.2.1 TWRMF Facility Engineering Review

Flying Nickel has conducted engineering studies to assess the TWRMF design presented in the 2014 NOA to confirm the suitability of the design and to determine if any material modifications to the design may be necessary. The full review report (TREK 2021) is attached in Appendix A. The study confirmed the basic design was sound and constructable with no adjustments necessary beyond what normally would be expected in moving from a conceptual design to the development of detailed design or during construction monitoring. A three-year construction period for the TWRMF was recommended by TREK (2021) and that schedule is consistent with the 3-year construction schedule identified in the 2014 NOA.

TREK (2021) also assessed whether the TWRMF design meets the requirements of EAL No. 2981 or if additional alteration of the licence would need to be requested and, in particular, if the planned clay liner approach proposed for the TWRMF and associated Polishing Pond meets licence requirements. Clause 17 of EAL No. 2981 specifies that “the licensee shall construct and maintain the TWRMF such that the entire base and inner banks of the intended tailings depository within the TWRMF are lined with a minimum 1 m thickness of compacted clay, or other material acceptable to the Director, possessing a maximum hydraulic conductivity of $1x10^{-7}$ m/s”. The feasibility report/drawings submitted for the original license application, and subsequently the Conceptual Design of the TWRMF submitted in the 2014 NOA departed from this requirement by leaving the peat in place across the floor of the TWRMF, thus relying on the natural (uncompacted) clay deposit to serve as a base liner. TREK (2021a, attached in Appendix A) examined the information on geotechnical soil conditions for the proposed site of the TWRMF presented in the Conceptual Design Report (Foth 2013) and for the previously proposed facility (Wardrop 2010) to determine if the native clay conditions were capable of meeting or exceeding the design requirement in the EAL.

TREK determined that the natural clay deposit across the facility base satisfies the design intent of a compacted clay liner.

3.2.2 Surface Water Collection and Management Plan

Flying Nickel also reviewed the surface water management plan presented in the 2014 NOA, which commits to collecting and directing all mine contact water (water that contacts mining-affected materials) north to the Minago River. This review indicated that, notwithstanding this important commitment, the 2014 NOA did not describe the works that would be necessary to implement the collection and direction of contact water to the Minago River. To address this deficiency, Flying Nickel commissioned Trek/Stantec to develop a surface water management plan to enable implementation of this 2014 NOA commitment.

This study included:

- Review and adjustment of stockpile pad sizing based on the geotechnical properties of the materials to be stockpiled (peat, clay, limestone, sandstone, and country rock) and minor rearrangement of these pads to facilitate water collection and management and to minimize the overall project footprint; and

- A surface water collection and management plan to describe how runoff from these stockpiles, pumped groundwater, pit dewatering, and discharges from the TWRMF would be collected and directed to the Minago River. This included the review and revision, as necessary, of polishing pond capacity requirements and the sizing of collection ditches and conveyance to the Minago

River. This plan also involves a gravity flow, open channel, discharge rather than the previously proposed, pumped/piped discharge.

The proposed stockpile sizing and arrangement on the site are illustrated on Figure 4, along with the planned locations of the two additional settling ponds and routing of the discharge swales from the polishing ponds to a side channel of the Minago River on Figure 5.

The estimated areas of disturbance associated with the project changes proposed by Flying Nickel appear to increase the total disturbed area by approximately 417 ha (23%) compared to the 2014 NOA plan (Table 1). The increased area of disturbance is primarily attributable to the additional polishing ponds, re-sizing of the waste rock and overburden stockpiles based on the geotechnical properties of the materials, and the addition of the discharge swales and associated maintenance trail.

The stockpile resizing was due entirely to the consideration of the geotechnical properties of the materials, the material quantities scheduled for stockpiling have not changed, consequently these increases would almost certainly have become evident during detailed project design. The new polishing ponds account for 70 ha of the additional disturbance. The discharge swales and maintenance access trail replace the previous discharge pipeline and maintenance trail that was not included in the disturbance footprint of the 2014 NOA. The sandstone stockpile footprint also was not previously included in the footprint although the quantity of sandstone to be produced has not changed. Consequently, the clearly identifiable increase in surface disturbance compared to the 2014 NOA is on the order of 70 to 100 ha, to account for the settling ponds and a wider zone of disturbance for the swales compared to the pipeline, an approximately 4% increase.

It should be noted that the surface water management plan primarily describes how the commitment made in the 2014 NOA to collect and direct all contact surface runoff north to the Minago River would be implemented and, in this regard, the plan is substantially consistent with that commitment. Only two explicit project changes resulted in the course of developing the surface runoff management plan: two 35-ha shallow settling ponds were added to provide adequate capacity to settle solids before discharge; and the previously proposed pumped discharge pipeline is replaced with open channel swales to carry the project discharge to the Minago River.

The solids that accumulate in the settling ponds will periodically be removed and transferred to the TWRMF for final disposal. With three settling ponds, maintenance of any pond can be carried out by taking the pond offline while continuing to operate the other two ponds.

The change in the surface water management plan, as proposed in the 2014 NOA and as detailed above will result in the project having just one final effluent discharge location and a single compliance point for monitoring of final effluent quality discharged to the Minago River. There will not be a discharge to Oakley Creek.

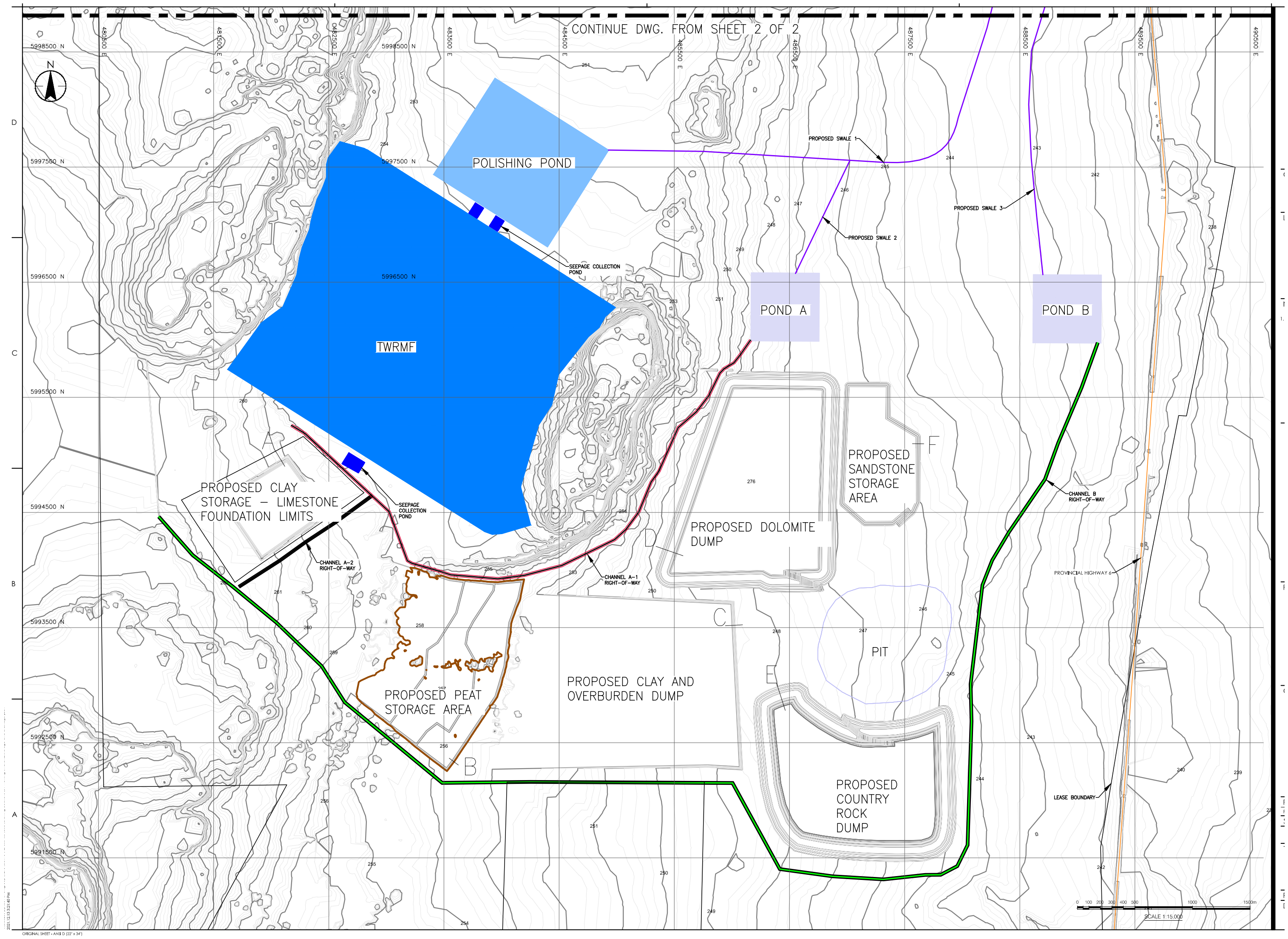

Figure 5. Minago Project site layout as proposed by Flying Nickel (From Stantec 2021).

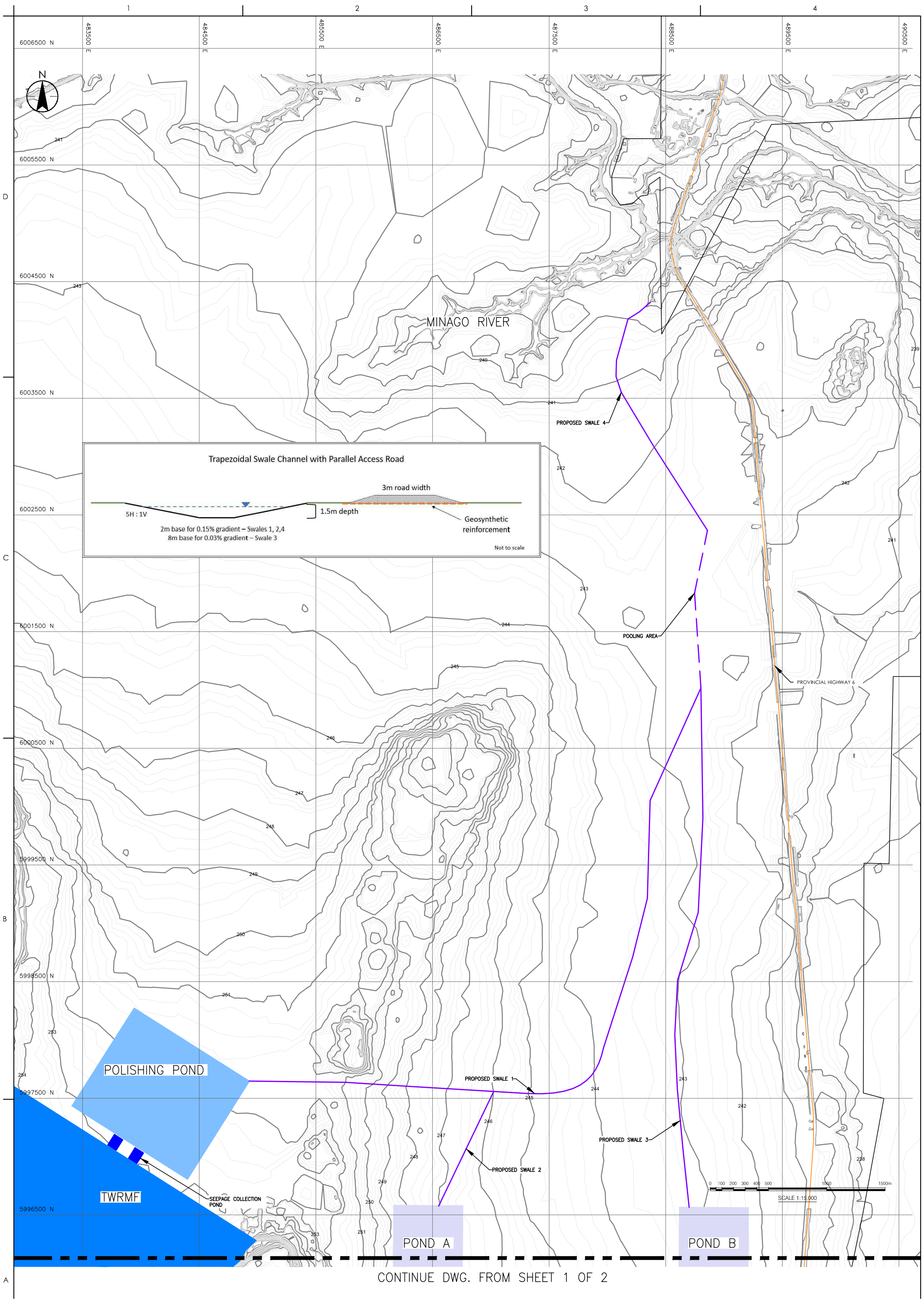

Figure 6. Minago Project discharge swale layout to carry flow to the Minago River as proposed by Flying Nickel (From Stantec 2021).

Table 1. Comparison of facility sizes indicated in the 2014 NOA with facility sizes proposed by Flying Nickel.

Facility	Area (ha) as per 2014 NOA	Area (ha) as per this NOA
Plant Site	4.2	4.2
Transportation Corridors and Access Roads	40.0	40
Limestone (Dolomite Stockpile)	191.0	245
Country Rock Stockpile	301.4	220
Sandstone Stockpile	Not Stated	75
Overburden Disposal Facility	375.3	N/A
Peat Stockpile	N/A	150
Main Clay and Overburden Stockpile	N/A	275
Construction Clay Stockpile	N/A	100
Pit Area	190.0	190
Tailings and Waste Rock Management Facility (TWRMF)	595.0	600
TWRMF Polishing Pond	120.0	120
Additional Polishing Ponds A and B	N/A	70
Discharge Pipeline and Maintenance Trail	Not Stated	N/A
Discharge Swales and Maintenance Trail	N/A	65
Camp (300 person)	2.4	2.4
Total	**1,819.3 +**	**2,236.6**

3.2.3 Water Quality Model Review

Flying Nickel also reviewed the water quality modelling presented in the 2014 NOA to assess the adequacy of the estimates of potential effects of the project effluent discharge on water quality in the Minago River in relation to the conditions in EAL No. 2981 and whether any additional project changes would be needed to ensure compliance with the permit conditions.

The review indicated that the effect of runoff from the various material stockpiles (peat, clay, limestone, sandstone, country rock) was not incorporated into either the 2010 EAP or the 2014 NOA water quality model on the assumption that runoff from the stockpiles is "benign". However, shake flask tests and humidity cell tests of these materials reported in the 2010 EAP indicate the potential for some neutral metal leaching from these materials that should be included in the model analysis.

Another important limitation of the water quality modelling completed in both the 2010 EAP and the 2014 NOA is that neither analysis considered the potential discharge effects under $7Q_{10}$ low flow conditions. The Manitoba Water Quality Standards Objectives and Guidelines (MWQSOGs), which are incorporated in EAL No. 2981 as water quality standards, require that the standards be met in the Minago River at $7Q_{10}$ low flows in addition to higher flows.

Finally, the baseline water quality condition in the Minago River that was used in the modelling was not clearly defined.

Flying Nickel has revised the water quality model to:

- explicitly define baseline Minago River water quality based on the 2006-2008 baseline studies,
- include estimated runoff quality and quantity from the material stockpiles based on humidity cell data, and
- consider both average and $7Q_{10}$ low flow conditions.

The revised model estimates are provided in Appendix B along with a full description of the input terms.

The model results indicated that the combined effect of directing all TWRMF polishing pond discharge, along with addition of runoff from the material stockpiles to the Minago River would result in the exceedance of several MWQSOG criteria (Al, Cu, Fe, Ni, Se) for protection of aquatic life at both average (Appendix B, Tables 14 and 15) and $7Q_{10}$ (Appendix B, Tables 12 and 13) low flows, indicating a need for additional water treatment beyond the previously planned settling of suspended solids.

Flying Nickel is proposing to install a 3-component semi-passive water treatment system to address the additional treatment requirement (Figure 7). The passive system will have the following components/treatment functions:

- Iron terrace for arsenic removal and ammonia oxidation to nitrate.

- Biochemical reactor for nitrate, sulphate, and removal of heavy metals and Se as sulphides.

- Aerobic polishing wetland (for minor removal of biochemical oxygen demand).

Engineering design on the passive treatment system remains to be done and will be completed as part of the feasibility study update that is currently in preparation and scheduled for completion in November 2022.

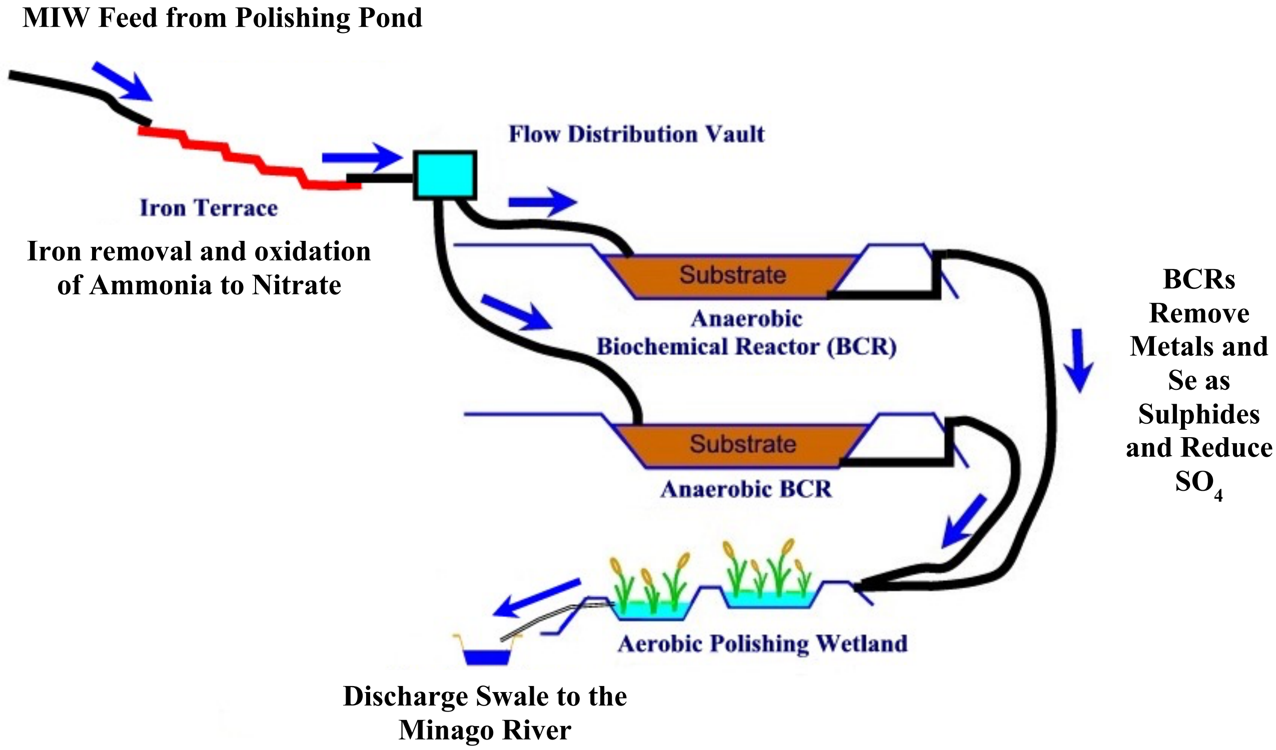

Figure 7. Typical arrangement of a 3-component passive treatment system. The two BCRs enable maintenance without having to entirely shut down the treatment system.

4.0 Environmental Effects Assessment

The environmental effects of the project as initially proposed were assessed in detail in the 2010 EAP and the 2014 NOA assessed the effects of the project changes proposed by Victory Nickel. Both assessments provide extensive details of baseline conditions, assessed impacts, and mitigation plans. The following assessment of potential impacts is focused on the project changes proposed by Flying Nickel.

4.1 Air Quality and Noise

None of the changes to the project planned by Flying Nickel has the potential to affect air quality or noise beyond those effects previously identified in the 2010 EAP and 2014 NOA. Since the 2010 and 2014 assessments were completed, more stringent emissions standards have come into force for nonroad diesel engines. Emissions from mining equipment operation are therefore expected to be considerably lower than previously estimated.

4.2 Hydrology

4.2.1 Oakley Creek

The original project development and operating plan had approximately 30% of project-related discharges reporting to Oakley Creek. This discharge was eliminated in the 2014 NOA and Flying Nickel also has adopted this change. No project-related discharges will be directed to Oakley Creek and stream flows will not be affected by project-discharges. The groundwater withdrawal plan also is not expected to affect flow in Oakley Creek, as assessed in the 2010 EAP and 2014 NOA.

4.2.2 Minago River

The project will discharge all mine-influenced water generated by the project to the Minago River and this will induce higher flows on the river below the point of discharge. The 2010 EAP examined the effect of discharging 70% of the TWRMF polishing pond discharge and concluded that, at average flows, water depth would increase approximately 5% due to the discharge and that the increased water flow would remain well below the long-term high-water mark. Under high flow conditions (e.g., 1:100 flood flow), the project discharge represented a negligible incremental contribution to flows or water depth (2010 EAP).

The effect of the revised discharge plan proposed in the 2014 NOA on flows in the Minago Rivers, with all mine-influenced water discharged to the river, was not explicitly examined in the 2014 NOA. The primary consideration in relation to this planned discharge is the effect under high flow conditions. River level would remain well below the long-term high-water mark under average flows.

The estimated 1:100-year baseline flood flows on the Minago River are 33.6 m^3/s at Freshet and 24.4 m^3/s in Summer at Station MRW-3 (Golder 2009). The total discharge from the mine site would add 1.7 m^3/s at Freshet, increasing river flow below the discharge by about 5%. The total discharge from the mine site would add 0.6 m^3/s in Summer, increasing river flow below the discharge by about 2.4%. Based on the flow-depth curves presented in the 2010 EAP and 2014 NOA, the water levels at these flows would remain well within the 1:200-year flood flow high water mark.

A primary concern associated with increased flows is the potential to cause scouring of the channel bottom or shoreline erosion, altering habitat and possibly increasing suspended solids concentrations in the water column. Shoreline erosion may be caused by the occurrence of water levels on the river outside the historical range, exposing previously undisturbed bank materials to water flow and resulting in shoreline erosion and increased suspended sediment concentrations. Similarly, stream flows outside the historical range create the potential for bottom scour, habitat alteration, and increased suspended sediment concentrations. The increased river level that may be caused by the project discharge during flood flow is not expected to cause increased channel scour or shoreline erosion because flows and levels are expected to remain within the historical range. The increased flows are negligible in comparison to estimated historical extreme high flows.

4.3 Surface Water Quality

4.3.1 Oakley Creek

Elimination of any contact water discharge to Oakley Creek also eliminates any potential effect on creek flow or water quality. No other project components have the potential to affect water quality in Oakley Creek.

4.3.2 Minago River

The 2014 NOA partially considered the potential effects of directing all pumped groundwater, water pumped from the open pit, and water discharged from the TWRMF north to the Minago River. That assessment indicated the discharge would comply with all MMER (Metal Mining Effluent Regulations; now called the Metal and Diamond Mining Effluent Regulations (MDMER)) effluent quality limits and that, at average Minago River flows and under average precipitation conditions, the TWRMF polishing pond discharge would not cause the applicable Manitoba Surface Water Quality Standards Objectives and Guidelines (MWQSOGs) to be exceeded in the Minago River, aside from those parameters (Al and Fe) that naturally exceed these criteria during some of the year.

However, the 2014 NOA did not consider the potential effects of the TWRMF polishing pond discharge on Minago River water quality under $7Q_{10}$ low flow conditions, nor did the 2014 NOA estimate the effect of directing all runoff from the material stockpiles (peat, clay, limestone, sandstone, and country rock) to the Minago River in addition to the discharge from the TWRMF polishing pond. The material stockpiles were classified as benign in the 2014 NOA. However, review of the kinetic geochemistry results suggests that runoff from the material stockpiles should be included in the water quality model (Appendix B).

Flying Nickel extended the water quality effects analysis to consider both $7Q_{10}$ low flow conditions on the Minago River and the effect of the contact water runoff from the material stockpiles (Appendix B). The following estimates of discharge effects assume no treatment beyond the already planned settling ponds for control of suspended solids.

Under low flow conditions, it can reasonably be expected that no contact runoff will report from the material stockpiles but that the TWRMF polishing pond discharge flow will largely be unaffected because the pond is primarily fed by groundwater from the deep dewatering wells, groundwater seepage pumped from the open pit, and process water. In this low flow condition, the TWRMF polishing pond discharge would account for approximately 37% of total river flow at winter $7Q_{10}$ low-flows, 75% of total river flow during freshet low flow, and 52% of total river flow during the June-Oct period low flow (Appendix B).

The effects of the TWRMF polishing pond discharge on receiving water quality during $7Q_{10}$ flows become evident early in the mine life. By Year 2, total Ni concentrations are estimated to exceed the MWQSOG Tier II chronic exposure objective during Freshet and the June-Oct period; total Se would exceed the Tier II objective in all seasons; total Fe concentrations would exceed the Tier III guideline during the Freshet and June-Oct periods; and total Al concentrations would exceed the Tier III objective during the June-Oct period. By Year 6, total Cu concentrations also begin to exceed the Tier II chronic exposure objectives during Freshet, with total Cd exceeding the Tier II chronic objective beginning in Year 7. None of these exceedances occurs at baseline conditions absent the discharge. Except for total Cd, the magnitudes of these exceedances all progressively increase to peak in Year 8 and, then decrease through years 9 and 10 following completion of nickel processing and as sand processing winds down. The increased total Cd in Year 7 continues through Year 10 at approximately the same concentration.

Baseline total Al concentrations in the Minago River exceed the Tier III guideline in Winter and during Freshet and total Fe concentrations exceed the Tier III guideline in Winter. The project discharge is expected to cause decreased Al and Fe concentrations in Winter through the mine life, because concentrations in the discharge are lower than in the Minago River under winter ice cover. Conversely, the project discharge would increase total Al concentrations during Freshet beginning in Year 2 and continuing through year 10.

Runoff is expected to report from the material stockpiles under average precipitation conditions and the combination of the TWRMF polishing pond and runoff from the material stockpiles is estimated to adversely affect Minago River water quality at average river flows. The effects become evident in Year 1, with total Al, Fe, and Se exceeding the applicable criteria in the June-Oct period. In Year 2, total Fe begins to exceed the Tier III guideline during Freshet as well as in the June-Oct period. In Year 5, total Ni begins to exceed the Tier II chronic exposure objective during the June-Oct period. The magnitudes of these exceedances all progressively increase to peak in Year 8, the last year of nickel ore processing. Total Ni concentrations decline with the end of nickel ore processing and concentrations in the Minago River drop below the Tier II objective in Years 9 and 10. Similarly, total Fe in the Minago River drops below the Tier III guideline during Freshet in years 9 and 10. In contrast, no material declines in total Al or Se concentrations are predicted to occur in either of Years 9 or 10, although concentrations stop increasing after Year 8. Concentrations of both Cu and Cd remain below the applicable Tier II objectives under the average river flow scenario.

As noted above, baseline total Al concentrations in the Minago River exceed the Tier III guideline in Winter and during Freshet and total Fe concentrations exceed the Tier III guideline in Winter. At average river flows, the combined TWRMF polishing pond and materials stockpiles runoff discharge is expected to cause decreased total Al concentrations in Winter through the mine life due to the lower total Al concentrations in the mine discharge than in the river in winter. Winter total Fe concentrations aren't affected by the discharge.

The above findings indicate the need to incorporate additional mine effluent treatment in the project plan to ensure project discharges do not cause any water quality criteria in the Minago River to be exceeded when, in the absence of the project discharge, the same criteria either are not exceeded at all, or the magnitude of the exceedance is lower, as required by EAL No. 2981.

Both the 2010 EAP and the 2014 NOA committed to undertake effluent treatment as necessary to ensure compliance. The focus in both submissions was the provision of sufficient settling pond capacity to manage suspended solids concentrations in the project discharges. The settling capacity requirement has progressively increased with each phase of study. The single 75 ha polishing pond identified in the 2010 EAP became a 120-ha pond in the 2014 NOA. The 2021 surface runoff management plan (TREK 2021b/Stantec 2021; Appendix A) determined that 3 ponds would be required: the 120-ha TWRMF polishing pond, plus two additional 35-ha ponds.

Treatment to manage Al, Cd, Cu, Fe, Ni, and Se will require more than settling. The 2014 NOA suggested that passage of the discharge through a portion of the existing natural wetlands at the end of the discharge pipe would provide any further polishing that might be required. Flying Nickel does not see this as providing an appropriate level of control nor is it viewed as a reasonable use of natural habitat. Instead, the company proposes to install a semi-passive treatment system to manage the parameters of concern and ensure water quality in the Minago River is protected and will comply with the terms of EAL No. 2981.

This system will incorporate an iron terrace stage, for reduction of iron concentrations, a biochemical reactor (BCR) stage for precipitation of metals and Se as sulphides, followed by an aerobic polishing wetland for removal of residual organic matter carried through from the BCR. Microbial activity in the iron terraces and BCR also can also treat residual ammonia. The system will be sized to provide sufficient treatment to reduce the concentrations of all 6 parameters of concern to meet the applicable MWQSOG criteria for protection of aquatic life. Engineering of this system will be done over the course of the feasibility study that is currently in preparation, with completion expected in November 2022.

Selection of the semi-passive treatment approach was driven by the need to reduce Se concentrations. The other metals (Al, Cd, Cu, Fe, and Ni) all can be treated using conventional lime treatment, but Se does not respond to precipitation using lime. The biochemical reactor stage in the semi-passive system can effectively precipitate Se as a sulphide, in addition to precipitating the other metals as sulphides.

With the application of water treatment as described, any change in Minago River water quality resulting from the project discharge will be within the applicable MWQSOGs for the protection of aquatic life, at average and $7Q_{10}$ low river flows. These are the most stringent water quality criteria applicable in Manitoba and are considered to represent “no-effect” concentrations. On this basis, the project discharge to the Minago River, as planned by Flying Nickel, is not expected to affect water quality for aquatic life, which is the most sensitive water use, or for human consumption.

4.4 Hydrogeology and Groundwater Quality

The project does not involve any discharges to groundwater. Seepage to groundwater from the surface facilities is expected to be negligible because of the approximately 13 m thick clay layer that underlies the entire project site. TREK (2021a; Appendix A) examined the permeability of the clay layer with respect to its effectiveness as a liner for the TWRMF and polishing pond and determined that it satisfies the clay liner specification of $1x10^{-7}$ m/s in EAL No. 2981. Although development of the open pit will breach the clay layer, the perimeter groundwater withdrawal wells and pumping of seepage form the open pit will induce groundwater flow toward the pit, such that any contaminants that may be introduced to the pit during mining are prevented from migrating into the groundwater system and are instead pumped from the pit to surface for management and treatment.

The Project will not involve any identified discharges to the local groundwater system but will require substantial groundwater withdrawals both to reduce the inflow of groundwater to the open pit and to remove any groundwater seepage from the open pit that does occur. Flying Nickel is not proposing any changes to the groundwater withdrawals previously planned by Victory Nickel. The conclusions of the 2010 EAP and 2014 NOA remain valid and applicable to the project as proposed by Flying Nickel. Most importantly, the groundwater withdrawals are not expected to adversely affect flows in either the Minago River or Oakley Creek due to the absence of a hydrologic connection between these watercourses and the local groundwater system (Golder 2009). However, the pumped groundwater will be discharged to the Minago River, as noted in Section 4.4.2 above.

The preliminary hydrogeological program, conducted in 2007, was followed by a comprehensive hydrogeological characterization of the site in the summer of 2008. The comprehensive hydrogeological program involved the pumping of four high-capacity dewatering wells located along the perimeter of the proposed open pit mine and monitoring the hydrogeologic response in these wells and in 24 observation wells. Long-term pumping tests were conducted to lower the hydraulic heads within the limestone (LS) unit significantly below the limestone-overburden contact (i.e., allow its conversion from a confined to an unconfined aquifer). Results of the long duration pumping test program were used to develop a conceptual hydrogeological model of the Site and a groundwater flow model of the proposed open pit area. The primary focus of the hydrogeological study was to estimate the configuration of the dewatering well system required for the operation of the proposed mine pit; to estimate the total required pumping rate for dewatering; and to estimate the extent of the drawdown cone created during open pit mining. The hydrogeological study concluded that a total of 12 dewatering wells completed in both the limestone and sandstone aquifers, at distances of approximately 300 m to 400 m along the crest of the ultimate pit, will be required to operate simultaneously. The total quantity of groundwater likely to be generated by these wells is 40,000 m^3/day (7,300 USgpm). The average pumping rate for an individual well is estimated to be 3,300 m^3/day (600 USgpm).

4.5 Fish and Aquatic Life

4.5.1 Oakley Creek

None of the project components or activities is expected to affect streamflow or water quality directly or indirectly in Oakley Creek. Consequently, no effects are expected downstream in the William River or in Limestone Bay on Lake Winnipeg. The project is not expected to affect fish, other aquatic life, or fish habitat in this watershed.

4.5.2 Minago River

Under the development and operating plan described in the 2014 NOA, all surface runoff collected from the site, pumped groundwater, pit dewatering, and excess water discharges from the TWRMF would be directed to the Minago River, a short distance upstream from the PTH 6 crossing. Without treatment, this discharge would cause several parameters to increase and exceed the applicable MWQSOGs for protection of aquatic life at average and $7Q_{10}$ low flows (Section 4.3.2 and Appendix B).

Flying Nickel's plan to incorporate effluent treatment will prevent the MWQSOG exceedances, other than those which occur naturally, such that the project discharge will not adversely affect water quality in the Minago River. Although some parameter concentrations may increase compared to the water quality baseline, the concentrations will remain below the aquatic life criteria. Parameters that naturally exceed the criteria (i.e., Al and Fe) will continue to do so, but the project will not cause concentrations of these parameters to increase further. Aquatic life will not be adversely affected by water quality.

The temperature of most mine effluent discharges typically is not the same as the temperature of the receiving waters and the discharge of water with a higher or lower temperature can cause thermal shock to aquatic life. However, by using the open channel swale to convey the discharge to the river, the temperature of the discharge is expected to be similar to that of the river at the point of discharge and thermal shock is not expected to be an issue in this instance.

The change to a discharge swale from a piped discharge also reduces the potential for bank or stream bottom erosion at the point of discharge to the Minago River. Discharge velocities from this low-gradient gravity flow system will be considerably lower, and similar to the inflow from a side-channel stream.

There is the potential for fish to enter the discharge swale from the Minago River. A free-flowing rockfill barrier will be located in the swale to prevent fish from moving into the swale.

4.6 Terrestrial Resources

4.6.1 Vegetation

As noted in Section 3.2 above, the project changes proposed by Flying Nickel do not involve a large increase in the area of disturbance in comparison to the aggregate disturbance identified in the 2010 EAP and 2014 NOA. The newly proposed area of disturbance is associated with the two additional polishing ponds A and B and with a somewhat wider band of disturbance along the discharge route related to the shift to an open channel discharge from a piped discharge. The discharge route has been located parallel to and as close as possible to the PTH 6 corridor in order to minimize fragmentation of the wetland complex.

Reviewer comments on the 2014 NOA requested a survey of the limestone ridges for the presence/absence of rare fern species in relation to the planned relocation of the TWRMF, which can occur in this habitat type in Manitoba. A fern survey has been commissioned for spring 2022 and findings will be reported as soon as they are received.

The vegetation community in the area of Polishing Ponds A and B and along the discharge route is within the Local Study Area that was previously assessed in the 2010 EAP and 2014 NOA. No unique vegetation communities or vegetation species at risk were identified in this area.

4.6.2 Wildlife

Potential impacts of the project on wildlife during construction, operations, and closure were assessed in the 2010 EAP and the 2014 NOA. The project changes proposed by Flying Nickel would result in a small incremental increase in terrestrial habitat loss, representing an approximately 4% increase over the disturbance proposed in the 2014 NOA. This increase in habitat disturbance is within or adjacent to the areas previously assessed and does not include any habitat types not previously identified or assessed.

Reviewer comments on the 2014 NOA requested a survey for the presence/absence of bat hibernacula along the limestone ridges that will be used for the TWRMF. A survey has been commissioned for spring 2022 and findings will be reported as soon as they are received.

4.6.5 Archaeology and Heritage Resources

Quaternary Consultants Ltd. (2008) found that:

- it is highly improbable that the area was used by inhabitants prior to the introduction of the fur trade,
- the possibility of finding any evidence of Pre-contact utilization of the area is next to impossible, and
- the likelihood of locating any evidence of Fur Trade or later use, other than prospecting and mining activities, is extremely minimal.

Based on their work, Quaternary Consultants Ltd. (2008) concluded that the proposed mine development will have no impact upon archaeological or heritage resources.

5.0 Closure and Reclamation

Flying Nickel will prepare and submit a comprehensive closure and reclamation plan for the project for regulatory review and approval prior to commencing project construction. That plan will be developed in consultation with the local First Nations (Norway House Cree Nation, Pimicikimak Cree Nation, Mosakahiken Cree Nation, and Misipawistik Cree Nation) and the relevant Manitoba government departments. At this time, Flying Nickel is not proposing any modifications to the closure and reclamation plans previously described in the 2010 EAP/2014 NOA.

6.0 Environmental Monitoring

The project will be subject to environmental monitoring requirements that will form part of the amended Environment Act Licence that will be issued on acceptance of the NOA. These requirements will include compliance with the compliance point effluent and receiving environment monitoring requirements of the Metal and Diamond Mining Effluent Regulations; sampling and analysis of waste rock for acid generation potential; annual third-party monitoring of baghouse or electro-static precipitator emissions for compliance with licence terms regarding particulate emissions; polishing pond discharge quality, and any other monitoring as may be required by Manitoba.

Flying Nickel has had productive discussions with the four First Nation communities regarding environmental monitoring, and particularly regarding how the monitoring should be done and how monitoring results should be made available to the communities. In this regard, the company plans to involve the communities directly in environmental monitoring. Misipawistik Cree Nation is establishing an environmental monitoring capacity and Flying Nickel expects they will be the prime contractor to conduct monitoring for the company. Specialist contractors will also be required to address some of the MDMER EEM monitoring requirements, at least through the first few EEM cycles, although the ultimate objective is to support the establishment of a full-service monitoring capacity, based at and staffed by the four nations, through training support and contracting.

The four First Nations and the company have agreed to jointly establish an Environmental Monitoring and Management (EMM) Steering Committee that will provide oversight to the monitoring program and assist with communication of the monitoring results to their communities. The committee will comprise one representative from the company, and one representative from each of the four nations. Receiving environment monitoring locations will be selected by consensus of the EMM, in consultation with provincial and federal regulatory agencies.

Flying Nickel has committed to making all environmental monitoring results available to all communities. A website will be established where all results will be posted and can be accessed by all community members. The company recognizes that this will be useful to some community members but certainly not to all, since use of the website requires an internet connection, some experience in using the internet to access information, as well as some knowledge of the monitoring requirements and in interpretation of the results. The EMM committee members will assist in communicating monitoring information to members of their communities as well bring questions from their communities back to the committee and the company. The company also will make regular presentations of monitoring results to each community. These meetings will initially be held quarterly, with meeting frequency adjusted as necessary to address community interests and concerns.

7.0 Community Engagement

Flying Nickel has been engaging with the Norway House Cree Nation (NHCN) since August 2021 regarding the company's plans for the project. The Company met with the Chief, several councillors, and nation management in Winnipeg on February 7, 2022, and signed a Memorandum of Understanding (MOU) regarding the project on February 17, 2022, dealing with employment and business opportunities and direct economic benefits. The company has been engaging with NHCN, the Pimicikimak Cree Nation, Mosakahiken Cree Nation, and Misipawistik Cree Nation since that time regarding business and employment opportunities and environmental management, monitoring, and protection. The Chiefs and Councils and management representatives of all four nations (Mosakahiken attended virtually due to weather, the other three nations attended in person) met with Flying Nickel in Winnipeg on April 13 and 14, 2022 to discuss the project, training and employment opportunities, and governance of the potential four nations joint-venture mining-related business. A considerable portion of the meeting was spent with questions on environmental management and monitoring and on monitoring data verification and access to the results, leading to the establishment of the Environmental Monitoring and Management (EMM) Steering Committee described in Section 6.0.

Flying Nickel, with the assistance of NHCN, is in the process of holding meetings in the communities to discuss project plans. The first community meeting was held in Grand Rapids on June 7, 2022. Meetings with the other three communities also were originally scheduled for the week of June 6 but have been postponed because of community matters unrelated to the Minago Project. These meetings will be held as soon as circumstances permit.

All four communities have expressed an interest in the employment and business opportunities associated with the project, provided that environmental quality, and particularly water quality and fish, is protected.

8.0 Summary of Proposed Changes

The project changes proposed in the 2014 NOA and in the present 2022 NOA Update are summarised in Table 2. These changes explicitly address the project design changes requested by NHCN and provide further details regarding how these changes will be implemented. The 2022 NOA Update goes further to include additional water treatment facilities (two additional polishing ponds and passive treatment system) to provide the necessary protection of water quality in the Minago River.

9.0 References

Foth Canada Corporation. 2013. Tailings and waste rock management facility, Conceptual design report, Minago nickel mine. Project ID: 11V777. Prepared for Victory Nickel Inc., November 2013.

Golder Associates. 2009. Hydrologic baseline study, Minago Project, Manitoba. Submitted to Victory Nickel Inc., March 6, 2009.

Manitoba Water Stewardship. 2011. Manitoba Water Quality Standards, Objectives, and Guidelines. Water Science and Management Branch, Manitoba Water Stewardship. Manitoba Water Stewardship Report No. 2011-01. November 28, 2011.

Stantec Consulting Limited. 2021. Minago Project – Surface Water Management Update. Memo to Robert Van Drunen, Silver Elephant Mining Corp. December 11, 2021, in TREK Geotechnical, Minago Nickel Mine, Technical Input for Notice of Alteration. Report prepared for Silver Elephant Mining Corp., Vancouver, BC, December 13, 2021.

Quaternary Consultants Ltd. 2008. Archaeological Impact Assessment of the Minago Mining Site. Prepared for: Victory Nickel Inc.

Stantec Consulting Limited. 2021. Minago Project – Surface Water Management Update. Memo to Robert Van Drunen, Silver Elephant Mining Corp. December 11, 2021, in TREK Geotechnical, Minago Nickel Mine, Technical Input for Notice of Alteration. Report prepared for Silver Elephant Mining Corp., Vancouver, BC, December 13, 2021.

TREK Geotechnical. 2021a. Minago Nickel Mine Geotechnical Assessment. Letter report to Silver Elephant Mining. September 17, 2021.

TREK Geotechnical. 2021b. Minago Nickel Mine, Technical Input for Notice of Alteration. Report prepared for Silver Elephant Mining Corp., Vancouver, BC, December 13, 2021.

Victory Nickel Inc. 2010. (2010 EAP). Minago Project, Manitoba. Environment Act Proposal – Environmental Impact Statement.

Victory Nickel Inc. 2013. (2014 NOA). Environment Act Proposal to Amend Environment Act Licence No. 2981 to Include the Proposed Tailings and waste Rock Management Facility. Environmental Impact Statement, V1-Part 1, December 08, 2013.

Wardrop. 2010. Feasibility Study – Minago Nickel Mine. Report No. 0951330400-REP-R0001- 02. March 4, 2010.

Table 2. Summary of Proposed Changes – Minago Nickel Project

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
Mine Life	10 full years No Change from 2014 NOA	Mine life increased to 10 full years on basis of increased mineable nickel resource	7 full years plus 2 partial years	Longer mine life for larger mineral resource
Mine Type	Open Pit No Change	Open Pit No Change	Open Pit	No Change
Mineral Resource	No Change from 2014	Mineable nickel resource increased to 31 Mt	Mineable nickel resource of 25.4 Mt	22% increase in mineral resource from 2010 to 2014
Mining Rate	10,000 tonnes ore/day No Change	10,000 tonnes ore/day No Change	10,000 tonnes ore/day	No Change
Open pit mining equipment, including trucks, shovels, loaders, and drills	No Change	No Change	Diesel powered mine haul trucks and loaders. Electric shovels	No Change
Mining Waste Management				
Overburden Stripping				

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
Peat Deposit is overlain by approx. 2.5 m layer of peat	Same as 2014 NOA – mechanical removal and stockpile Stockpile relocated closer to pit to facilitate runoff management and reduce haul distance Peat quantity to be stripped remains the same – pad size based on peat geotechnical properties	Changed to mechanical removal (truck and shovel) and stockpile peat and clay on separate pads Material quantity remains the same	Removal by dredging and co-disposal with clay in containment cell	Change to mechanical removal means containment cell no longer required. Separate management of peat preserves material for later use in site reclamation Reduced haul distance reduces energy consumption
Clay Approx. 13 m thick layer of clay underlies the peat	Same as 2014 NOA – mechanical removal and stockpile Primary stockpile relocated to facilitate runoff management and reduce haul distance; now sized based on clay geotechnical properties. Second stockpile added to manage clay for construction near point of use.	Changed to mechanical removal (truck and shovel) and stockpile peat and clay on separate pads Material quantity remains the same	Removal by dredging and co-disposal with peat in containment cell	No Change from 2014 NOA Containment cell no longer required. Separate management of clay preserves material for use in construction and later use in site reclamation. Reduced haul distance reduces energy consumption

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
Waste Rock Management				
Limestone (Dolomite) Waste Rock Approx. 60 m thick layer of dolomite underlies the clay layer Approx. 111 M tonnes	No change in quarrying. Material to be stockpiled on site adjacent to open pit. Stockpile in same location but re-sized (area increased approximately 28%) based on geotechnical properties to accommodate all limestone waste rock	No change	Conventional mining (rip or blast, load, and haul). Stockpile adjacent to open pit.	No change in quarry method or quantity. Stockpile size adjusted based on geotechnical properties
Sandstone Approx. 10 m thick layer of sandstone underlies the dolomite cap Approx. 10 M tonnes	No change in mining, processing, or quantity Stockpile re-sized based on geotechnical properties and relocated adjacent to pit	No change.	Conventional mining (rip or blast, load, and haul). Stockpile adjacent to open pit. Process on site from stockpile to produce frac sand to be sold offsite. Process tailings placed in the TWRMF.	
Granitic Country Rock Approx. 111 M tonnes	No change in mining. Stockpile in same location but re-sized based on geotechnical properties. Area reduced from 301 ha to 220 ha	No change.	Conventional mining (blast, load, and haul). Stockpile adjacent to open pit.	No change in quantity or mining – smaller stockpile based on geotechnical properties

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
Ultramafic Waste Rock Approx. 36 M tonnes	No Changes	No changes	Conventional mining (blast, load, and haul). Placed in TWRMF co-mingled with tailings and with a water cover to prevent ARD	No Changes other than TWRMF location
Tailings and Waste Rock Management Facility (TWRMF)				
Location	Same as 2014 NOA	Relocated to area between dolomite ridges to NW or previously proposed location		Moves TWRMF out of the Lake Winnipeg watershed
Dam Requirements	Same as 2014 NOA	595 ha footprint North Dam 13 m crest height with 2 m freeboard South Dam 8 m crest height with 2 m freeboard	219.7 ha footprint TWRMF entirely contained by constructed dams, with a 23 m crest height located adjacent to open pit	Makes use of existing topography for some of the containment Reduces total dam length Reduces max dam height by 43 to 65% Increases footprint by 271%
Tailings Properties	Same as 2014 NOA	Slurry tailings with 45/55% solids content pumped to TWRMF All tailings are NAG 31 M tonnes nickel tailings based on increased nickel resource	Slurry tailings with 45/55% solids content pumped to TWRMF All tailings are NAG 25.4 M tonnes nickel tailings	Increased tailings production proportionate to increased mineral resource

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
Ultramafic Waste Rock Properties	Same as 2014 NOA	No Change in quantity or geochemical properties	36 M tonnes Potentially Acid Generating (PAG)	Ultramafic PAG waste rock co-deposited with NAG tailings in TWRMF and stored underwater to prevent ARD
Processing Plant (PPT)	No Change	No Change		
PPT Capacity	No Change	No Change		10,000 tonnes/day
PPT Reagents Type and Dosage	No Change	No Change		
PPT Location	No Change	No Change		
Concentrate Transport	No Change	No Change	Trucked to load-out at Ponton. Rail from Ponton to smelter in Sudbury or to port for offshore smelting	No Changes
Explosives Storage Facility	No Change	No Change		No Changes
Roads and Laydown Areas	No Change	No Change		
Staff Accommodations and Facilities	No Change	No Change		

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
Truck Repair and Maintenance Facilities	No Change	No Change		
Associated Electrical and Mechanical Systems	No Change	No Change		
Mine Site Water Management				
Mine Site Surface Runoff	Water management plan developed to implement the general management approach described in the 2014 NOA. Clean water run-on to the mine site prevented. Contact runoff water collected in perimeter ditches and directed to two new settling ponds and then to Minago R. Runoff analysis determined the single polishing pond identified in the 2014 NOA would not be adequate to manage all runoff from the site as well as water from the TWRMF. Two additional settling ponds, Ponds A and B, determined to be required to manage runoff	2014 NOA committed to collect and direct all contact runoff water to the Minago R. No discharge to Oakley Creek. Specifics of the runoff collection system were not provided.	70% of all mine influenced water discharged to the Minago River – discharge occurring all year 30% of mine influenced water (runoff from waste rock stockpiles) discharged to Oakley Creek during the open water season	Eliminates discharge to Oakley Creek. Provides a means of collecting all mine site contact water runoff. Provides sufficient polishing pond capacity to ensure adequate settling time for suspended solids.

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
TWRMF Seepage	No Change from 2014 NOA	Same approach applied at new location Seepage reduced by 91% because of the lower dam heights	Seepage collection ditches and ponds located at toe of the tailings dams. Seepage collected in ponds pumped back into TWRMF	Reduced maximum dam height and shorter total dam length reduces dam seepage by 91%
TWRMF Discharge	No Change from 2014 NOA All pond discharge to Minago River.	Same approach applied at new location. All pond discharge to Minago River.	Excess water, beyond requirement to maintain water cover, discharged to polishing pond. 70% directed to Minago River 30% discharged to Oakley Creek in open water season	No Discharge to Oakley Creek
Pit Perimeter Dewatering Wells	No Change in dewatering well plan or water use. Excess water directed to TWRMF, which discharges to the Minago River year-round via a gravity flow discharge swale instead of in a pumped discharge	No Change in dewatering well plan or water use. Excess water directed to TWRMF. Pumped discharge to the Minago River year round	12 dewatering wells located around the open pit used to draw down the groundwater level and minimize groundwater seepage to the open pit. Pumped water used for process and domestic uses and excess water discharged to the TWRMF polishing pond. TWRMF polishing pond discharged toward the Minago R. year-round	All excess dewatering well water directed to Minago R. as per 2010 EIS and 2014 NOA.

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
Pit Water Management	Minor Change Water pumped from pit sump to Polishing Pond B – gravity flow discharge to Minago River via discharge swale	No Change. Water pumped from pit sump to TWRMF polishing pond – pumped discharge to Minago River	Water pumped from pit sump to TWRMF polishing pond – pumped discharge to Minago River.	All water directed to Minago River
Water Treatment Systems	Flying Nickel's review of the surface water management plan determined that additional polishing pond capacity is needed beyond the single pond indicated in the 2014 NOA. Three polishing ponds have been specified by Trek/Stantec. TWRMF Polishing Pond – 120 ha – receives runoff from the TWRMF and recovered water from the TWRMF Pond A – 35 ha. For containment and management of runoff from the plant site, clay and peat stockpiles, and portions of the rock dumps.	Single TWRMF polishing pond to handle all water management and treatment. Would receive all discharges from the TWRMF, pit dewatering water, and all site surface runoff including all runoff from the rock dumps, and the clay and peat stockpiles. Pond relocated to the north of the new TWRMF site. Pond area increased to 120 ha Pond discharge pumped to the Minago River	Single TWRMF polishing pond to handle all water discharged from the TWRMF; excess perimeter pit dewatering water; and excess pit sump dewatering water. The polishing pond primarily functions to manage suspended solids. Flocculants can be added to assist in settling of fines. 75 ha pond area All discharge from the TWRMF pond pumped north toward the Minago R. via a pipeline, All other site runoff collected in settling ponds (non-specified, number, locations, or capacities)	Increased settling pond capacity identified as necessary to provide adequate settling. 3 stage passive treatment system identified as necessary to meet MWQSOGs in Minago River

	Pond B – 35 ha. For containment of run-off from the mine rock dumps, pit dewatering, and runoff from the eastern mine area Additional treatment determined necessary to meet MWQSOGs in Minago River at $7Q_{10}$ low flows and to manage runoff from material stockpiles Proposed 3-stage passive treatment system Discharges from all three ponds flow by gravity to the Minago R. via swales		and pumped south to Oakley Creek via a pipeline during the open water season. Overall, approximately 70% of discharged water directed north to the Minago R. and 30% directed south to Oakley Creek	

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
Sewage Treatment	No Change	No Change	All sewage and grey water generated on the mine site treated in an extended aeration treatment system. Treated outflow discharged to the TWRMF.	No Change
Discharge System to Oakley Creek	Same as 2014 NOA No discharge to Oakley Creek.	Change. No discharge to Oakley Creek.	Open water season – about 30% of excess water discharged to Oakley Creek. Winter – all excess water discharged to Minago R.	No discharges to Oakley Creek
Discharge System to Minago River	Polishing ponds discharge to two gravity-flow swales that merge to a single swale approximately 4 km north of the project site. TWRMF and Pond A discharge to west swale. Pond B discharges to east swale. Single swale reports to the Minago R. Open water season – pond discharge is by gravity overflow. Winter – discharge is by pumped overflow to the channels.	Polishing pond discharge pumped toward Minago R. via a pipeline.	Polishing pond discharge pumped toward Minago R. (100% in winter, 70% in open water season)	100% discharge to the Minago River

Project Component	Flying Nickel Plan	2014 NOA	2010 EIS	COMMENTS
Discharge Compliance Point	1 Compliance Point – at confluence of discharge swales	1 Compliance Point – at end of pipe discharge	2 Compliance Points – at end of each discharge pipe	Single Compliance Point improves environmental controls
Winter Discharges route to the Minago River (Nov. – April)	Pond effluent pumped to discharge swales and then gravity flow to Minago River	No Change	Effluent would be pumped to a channel near the Minago River and will naturally flow to the Minago River	
Spring and Summer Months Discharges to the Minago River (May – October)	Pond effluent gravity overflow to discharge swales and then gravity flow to Minago River	No Change	Effluent will be pumped to approximately 4 kilometres towards the Minago River and will be discharged into the muskegs and let to flow naturally to the Minago River	
Effect on Minago River Water Quality	The addition of water treatment will ensure that discharge does not cause MWQSOGs in Minago River to be exceeded and that Al and Fe concentrations, which exceed MWQSOGs at baseline, do not increase further	Effect was uncertain, particularly at low flows	Effect was uncertain, particularly at low flows	Improved effluent quality and assurance of Minago River water quality protection
Closure Considerations	No Change	Same as in the 2010 EAP		