GENERATIONPGM

Marathon Palladium Project

Human Health

MARCH 29, 2022

Agenda

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- Introduction
- Human Health
  - Original EIS
  - Effect Assessment Framework
  - Human Receptors
  - Screening of Water Quality, Air Quality and Country Foods
  - Results
  - Commitments
- Country Food
- Navigable Waters

Introduction

Introduction

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GenPGM Witness Panel:

- Drew Anwyll, GenPGM - Witness Panel Chair
- Jeremy Dart, GenPGM - Environmental & Permitting Lead
- Cathryn Moffett, GenPGM - Indigenous Consultation Lead
- Tabatha LeBlanc, GenPGM - Indigenous Consultation

Technical Witnesses:

- Brian Fraser, Ecometrix - Environmental Lead
- Dr. Don Hart, Ecometrix - Human Health
- Jon Pounder, Stantec – EIS Addendum

GenPGM Vision and Key Corporate Goals:

- Develop and **grow in a sustainable** manner
- Achieve **substantial benefits** for the region
- Operate **responsibly** and provide a **safe work environment**
- To be an industry leader in developing **mutually beneficial** and **respectful** relationships with Indigenous communities, groups and members
- Focusing on providing **critical minerals** for Canada and Ontario

Project Location

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- Located approximately 10 km north of the Town of Marathon and northwest of Biigtigong Nishnaabeg First Nation
- 300 km east of Thunder Bay
- The terrain is moderate to steep with frequent bedrock outcrops and predominant east-west oriented valleys
- Access to the Project site is by an access route called Camp 19 Road which extends north of Highway 17 and proceeds along southern portion of the site before turning north along the Pic River

Source: CIAR #224 Figure 1.4-6

Project Location: Local and Regional

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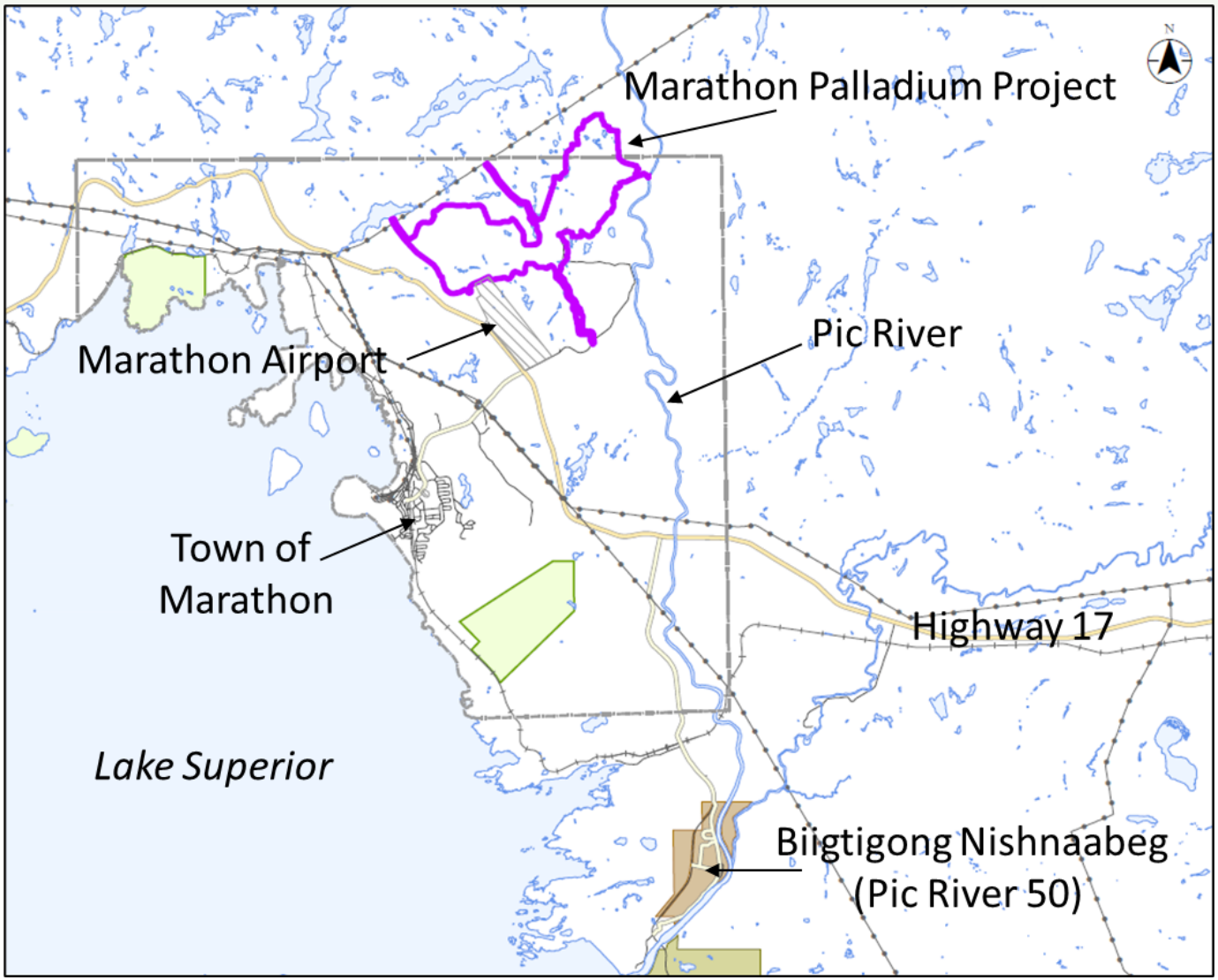

Adapted from: CIAR #727

General Site Layout

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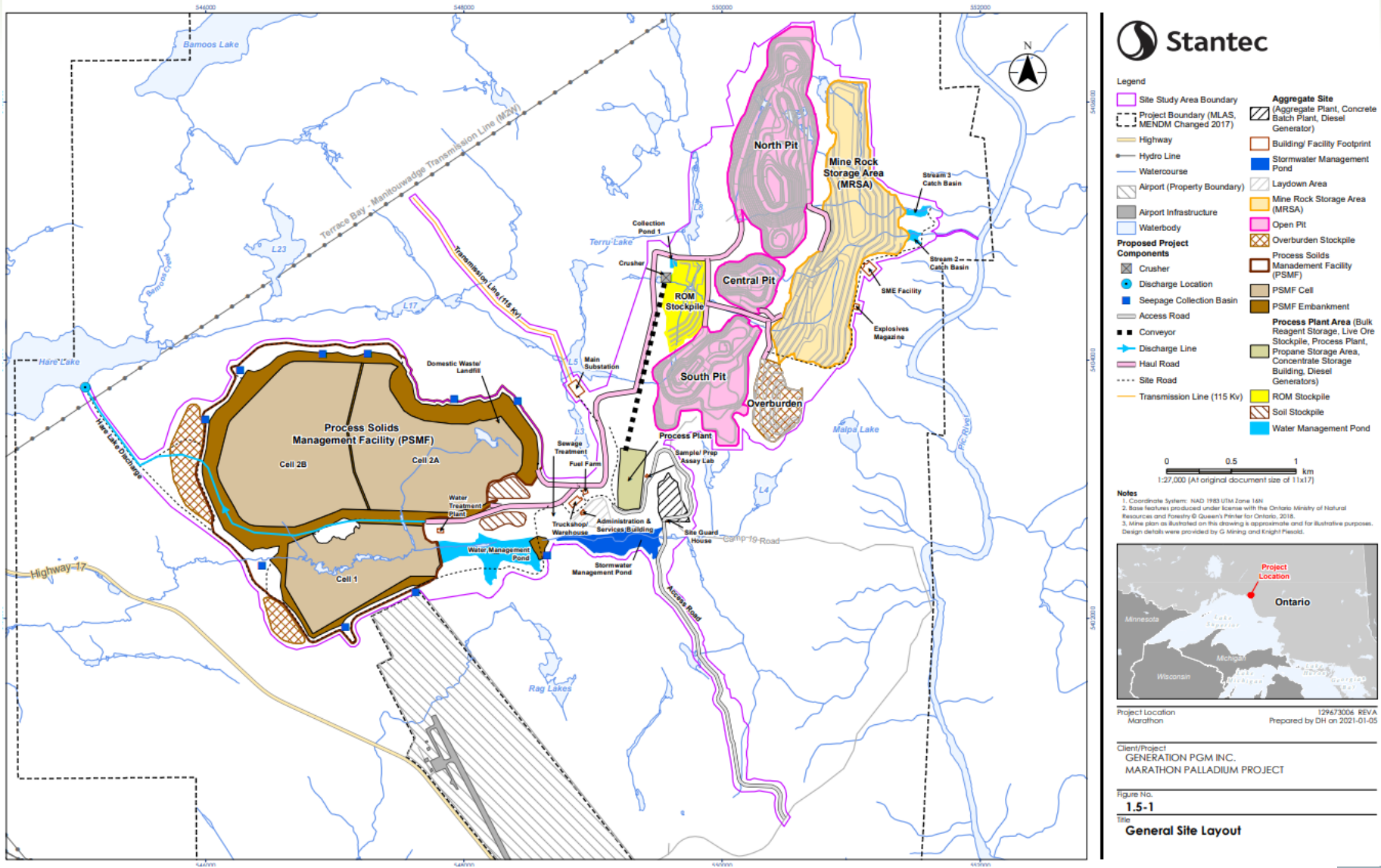

Source: CIAR #727 Figure 1.5-1

Environmental Impact Statement

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- Over ***15 years*** of consultation and engagement efforts and input from Indigenous communities, public and regulators
- ***Design details*** provided within EIS and EIS Addendum for robust effects assessment
- Updated technical studies demonstrate that the Project ***can comply*** with Federal and Provincial regulatory requirements
- GenPGM is committed to on-going dialogue and implementing proposed mitigation measures and commitments outlined in EA documentation
- With mitigation and environmental protection measures, the Project ***is not predicted*** to result in any significant adverse environmental effects or significant adverse cumulative effects
- Predicted effects and effectiveness of mitigation measures will be verified through follow-up programs and adaptive management process

Human Health

Human Health – Original EIS

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- Original EIS (2012) and responses to information requests concluded no significant adverse effect on human health would result from Project-related changes to:
  - air quality
  - water quality
  - country foods
  - noise
  - electromagnetic fields (EMFs)
- Key mitigation measures
  - reduce Project-related environmental effects (e.g., manage dust, treat water)
  - design mine footprint to avoid Bamoos Lake, including drainage from SSA
  - maintain access to Bamoos Lake
  - engage with Indigenous communities to inform closure planning and monitoring programs
  - offer training and employment opportunities for Indigenous peoples
- Conceptual plan for country food monitoring
- Human Health Effects Assessment updated in support of EIS Addendum

Source: CIAR #224 Section 6.2.9.5, CIAR #224 Section 5.9.5.2, CIAR #587 SIR10, CIAR #725 AIR16

Human Health – Effects Assessment

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Framework of Assessment (effect, pathway, indicators)		
Changes to human health	• Exposure via inhalation of constituents in air originating from Project air emissions • Exposure via ingestion of constituents in drinking water originating from Project water emissions • Exposure via ingestion of constituents in country foods originating from Project air and water emissions	• Exposure Ratio (ER) – The ratio of the estimated exposure to a non-carcinogen related to Project activities, and a relevant toxicity reference value • Incremental Lifetime Cancer Risk (ILCR) – The estimated incremental increase in lifetime cancer risk associated with exposure to a carcinogen related to Project activities
Change to country foods	• Air and water emissions from the Project may affect concentrations of constituents in country foods harvested by humans	• Changes in the concentrations of constituents in country foods that are directly related to Project activities and measured as a mass of a chemical per mass of tissue (e.g., mg/kg)

- Changes to air quality, water quality and noise covered in topic-specific presentations

CIAR #727 Table 6.2.10-2

Human Health Local Study Area

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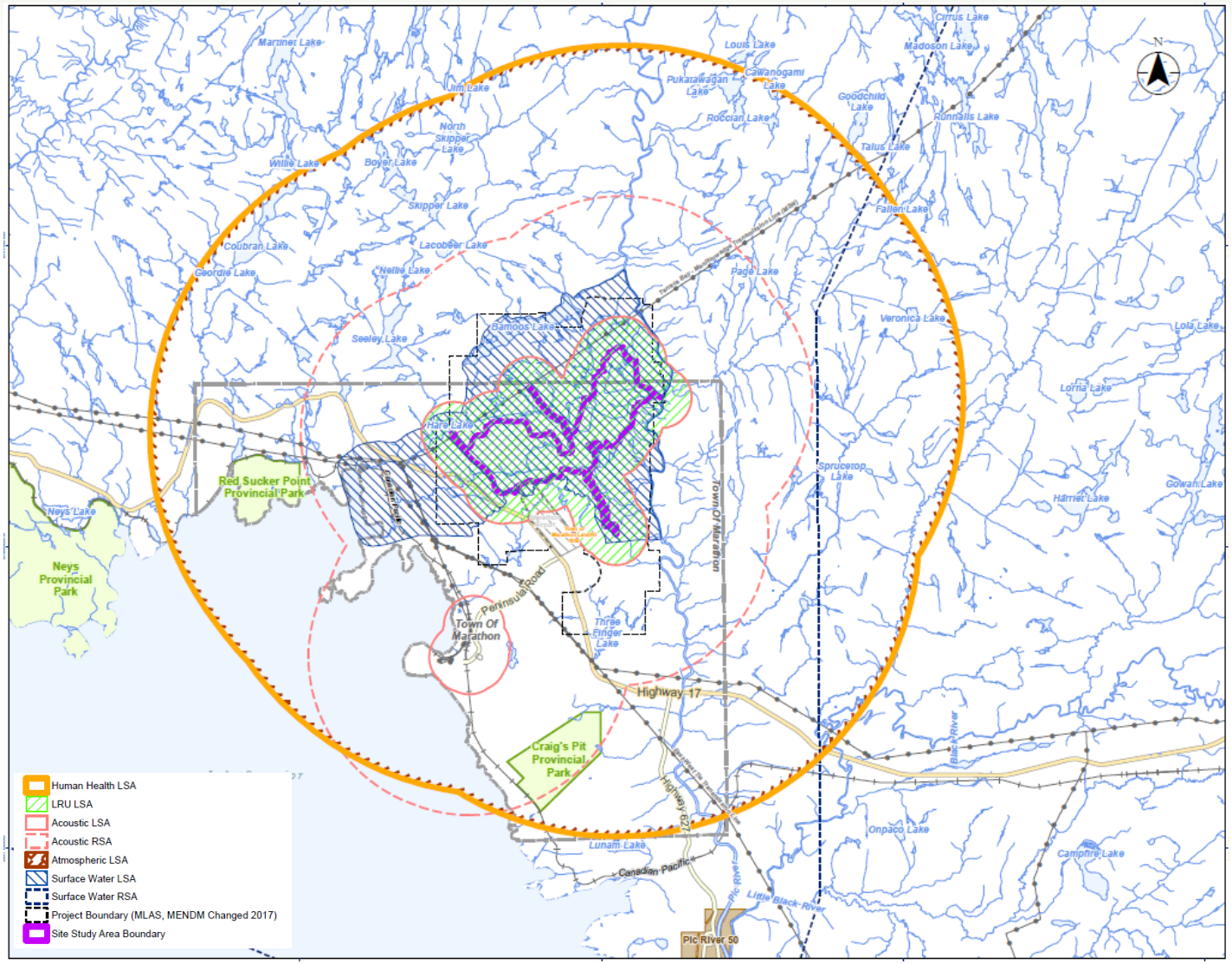

Source: CIAR #727 Modified from Figure 6.2.10-1

Access to Site and Surrounding Areas

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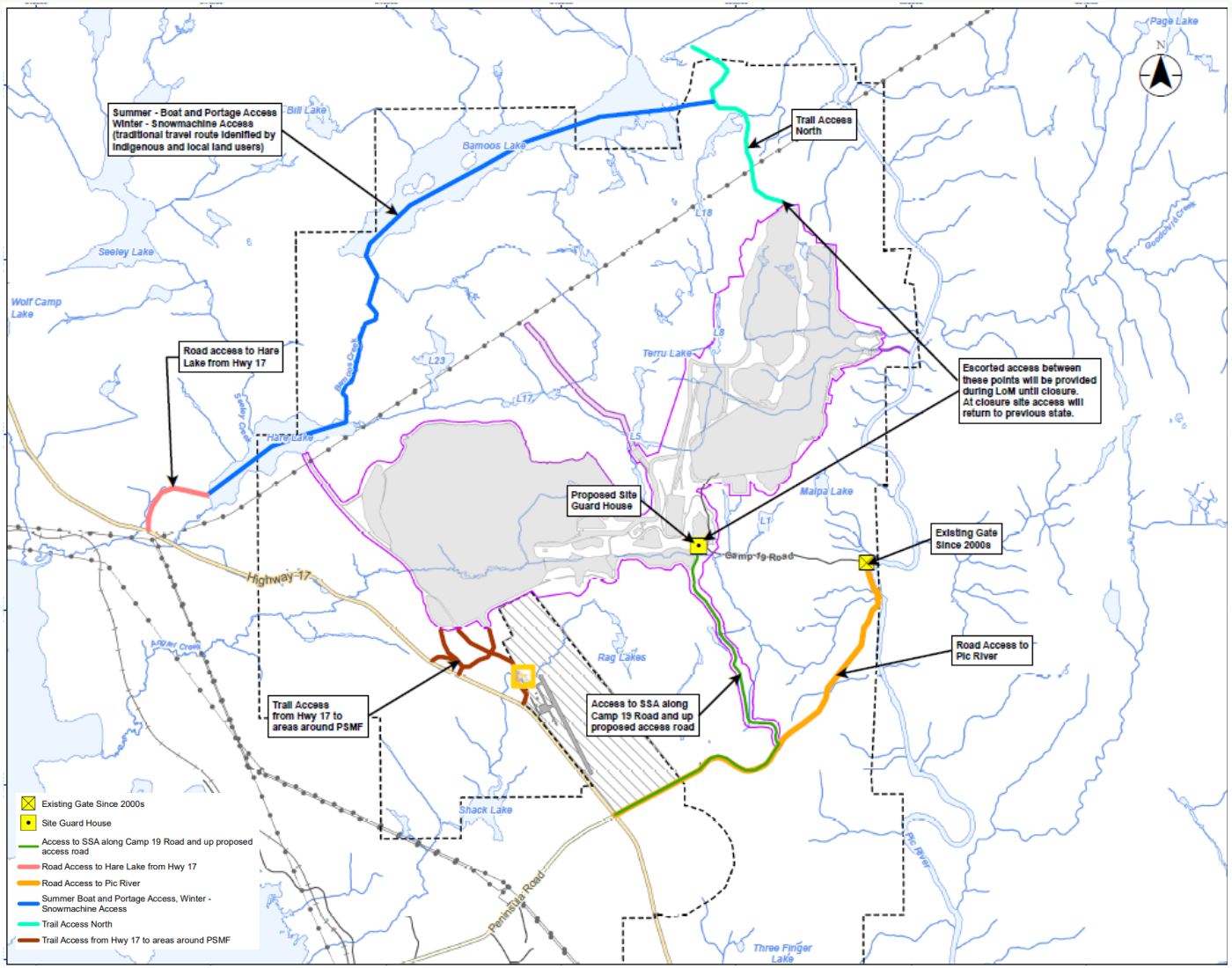

Source: CIAR #950 IR7-4 Figure 1

Human Receptors

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Human Receptors	Locations (Air Quality Model Receptor ID)	Assumptions
Subsistence Harvesters	Hare Lake (PS_1), Bamoos Lake (W_10), Biigtig Ziibii (Pic River, M_5)	• hunt, trap, fish, harvest timber and gather berries/plants in the vicinity of SSA • consume country foods harvested in the vicinity of SSA • consume surface water when harvesting • breathe outdoor air 8 hours/day, 8 weeks/year, 80 years • protective of recreational land users and country food consumers
Seasonal Residents	Hare Lake (PS_1)	• consume surface water, game, fish and plants from around Hare Lake • breathe outdoor air 4.8 hours/day, 8 weeks/year, 80 years
Permanent Residents	Town of Marathon (R_1 to R_22)	• reside in Town of Marathon • consume groundwater as drinking water • breathe outdoor air 3 hours/day, 52 weeks/year, 80 years

Source: CIAR #727 Appendix D10 Human Health Risk Assessment Updated

Air Quality Model Receptor Locations

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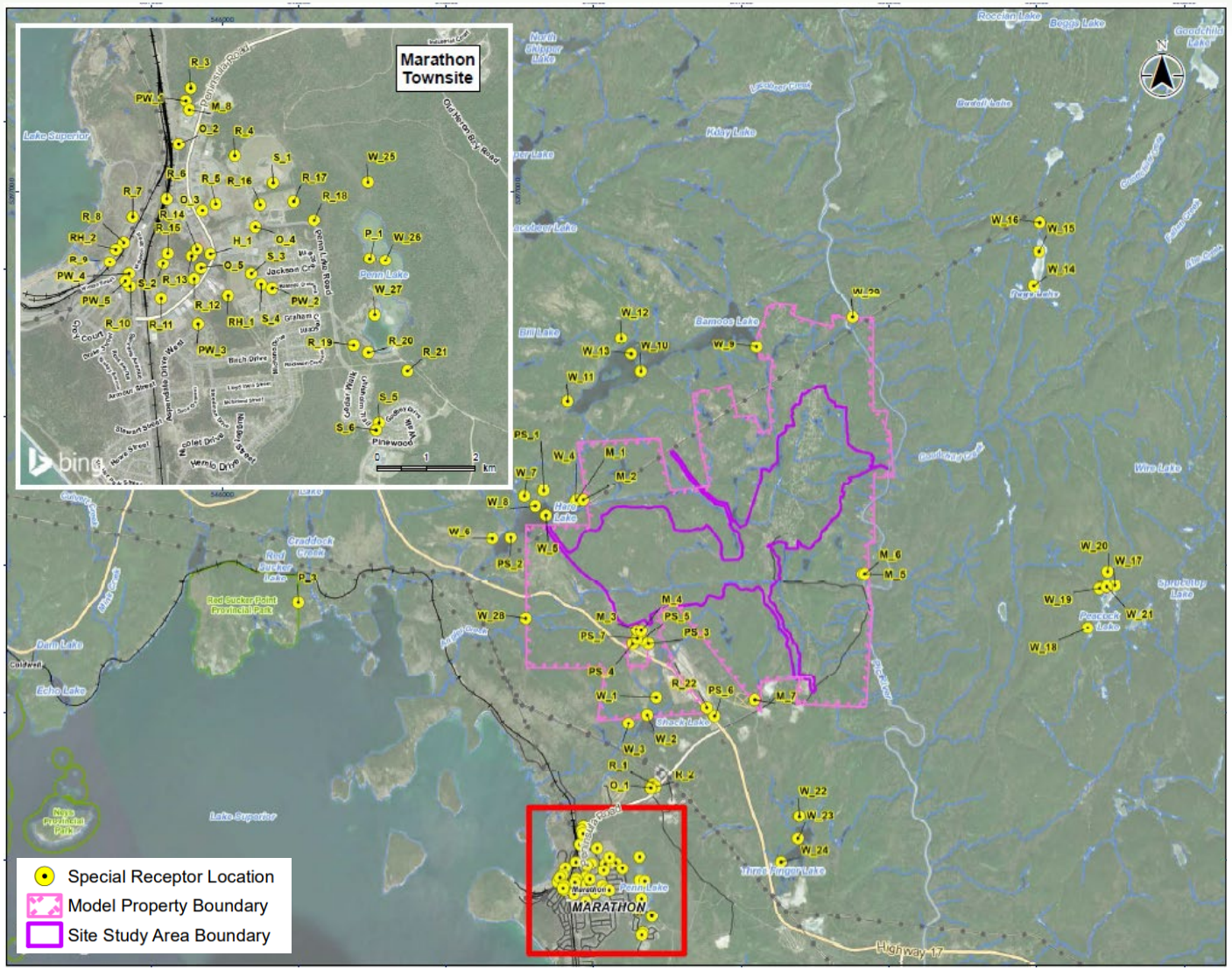

Source: CIAR #950 IR6-3 Figure 1-A

Human Health Conceptual Site Model

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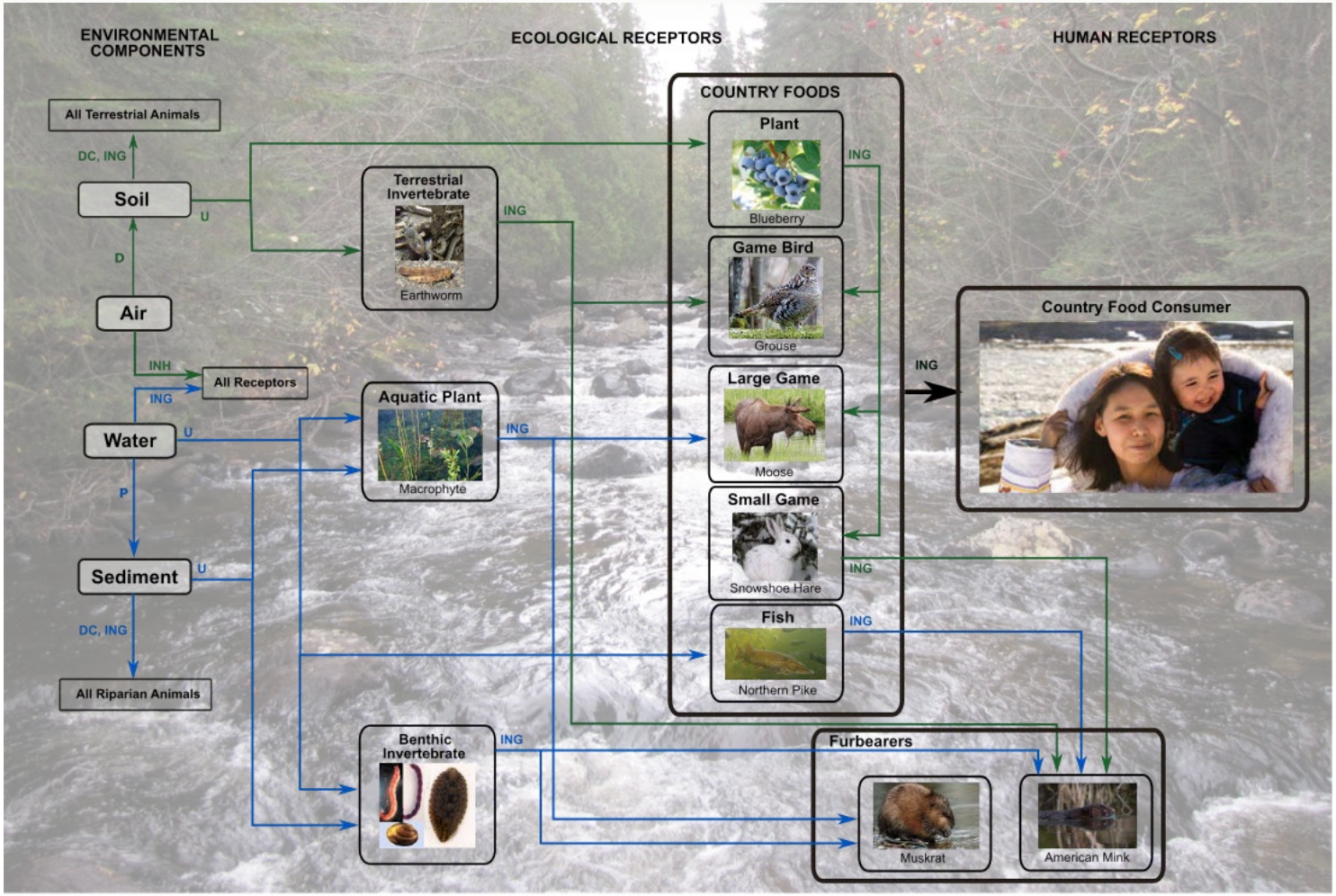

D: Deposition; **P**: Partition; **DC:** Direct Contact; **U:** Uptake; **ING:** Ingestion; **INH:** Inhalation

Ecometrix

Source: CIAR #727 Appendix D10 Human Health Risk Assessment Updated Figure 5-2

Water Quality Screening Assessment

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- Surface Water
  - Constituent concentrations in surface water are not predicted to increase above water quality guidelines during any phase of the Project
- Groundwater
  - Seepage from Project components into groundwater will travel over the span of decades to centuries
  - No hydraulic connection to drinking water supply wells
- No constituents carried forward for quantitative risk assessment

Source: CIAR #727 Section 6.2.10

Air Quality Screening Assessment

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- Primary Screening
  - Benzene, benzo(a)pyrene, crystalline silica, nickel, nitrogen dioxide and dustfall are predicted to increase above air quality criteria at or near the property boundary
  - Other constituent concentrations in air are not predicted to exceed air quality criteria
- Secondary Screening
  - Consider constituents predicted to exceed at residential or frequent use locations – residences, cottages, harvesting locations
  - Crystaline silica – rarely exceeds its “short-term” criterion, which is considered overly conservative – not carried forward
- Benzene and benzo(a)pyrene carried forward for quantitative risk assessment

Source: CIAR #727 Appendix D10 Human Health Risk Assessment Updated

Country Food Screening Assessment

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- Air
  - meeting air quality criteria is the basis of facility permitting in Ontario
  - air quality criteria considered protective of terrestrial pathways
  - benzene and benzo(a)pyrene
    - predicted to exceed air quality criteria
    - no bioaccumulation in food
    - weathering limits buildup from deposition on plants
- Water
  - meeting water quality guidelines is the basis of facility permitting in Ontario
  - water quality guidelines generally protective of aquatic pathways with a few exceptions
  - mercury and arsenic
    - potential to bioaccumulate
    - mercury not expected to be released in effluent
    - arsenic change in surface water and fish insufficient to reach level of concern
- Based on screening evaluation, no further quantitative assessment of country foods

Source: CIAR #950 IR6-33, CIAR #727 Section 6.2.10

Human Health - Results

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- Air
  - Risks from benzene, benzo(a)pyrene and other products of fuel combustion are well below the negligible risk level at residences, cottages and harvest locations
- Water
  - Constituents in surface water are not expected to increase above water quality guidelines
  - No connection from Project groundwater to water supply wells
- Country Foods
  - Environmental quality is not expected to differ substantially from background conditions at locations where country foods are likely to be harvested
- Overall, no discernable health effects from the Project

Source: CIAR #727 Appendix D10 Human Health Risk Assessment Updated

Human Health – Commitments

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Management Programs

- Mitigation measures specific to the atmospheric, aquatic, terrestrial and social environments:
  - Atmospheric quality management, including mitigation and management measures to reduce air and noise impact
  - Water management (surface and ground), including sediment and erosion control and stormwater management
  - Acid rock drainage and metal leaching management
  - Vegetation, wildlife and species at risk management
  - Socio-economic program
  - Occupational health and safety plan
  - Access management, including escorted access through the mine site

Source: CIAR #727 Section 7, CIAR #727 Section 8, CIAR #950 IR7-4

Human Health – Commitments

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Monitoring and Training Programs

- Engage with Indigenous peoples, interested parties and appropriate agencies to
  - Monitor air quality, effluent, surface water, groundwater and country foods
  - Monitor mercury in aquatic environment
  - Assess results with respect to human health
- Implement Harvester Training Fund to support annual harvests
- Offer education and training programs to build capacity and increase employability for Indigenous workers
- Monitor and record health and safety incidents, near misses and potential hazards

Source: CIAR #727 Section 7, CIAR #727 Section 8, CIAR #950 IR7-4, CIAR #950 IR5-12

Country Food

Country Food Monitoring Program Update

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Ongoing community engagement

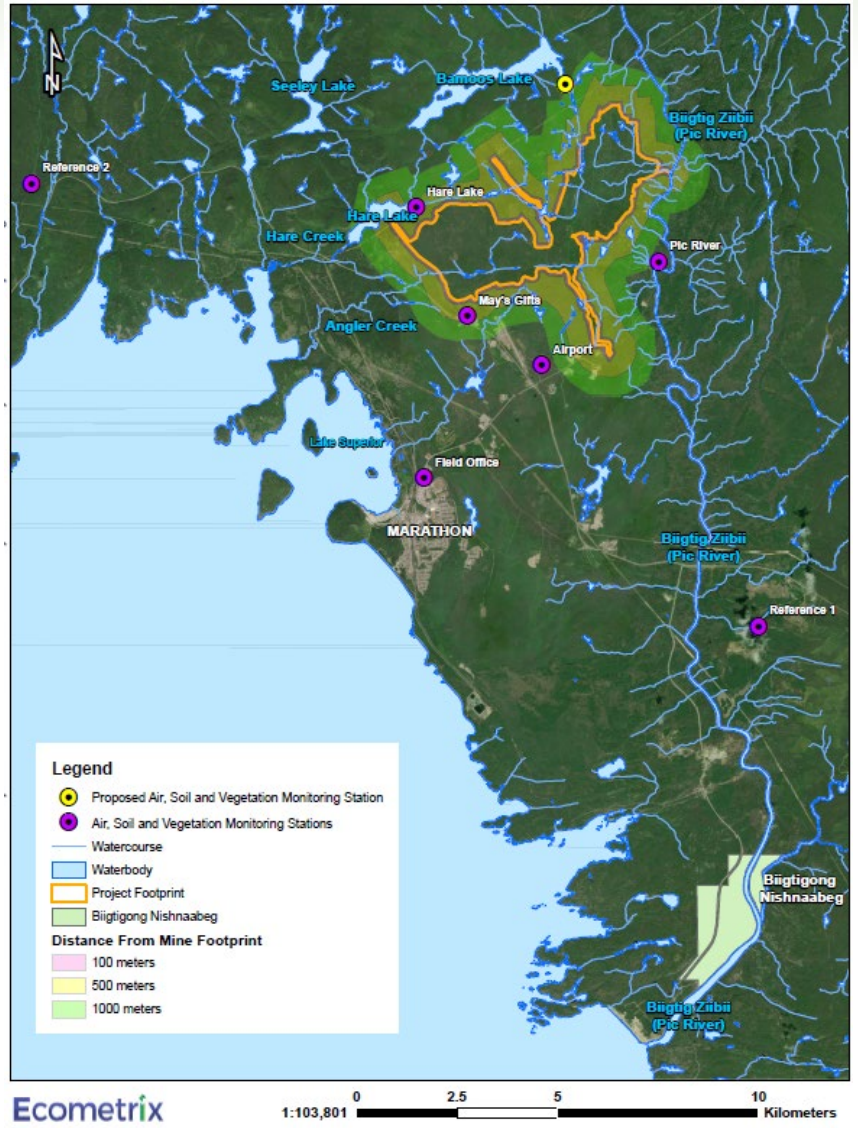
- Country food monitoring (vegetation, wildlife, fish)
- Country food diet survey

Vegetation samples collected in 2021

- Birch
- Blueberry
- Bunchberry
- Labrador tea
- Raspberry

Wildlife

- Engage local trapper (e.g., beaver along Camp 19 Road)



Source: CIAR #950 IR6-33

Biigtig Ziibii (Pic River) Fish Tissue Sampling Locations in 2021

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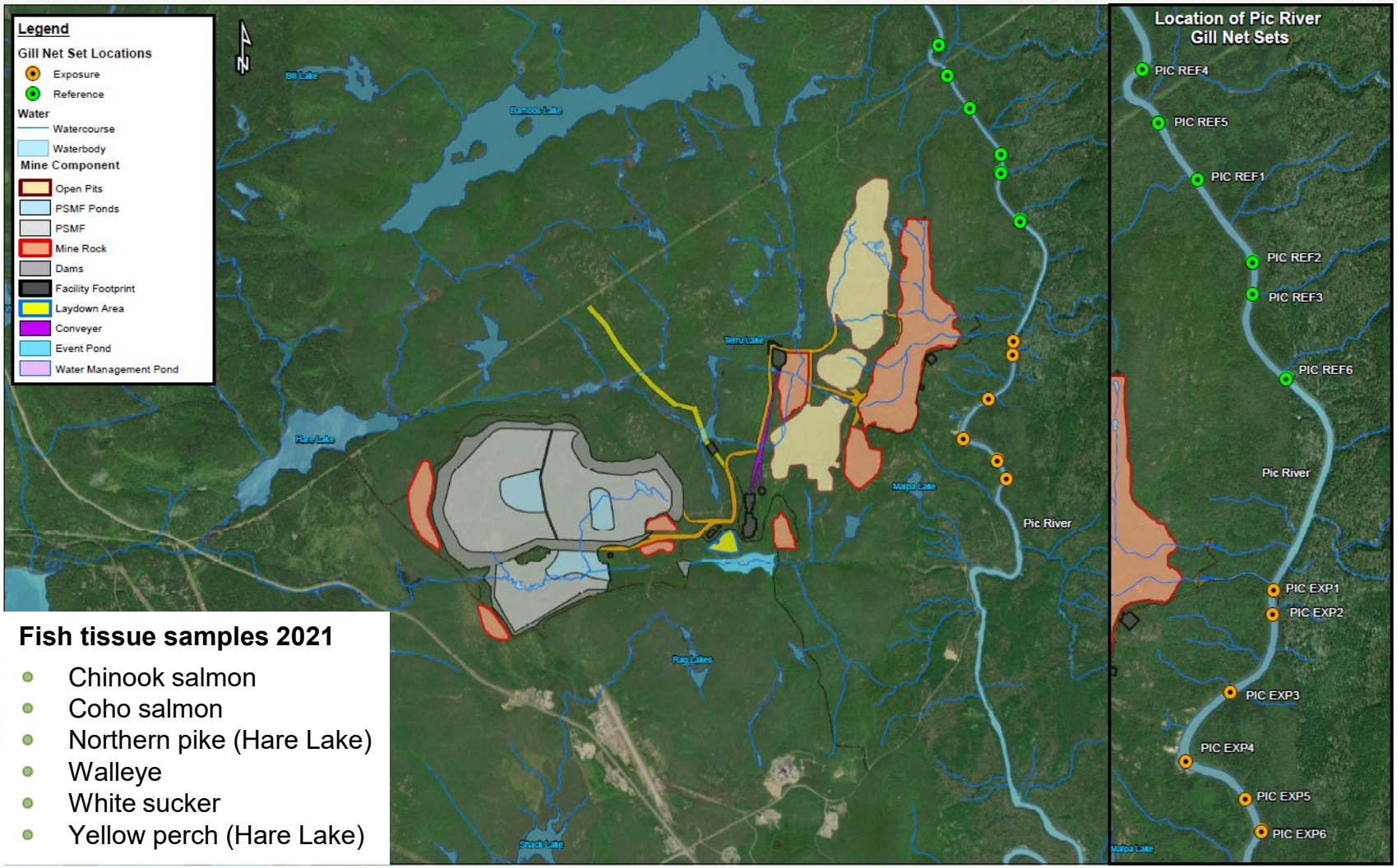

Fish tissue samples 2021

- Chinook salmon
- Coho salmon
- Northern pike (Hare Lake)
- Walleye
- White sucker
- Yellow perch (Hare Lake)

Ecometrix

Source: CIAR #950 IR6-33

Country Food Analyses

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- 187 plant, 187 soil, 49 fish muscle and 49 fish liver samples collected in 2021
- Submitted for analysis of chemicals of interest
  - Metals by ICP-MS (Inductively Coupled Plasma Mass Spectrometry)
  - Mercury by CVAAS (Cold Vapor Atomic Absorption Spectroscopy)
- Analytical results will be available in spring of 2022
- Results will be shared with Indigenous groups through established environmental committees

Human Health - Summary

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- With mitigation and environmental protection measures, environmental exposures from Project-related changes are predicted to be less than benchmarks protective of human health
- Monitoring of environmental media, including air, water, soil and country foods, will verify assessment conclusions
- Ongoing engagement with Indigenous communities on environmental monitoring programs and results
- Consistent with original EIS and responses to information requests, Project-related changes in air quality, water quality, country foods, noise and EMFs are not expected to have significant adverse effects on human health

Source: CIAR #727 Appendix D10 Human Health Risk Assessment Updated

Navigable Waters

Navigable Waters

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- Project reviewed against the requirements of the *Navigable Waters Protection Act* and *Canadian Navigable Waters Act* (2019)
- Navigable water is defined as a body of water that is
  - *used (or where there is a reasonable likelihood that it will be used) by vessels*
  - *in full or in part, for any part of the year as a means of transport or travel for:*
    - *commercial or recreational purposes, or*
    - *as a means of transport or travel for Indigenous peoples*
  - *there is public access, by land or by water or there is no such public access but there are two or more riparian owners or where the only riparian owner is Canada or a province*

Source: CIAR #722 Cultural Heritage Updated Baseline Report

Navigable Waters

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- Project will potentially affect water courses and water bodies
  - 13 numbered waterbodies (i.e., small ponds and lakes) and a number of other smaller ponds with a combined surface area of 10.6 hectares
  - Small on-site connecting channels, ponds and lakes are interpreted at this time as not being navigable as they do not likely meet the navigable water definition
- Dialogue with Transport Canada to incorporate input from communities and their use of waterways within the vicinity of the SSA is ongoing with respect to potential future use

Source: CIAR #722 Cultural Heritage Updated Baseline Report

More information on the Project can be found at:

www.genmining.com

If you have additional questions,
Please email us at comments@genpgm.com