



Mining Readiness Strategy

A guiding framework for the City of Thunder Bay to support the growing Northwestern Ontario mining sector

FINAL DRAFT

Prepared by MNP LLP for The Corporation of the City of Thunder Bay and Thunder Bay Community Economic Development Commission (CEDC)

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Executive Summary

Northwestern Ontario is positioned to capitalize on a significant regional economic development opportunity over the coming years due to the current 6 operating mines (gold and palladium) and 15 major exploration projects (gold, palladium, lithium, graphite and nickel-copper-PGE) in the region.

The City of Thunder Bay and the Community Economic Development Commission (CEDC) engaged MNP to develop a Mining Readiness Strategy focused on business development in mining supply and services, workforce training and development, transportation and electrical infrastructure, economic impacts, research and development, and gaps and barriers to mine development.

What we heard from Stakeholders

MNP developed the strategy through mining industry stakeholder interviews with 18 exploration and mining companies and 25 associations (representing a 93 percent participation rate), and documentation review of public reports to compile valuable mining sector information and develop recommendations for the CEDC's strategic priorities.

Mining Supply and Service Businesses: The mining operations companies (representing the buyer) recommended a focus on quicker customer service times due to mine proximity, general mine support businesses, training centers, structural mining materials, delivery services and chemical processing.

Proximity to Mines

- Local distribution centers.
 - Transportation and logistics services (e.g. trucking).
- Equipment and parts service centers.
- General mine support services (e.g. security, transportation, cleaning, catering, health, etc.).
- Ground support materials (e.g. shotcrete).

Workforce Training

- Skilled trades training centers.
- Mining skills training centers.
- Life skills and career development services.

Critical Minerals

- Chemical processing plants for critical mineral processing (e.g. lithium, graphene).

Available Land

- Promote available commercial and industrial land available in the city.

Employment in the Mining Sector: Operations jobs estimated to peak around 2026 and construction jobs estimated to peak around 2023, if no interruptions occur to the major exploration projects.

3,600+

**Mine Operations
Jobs in 2020**

Estimated for the 6
operating mines in
Northwestern Ontario.

100%

**Increase in Mine
Operations Jobs**

Estimated to peak at
7,400+ total positions.

2,000+

**Peak Construction
Jobs in 2023**

Estimated for the 15 major
exploration sites in
Northwestern Ontario.

7,000+

**Peak Mining Jobs
between 2023-2028**

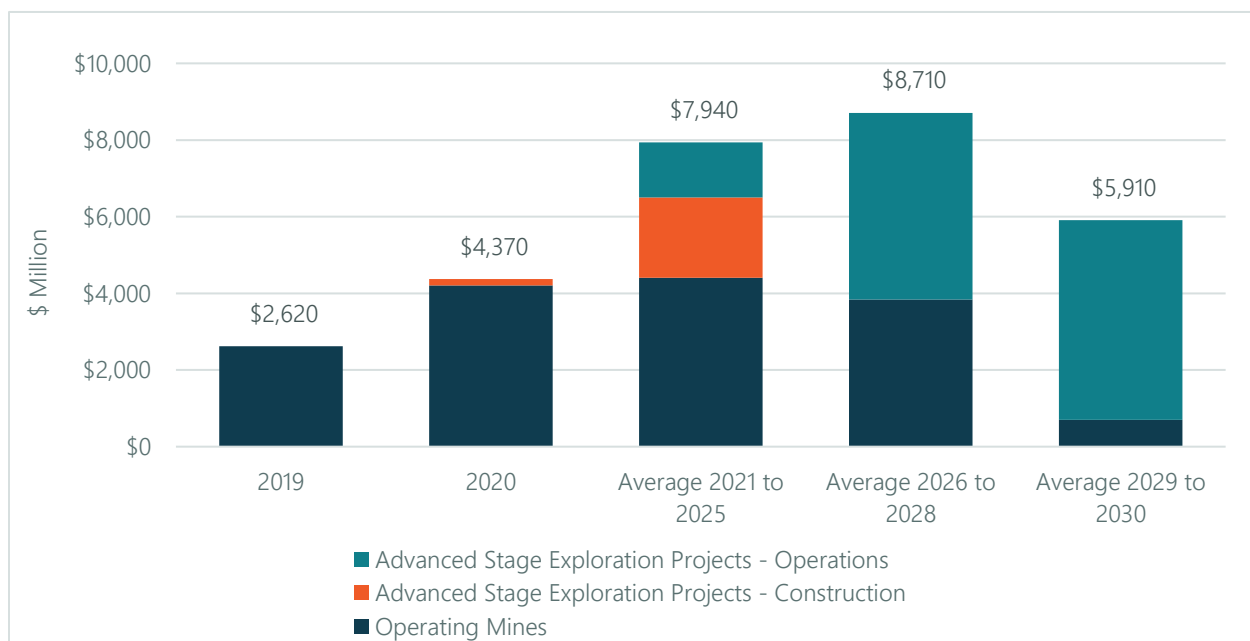
Estimated jobs required for
construction and operation
of new and existing mines.

Transportation and Electrical Infrastructure: Construction requirements for exploration sites was found to be primarily minimal or moderate for both access road construction and electricity transmission connection due to advantageous locations close to highways and transmission lines.

Electricity Demand: Estimated to grow by 180 percent by 2026, from 195 MW to 550 MW. The regions experiencing the highest rate of growth include Marathon-Greenstone (116 MW) and Red Lake (84 MW).



Economic Impacts: During the peak period between 2026 to 2028, direct economic output is estimated to be \$5.22B and total economic output (direct, indirect and induced) to be \$8.71B.



Strategic Readiness Actions Summary

MNP has developed seven primary strategic recommendations which are actionable and achievable for the CEDC to support the near term ramping up of mining activities:

1. The CEDC should act quickly to implement the strategic recommendations with completion targets by the end of 2021.
2. Leverage technology and digital media by enhancing the CEDC Mining website, allowing ease of access to contemporary information and facilitate the exchange of information and data.
3. Develop or expand on the CEDC mining readiness Marketing and Communications plan to ensure the Thunder Bay is widely known as the node for facilitation, collaboration, training and information of mining related services.
4. Advanced facilitation and knowledge transfer about the regional Mining Supply and Services offerings, making prospective clients and companies aware of who's in the region and able to support the growing mining industry.
5. Promote Thunder Bay as the Workforce Training and Development hub for mining sector and inform the education and training associations of what types of jobs are needed in the future.
6. Improve the regional mining industry stakeholders' awareness (e.g. electricity planning and infrastructure organizations, exploration and mining companies, and provincial and federal government) of the Transportation and Electrical Infrastructure needs and planned or in-progress projects.
7. Evaluate strategic incentives and municipal infrastructure priorities which incentivize Business and Economic Development for the Mining Sector.

1.0 Introduction

1.1 Background and Purpose

Northwestern Ontario (NWO), including the City of Thunder Bay, is positioned to capitalize on a major regional economic development opportunity over the next few years related to mineral exploration and mine production led primarily by gold and palladium, and supplementary metals nickel, copper, platinum, graphite, chromite, iron and lithium. Northwestern Ontario currently has 6 existing operating mines and 15 major exploration projects that are poised to become producing mines over the next decade, providing the foundation for a strong and emerging mineral sector.

As a result, industrial development opportunities are expected to grow and diversify the economy of the region and contribute to economic and social development in the local and Indigenous communities.

1.2 Scope

To build a strategic plan for the various mining activities in Northwestern Ontario, The City of Thunder Bay and the Community Economic Development Commission (CEDC) engaged MNP LLP (MNP), and their regional engineering and mining sector advisory partners TBT Engineering, to develop a Mining Readiness Strategy focused on regional developments over the next ten years (2020 to 2030). The report focuses primarily on:

- Business Development in Supply and Services: Maximizing exploration and mining service and supply opportunities for Thunder Bay, including connecting directly with the 6 mines and 15 exploration managers, identifying indirect and induced businesses and gaps in the supply chain.
- Workforce Training and Development: Develop an understanding of positions required by mines now and in the future, assess existing college, university and trade programs and how to address any gaps.
- Transportation and Electrical Infrastructure: Identify road, port and airport access and electricity requirements and constraints for the 15 exploration sites.
- Economic Impact of New and Existing Mine Developments for Thunder Bay: Estimate the contribution to Thunder Bay's economy by the 6 producing mines and 15 exploration projects.
- Research and Development: Identify potential technology advances and partnerships with local education and research centers.
- Identifying Gaps and Barriers to Exploration and Mine Development in Northwestern Ontario.

The report will conclude with strategic recommendations that the CEDC can implement to support the exploration and mining sector in the City of Thunder Bay and Northwestern Ontario.

1.3 Report Structure

The report is organized as follows:

- Section 2 – Describes the approach and methodology used to develop the mining readiness strategy.
- Section 3 – Describes the current state of the exploration and mining industry in Ontario and Northwestern Ontario.
- Section 4 – Summarizes the major themes and responses from stakeholder interviews.
- Section 5 – Describes the mining supply and service businesses that are best suited to be in Thunder Bay.
- Section 6 – Provides an analysis of current and future workforce requirements at the mine sites.
- Section 7 – Summarizes the transportation and electricity infrastructure requirements for the existing and future mining operations.
- Section 8 – Economic impact estimates of the 6 operating mines and 15 exploration projects.
- Section 9 – Provides the strategic recommendations to be implemented as part of the Mining Readiness Strategy.
- Appendices A through J – Provide supporting information referenced in the main body of the report.

1.4 Qualifications

The findings presented in this study are subject to the following qualifications:

- Strategic recommendations are developed by MNP as a third-party independent consultant to align with the CEDC's mandate as understood by MNP.
- Recommendations are based on CEDC information submitted to MNP and stakeholder feedback received during the interview process.
- Majority of the exploration sites reviewed in the report are in advanced stages having completed technical and feasibility reports and have a high level of confidence in proceeding to an operating mine soon.
- Not all required data was available by the stakeholders or made public.
- MNP received feedback from 93 percent of the CEDC identified mining industry stakeholders.
- No in person or on-site consultation was complete due to COVID-19 restrictions.
- The economic impact estimates were developed using input-output models. Input-output models are static models based on the flow of goods and services at a point in time. Over time those relationships may change due to changes in technology and productivity.
- Projections are based on past events giving an expectation of certain future events. Future events are not guaranteed to follow past patterns and results may vary, even significantly. Accordingly, we express no assurance as to whether the projections underlying the economic impact analysis will be achieved.

2.0 Approach and Methodology

The mining readiness strategy was developed by MNP through the approach outlined in Figure 1.

Figure 1: Mining Readiness Strategy Approach



2.1 Data Sources

MNP utilized a combination of primary and secondary sources to gather data and information for the mining readiness strategy.

Primary Research

MNP conducted interviews with Northwestern Ontario exploration and mining related stakeholders to gather information on the main topics of the study, including:

- Business development in the supply and services sector.
- Workforce training and development.
- Transportation and electrical infrastructure.
- Economic impact of new and existing mine development for Thunder Bay.
- Research and development.
- Gaps and barriers to exploration and mining in Northwestern Ontario.

MNP completed 43 total interviews, including:

- 12 interviews with exploration companies and 6 interviews with active mining companies.
- 25 interviews with various associations (educators, labour unions, employment services, mining and prospecting associations, infrastructure representatives, and indigenous communities).

Secondary Research

MNP conducted a review of relevant publicly available documents including annual financial reports of public exploration and mining companies, data from government bodies (e.g. Natural Resources Canada, Ontario government documentation, Statistics Canada, etc.) and information from previously completed employment, economic development and electrical infrastructure publications provided by the CEDC.

3.0 Regional Mining Overview

Ontario is currently the largest producer in Canada of gold, platinum group metals (platinum, palladium, rhodium, ruthenium, osmium and iridium) and nickel, and the second largest producer of copper.¹ The value of mineral production in Ontario has consistently exceeded \$10 billion since 2014, and reached a value of \$10.7 billion in 2019.²

Ontario is often one of the leading jurisdictions for exploration expenditures, alongside Quebec and British Columbia, with spending in the province over the last three years between \$517 to \$585 million.³

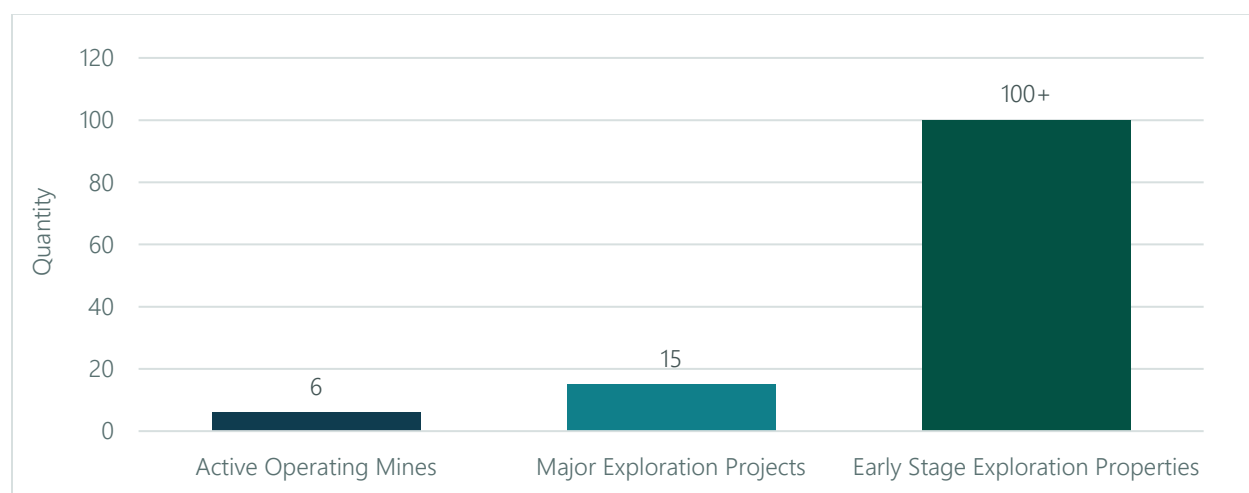
It is estimated that the mining industry creates 26,000 direct jobs and approximately 46,000 indirect jobs in mineral processing and mining supply and services in Ontario. The mining industry is also the largest private sector employer of Indigenous Canadians, accounting for 6 percent of the total mining labour force and 11 percent of direct mining jobs in Ontario.¹

In 2020, Ontario had 40 operating mine sites, including 20 gold mines, 9 base metal mines (e.g. copper, zinc), an iron mine and a platinum group metal mine. The mines are primarily located in Timmins, Sudbury and Northwestern Ontario.

3.1 Exploration and Mining in Northwestern Ontario

Northwestern Ontario currently hosts 6 of the 40 operating mines in the province and is poised for growth with 15 major exploration sites in the region. In addition, there are over a hundred early stage exploration properties in Northwestern Ontario, actively being explored (not considered in this study), some of which in time may mature to major exploration or operating mine status (Figure 2).

Figure 2: Number of Operating Mines, Major Exploration and Early Stage Exploration Projects in Northwestern Ontario



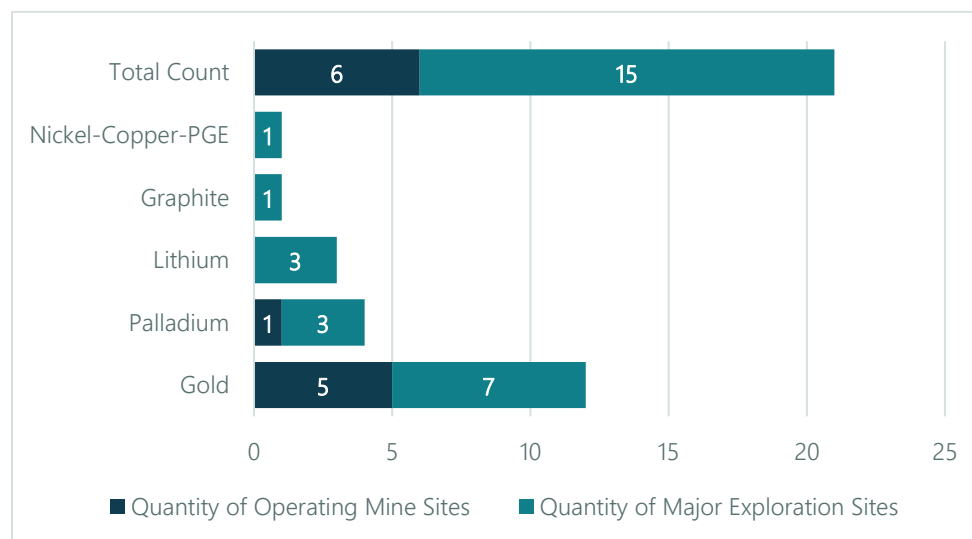
¹ https://www.oma.on.ca/en/ontariominning/facts_figures.asp

² <https://www.nrcan.gc.ca/our-natural-resources/minerals-mining/minerals-and-economy/20529>

³ <https://www.nrcan.gc.ca/science-data/science-research/earth-sciences/earth-sciences-resources/earth-sciences-federal-programs/canadian-mineral-exploration-information-bulletin/17762>

The metals found in the region primarily include gold, palladium, lithium, graphite and nickel-copper-platinum group elements (PGE), with gold currently being the major focus for active mines and major exploration sites (Figure 3).

Figure 3: Distribution of metals by major exploration sites and active mines in Northwestern Ontario (2020)



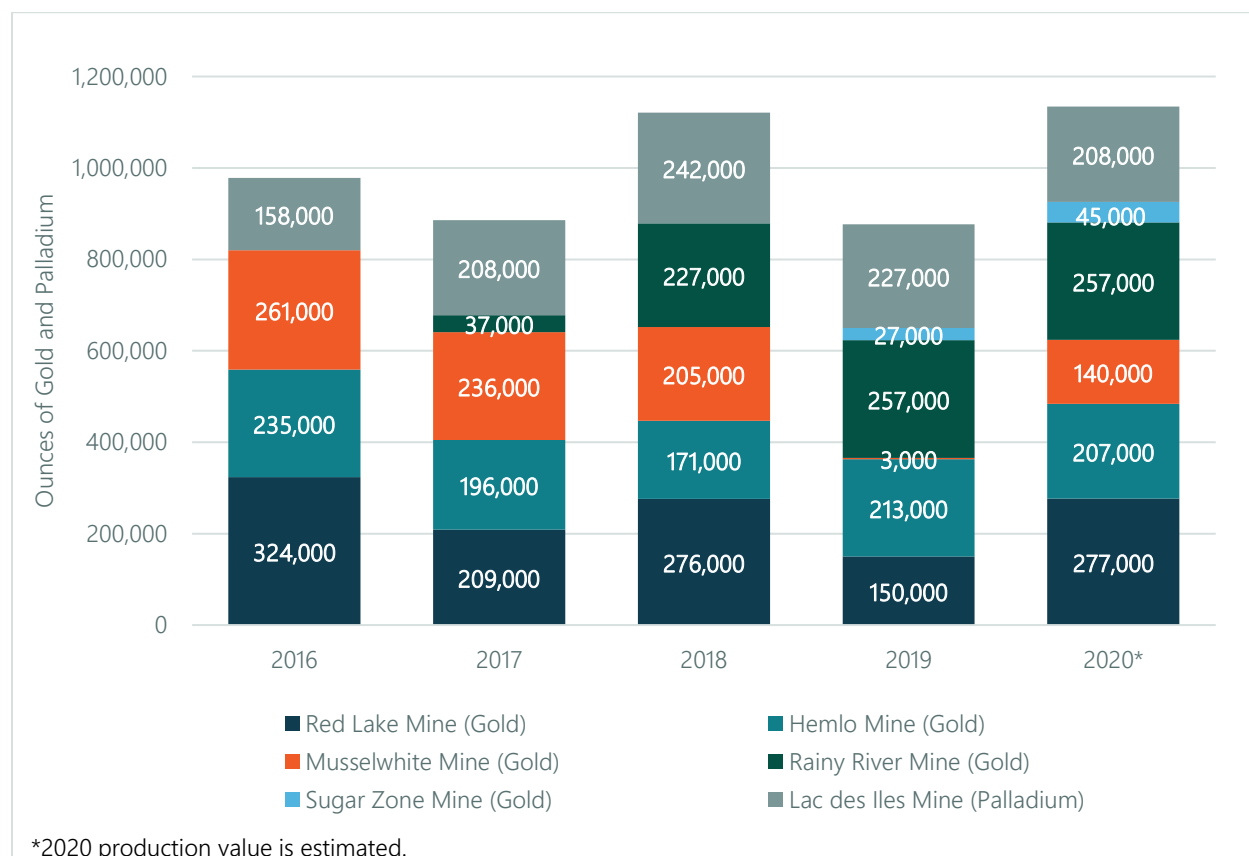
The operating mines in the region include four mines that began operations over 20 years ago, and 2 relatively new gold mines, outlined in Table 1.

Table 1: Operating Mines in Northwestern Ontario

Company	Site Name	Start Year	Projected End Year	Metal Deposit
Evolution Mining	Red Lake Mine	1949	2033	Gold
Barrick	Hemlo Mine	1985	2028	Gold
Impala Canada	Lac des Iles (LDI) Mine	1993	2027	Palladium
Newmont	Musselwhite Mine	1997	2028	Gold
New Gold	Rainy River Mine	2017	2028	Gold
Harte Gold	Sugar Zone Mine	2019	2032	Gold

Production of the 20-year old mines has been steady over the past five years (excluding the Musselwhite mine that experienced a conveyor fire in 2019) and the newer mines have been steadily ramping up production (Figure 4).

Figure 4: Historic Northwestern Ontario Operating Mine Production (Gold and Palladium)



Source: [Ontario Mining & Exploration directory and resource guide 2020](#) and various company financial reports

The location of the major exploration and operating mine sites is provided in Figure 5.

Figure 5: Northwestern Ontario Major Exploration and Mining Sites



3.2 Regional Infrastructure Projects

Various transportation and electrical infrastructure projects are currently in planning or construction phase in Northwestern Ontario that are intended to support the local towns, remote and Indigenous communities and the mining industry.

East-West Tie Electricity Transmission Project

The East-West Tie transmission project is a new 450 km long, double circuit, 230 kV line being installed between Wawa and Thunder Bay with a connection midway in Marathon (Figure 6). The project, valued at \$777 million, began in late 2019 and is expected to be complete by end of 2021. The new transmission line is intended to ensure long-term reliability of electricity in Northwestern Ontario, including the mining sector which is expected to drive electricity demand growth over the next decade.⁴

Figure 6: East-West Tie Transmission Line⁵



Wataynikaneyap Electricity Transmission Project

There are currently 32 remote communities, of which 25 are recognized First Nations communities, in the northern area of Northwestern Ontario that are not connected to the provincial transmission grid. The communities are powered by diesel generation that feeds into local distribution grids. The costs to use diesel power can be over three times more than the provincial grid due to the cost of fuel and transportation costs, as often the fuel can only be shipped in via winter ice roads or flown in. The 25 First Nations communities currently has an approximate population of 15,000 people (and growing) and a peak electricity demand of 20 MW.⁶

⁴ <https://www.nextbridge.ca/regulatory-approvals>

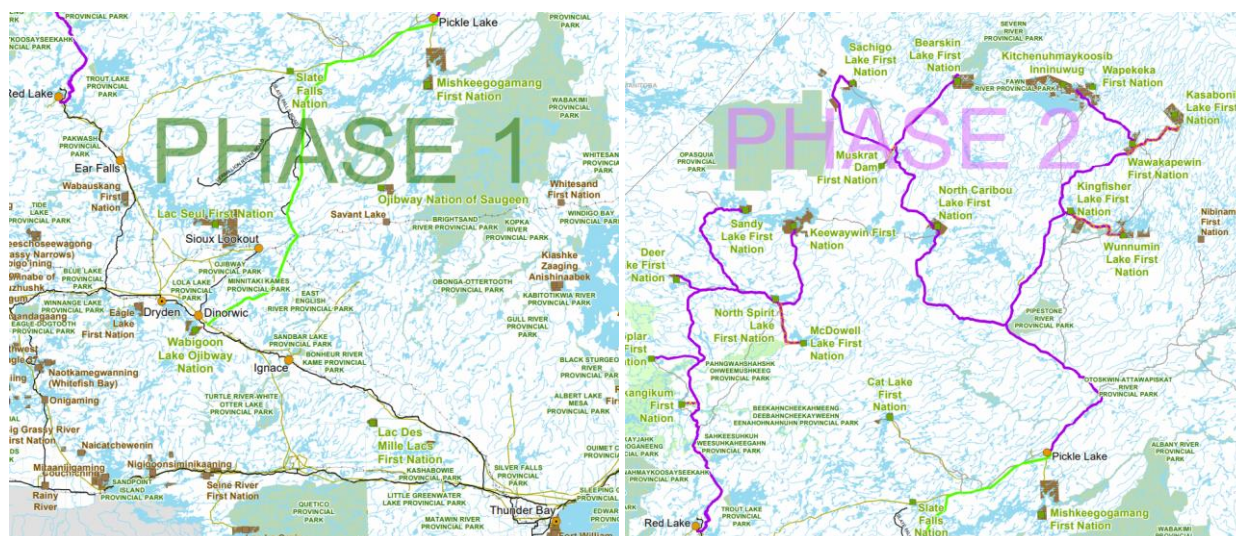
⁵ <https://www.nextbridge.ca/home>

⁶ <https://www.wataypower.ca/project/background>

The new 1,800 km long Wataynikaneyap transmission line will be bringing grid connection to 17 remote communities in Northwestern Ontario (Figure 7) and includes two major construction phases:

- Phase 1: A 300 m long 230 kV line replacing the existing 70-year-old 115 kV E1C line. Potential construction completion in late 2020.⁷
- Phase 2: A brand new 1,600 km transmission line with a mix of 115 kV, 44 kV and 25 kV service. To be completed by 2023, with remote community connections expected in 2021.⁸

Figure 7: Wataynikaneyap Transmission Line, Phase 1 and 2⁹



Waasigan Transmission Line Project

The Waasigan Transmission Line is a proposed new double-circuit 230 kilovolt (kV) transmission line between Lakehead Transformer Station (TS) in the Municipality of Shuniah and Mackenzie TS in the Town of Atikokan, and a new single-circuit 230 kV transmission line between Mackenzie TS and Dryden TS in the City of Dryden (Figure 8).

The project is currently undergoing public and stakeholder consultation for the environmental assessment, which is slated to be complete by 2024 prior to any construction beginning.¹⁰

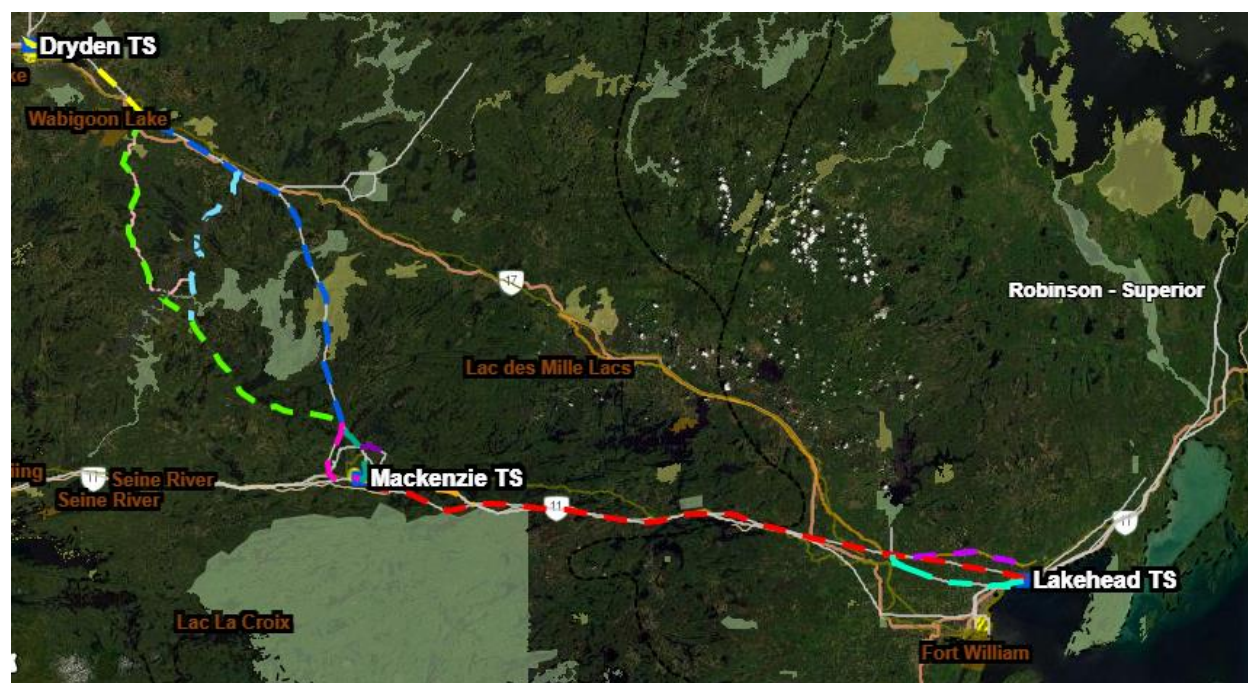
⁷ <https://www.wataypower.ca/project/phase-1>

⁸ <https://www.wataypower.ca/project/phase-2>

⁹ <https://www.wataypower.ca/documents>

¹⁰ <https://www.hydroone.com/about/corporate-information/major-projects/waasigan>

Figure 8: Waasigan Transmission Line Project



Source: <https://maps-dillon.maps.arcgis.com/apps/webappviewer/index.html?id=43ac330673e34705be1b8da570e4420e>

Ring of Fire Road Construction

The Ring of Fire is known to be one of the most promising mineral deposits in Ontario, located approximately 500 km northeast of Thunder Bay and covering about 5,000 km² of area. Current estimates suggest a multi-generational potential of chromite production, along with significant production of nickel, copper and platinum.¹¹

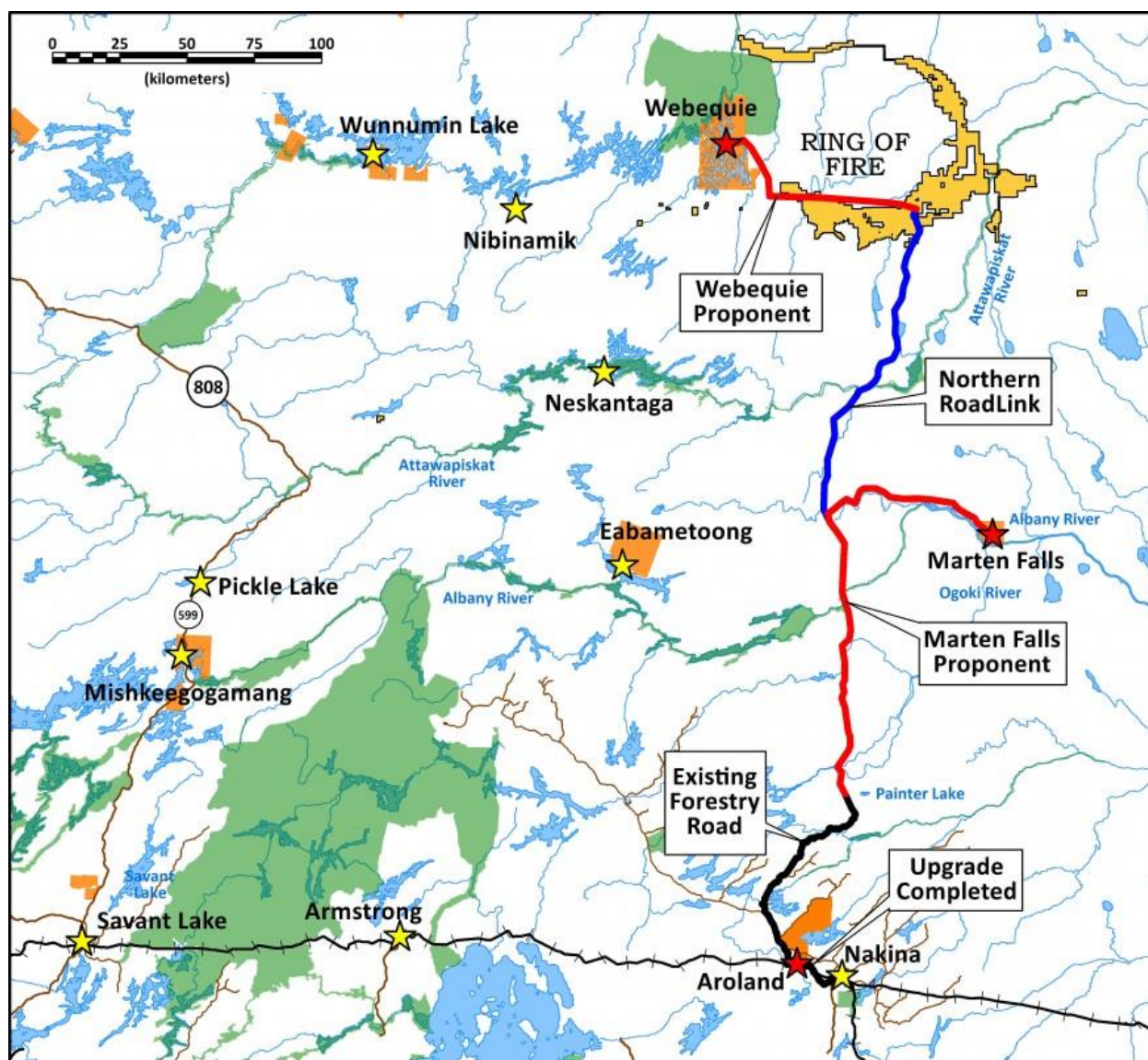
Due to the location of the Ring of Fire in the far north, availability of all-season roads present challenges in accessing the mineral deposit, adding costs to developing a mine in the region, or present a barrier to mining altogether. Road development conversations between government and Indigenous communities have been an ongoing initiative, and in March 2020, it was announced the government would be moving forward on advanced planning of an all-season north-south road to provide access to potential mine sites and connect First Nation communities to Ontario's highway network.¹²

More recently, Provincial Environmental Assessment, Federal Impact Assessment, and engineering design work is underway on three sections of the overall road right-of-way (North-Webequie Supply Road, South-Marten Falls First Nation Community Access Road, and Central-the Northern Road Link). The initiative is indigenous led, by Webequie and Marten Falls First Nations, and once constructed will provide a community access road system and access to the Ring of Fire from south to north (Figure 9).

¹¹ <https://www.mndm.gov.on.ca/en/ring-fire>

¹² <https://news.ontario.ca/en/release/56039/moving-forward-with-road-access-to-the-ring-of-fire>

Figure 9: Road to Ring of Fire¹³



Port of Thunder Bay

The Port of Thunder Bay is the Western Canadian terminus of the St. Lawrence Seaway System, the largest inland waterway in the world. The Port was built to provide access to European markets for Western Canadian grain producers through the longest grain supply chain in the world.

An integral part of the Port of Thunder Bay's strategy is expanding upon the successful project cargo corridor, facilitating the movement of dimensional cargo to and from Western Canada and international markets. The Port coordinates the activities of stevedores, trucking companies, equipment operators,

¹³ <https://norontresources.com/wp-content/uploads/2020/11/Q3-2020-Corporate-Presentation-FINAL.pdf>

railways and fabricators to ensure that project cargo is handled efficiently and that shippers derive value out of shipping cargo via Thunder Bay.

The Port strives to diversify cargoes to reduce dependency on select commodities. The Port has prepared a significant 5-Year Capital Plan in strategic investments, including the expansion and reconfiguration of the general cargo terminal to capitalize on future cargo growth opportunities.¹⁴

The Port's facilities, able to handle 9 million tonnes of cargo annually, include:

- 8 grain elevators
- 3 dry bulk terminals
- 2 liquid bulk terminals
- 1 general/project cargo terminal
- 1 shipyard with drydock

The port also has available waterfront land for property development, including:¹⁵

- Harbour Park – a 45-hectare industrial park.
- Intercity Site – a 12-hectare waterfront site with a 61-metre dock, rail access and operational grain elevator.

An aerial view of part of the port's facilities is presented in Figure 10.

Figure 10: Port of Thunder Bay¹⁶



¹⁴ <https://www.portofthunderbay.ca/administration/>

¹⁵ <https://www.portofthunderbay.ca/administration/property-development/>

¹⁶ Photo by Ron Garnett / www.AirScapes.ca

3.3 Developments in Critical Minerals

Critical minerals consist of the metals cobalt, copper, nickel, uranium, lithium, magnesium, platinum group metals, rare earth elements and others, and are vital in aerospace, telecommunications, computing, and an array of clean technology industries.¹⁷

Canada ranks among the top five exports of various critical minerals including platinum group metals, nickel, cobalt, and graphite, seen in Figure 11 and Figure 12.¹⁸

Northwestern Ontario currently has eight advanced critical mineral exploration sites, including lithium, graphite, copper and platinum group metals (palladium) providing an opportunity for the province to become a leading jurisdiction in critical mineral production.

Critical minerals like lithium and graphite also require processing of the raw mined material to create a useable product, presenting an opportunity for Northwestern Ontario to become a leader in the chemical processing and conversion of critical minerals to provide products for clean technologies such as batteries for electric vehicles and large scale electrical grid energy storage.

Government Initiatives

In 2020, multiple government funding initiatives were announced that support the development of critical minerals, including \$590 million from the Ontario and federal government to build electric vehicles at Ford's Oakville plant, representing a commitment to clean technology, and a \$31 million investment by the Saskatchewan government to build Canada's first rare earth processing facility.^{19, 20}

Figure 11: Canada's Technology Mineral Production and Advanced Projects, 2017

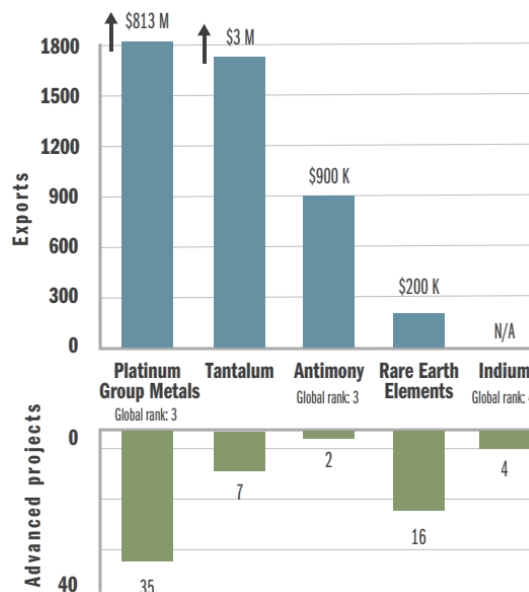
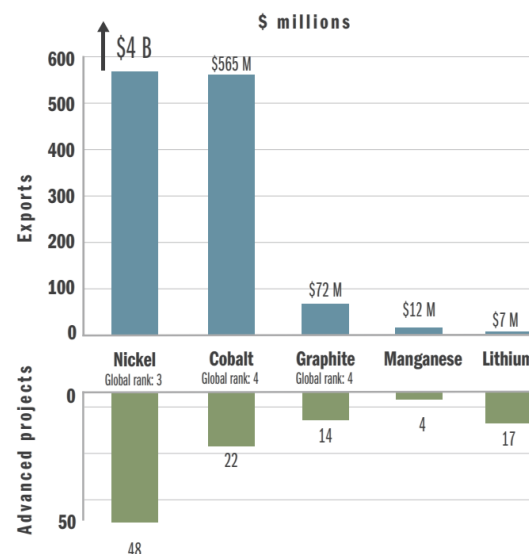


Figure 12: Canada's Battery Mineral Production and Advanced Projects, 2017



¹⁷ <https://mining.ca/our-focus/critical-minerals/>

¹⁸ https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/Critical%20Minerals_EN_2020_accessible.pdf

¹⁹ <https://news.ontario.ca/en/release/58736/historic-ford-canada-investment-transforming-ontario-into-global-electric-vehicle-manufacturing-hub>

²⁰ <https://www.saskatchewan.ca/government/news-and-media/2020/august/27/ree-facility>

3.4 City of Thunder Bay

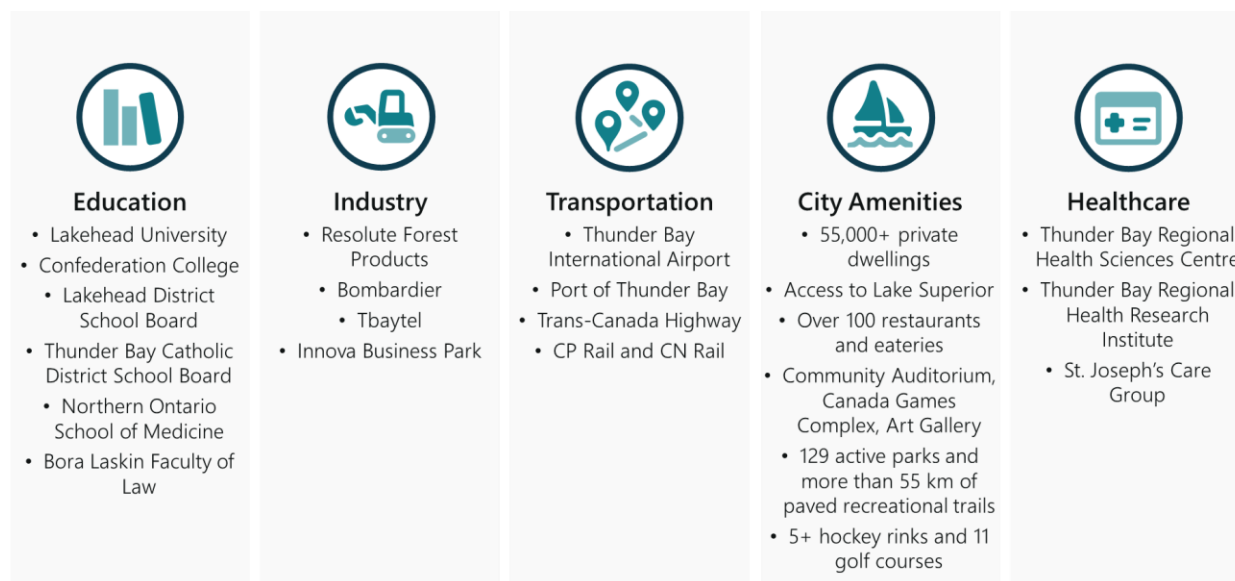
Thunder Bay is a central Canadian city on the north shore of Lake Superior, located 1,300 km northwest of Toronto, 700 km east of Winnipeg and 580 km northeast of Minneapolis. The city's location allows it to be the gateway to the northwest, providing access to eastern and western markets through the port, international airport, major highways and railways.

With a population of 121,621 (census 2016), Thunder Bay is the largest community on Lake Superior and the most populous municipality in Northwestern Ontario.²¹ In 2016, 19 percent of the population was between 15 to 29 years of age, 17 percent was 30 to 44 and 23 percent was 45 to 59.²²



The city is home to various major businesses and resident amenities, summarized in Figure 13.

Figure 13: City of Thunder Bay Major Businesses and Amenities Summary



²¹ <https://www.thunderbay.ca/en/business/resources/Documents/EconomicDevelopment/Community-Profile-for-Investors.pdf>

²² Statistics Canada. 2017. Thunder Bay [Census metropolitan area], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017.

3.5 Community Economic Development Commission (CEDC)

The CEDC was incorporated in 2006 as an arms-length Community Development Corporation that is led by an independent board with core funding from the City of Thunder Bay. The CEDC helps those interested in business and economic activity in the City of Thunder Bay with community information and statistics, networking and referrals, assistance in site selection and labour market data. It is responsible for business development, businesses retention and expansion, entrepreneurial support, Indigenous community joint projects, opportunity promotion, and collection and assessment of key business data.²³

The CEDC includes specialized business sectors in aboriginal partnerships, film, forestry, knowledge based, manufacturing, mining and transportation.²⁴

Mining Division

The CEDC's mining business sector department supports the mining sector in Northwestern Ontario through initiatives including:²⁵

- Providing regular updates, [data and information](#) regarding the exploration projects and operating mines in the region.
- Providing links and information to [job opportunities](#).
- A Thunder Bay [Supply and Services Directory](#) that allows local companies to be found based on a company name, keyword or business type category search.
- Government relations.
- Introductions between mining companies, educators, trainers, and associations located in the region.



²³ <https://www.thunderbay.ca/en/about-cedc.aspx>

²⁴ <https://www.thunderbay.ca/en/business-sectors.aspx>

²⁵ <https://www.thunderbay.ca/en/mining.aspx>

4.0 Stakeholder Feedback

Stakeholder interviews were conducted with 18 exploration and mining companies, and 25 associations. Each interview consisted of reviewing an interview guide prepared by MNP with questions covering business development in supply and services, workforce training and development, transportation and electrical infrastructure, economic impact of new and existing mines, research and development, and gaps and barriers to exploration and mine development.

4.1 Interview Participants

Exploration and Mining	Associations
Avalon Advanced Materials	Ambassadors Northwest
Barrick Gold	Anishinabek Employment & Training Services
Clean Air Metals	Carpenters Union
Evolution Mining	Centre of Excellence for Sustainable Mining and Exploration (CESME)
First Mining Gold	Confederation College
Frontier Lithium	Construction Assoc. of Thunder Bay
Generation Mining	Electrical Workers
Great Bear Resources	Energy Task Force
Greenstone Gold	Fort William First Nation (FWFN)
Harte Gold	Hydro One
Impala Canada	Independent Electricity Systems Operator (IESO)
New Gold Inc.	Lakehead University
Newmont	Nishnawbe Aski Development Fund
Noront Resources	Nokiiwin Tribal Council
Pure Gold Mining	North Superior Workforce Planning Board
Rock Tech Lithium	Northwest Employment Works (NEW)
Treasury Metals	Northwestern Ontario Prospectors Association
Zen Graphene	Ontario Mining Association (OMA)
	Ontario Prospectors Association (OPA)
	Ontario Youth Apprenticeship Program (OYAP)
	Port of Thunder Bay
	Thunder Bay Chamber of Commerce
	Thunder Bay Intl Airport Authority
	Thunder Bay Metal Fabricators Association
	YES Employment
Total: 18	Total: 25

4.2 Top Interview Themes

- 1 The CEDC is perceived by mining industry stakeholders as a key facilitator for business introductions and sharing knowledge about economic development opportunities and support.
- 2 City/CEDC needs to advance their marketing and communications strategy to emphasize that Thunder Bay is a full-service hub for Northwestern Ontario.
- 3 Exploration and mining companies will prefer to buy local if their supply chain staff are aware of the local businesses which are qualified to deliver the needed supplies and services.
- 4 There is an emerging opportunity for critical mineral processing and support directly within the municipal boundaries of Thunder Bay.
- 5 There is a near-term great need for skilled trades and numerous types of support services roles as new mines are constructed and begin operations.
- 6 A tailored strategy to support local workers and Indigenous community members gain the job skills along with the logistical support to get to the work sites is needed.
- 7 The city of Thunder Bay has abundant municipal infrastructure to support growth in the regional mining industry, but the broader northwest regional infrastructure has some significant challenges with road and electricity supply.
- 8 Thunder Bay is currently receiving significant economic benefits due to the mining industry and is well perceived and positioned to benefit from the forecasted increase in mining activity.
- 9 All mining companies are willing to partner with local research facilities if the opportunity arises.
- 10 Extended timelines for permitting and approvals is seen as the major impediment to advancing mine development.

4.3 Mining Industry Stakeholder Interview Feedback

The feedback and common themes heard from stakeholder interview participants is summarized below for each major category covered in the Mining Readiness Strategy.



What we Heard: Business Development in Supply and Services

1. Enhance the existing local supply and service business directory with additional service offering filters and consistent company descriptions to promote local capabilities to foreign and existing exploration and mining companies.
2. Emerging opportunity to host multiple critical mineral processing facilities (lithium and graphene), attracting clean tech businesses to the city.
3. Local procurement preferred by exploration and mining companies when available and competitively priced to support the region and receive quicker customer support times.
4. Some specialized mining supply and services is procured outside of Thunder Bay (e.g. drilling contractors, who primarily come from Sudbury, Quebec or Winnipeg).
5. Businesses focused on quicker customer service may have the advantage including parts warehousing, logistics and equipment service type companies.
6. CEDC can facilitate and expedite introductions between mining, local businesses and supporting associations becoming a communications hub.
7. Communicate the types of supply and services required by exploration and mining operations to attract new businesses to the area, develop new businesses from local entrepreneurs, or aid students and experienced workers to seek employment in a mining related field.
8. Transition the legacy forestry industry skillset and facilities to mining supply businesses which could now be converted to a mining hub using existing facilities, skillsets, and labour supply.
9. Available commercial and industrial land in the city is an opportunity to attract new businesses, particularly near the waterfront and port's special economic zone.



What we Heard: Workforce Training and Development

1. Lack of local skilled trades training and labour force, particularly millwrights, heavy equipment, and electricians.
2. Skilled and trained Indigenous workers would provide an advantage for exploration and mine companies working in NW Ontario.
3. Experienced geologists, engineers and managers are in short supply in the region.
4. New emerging opportunities for chemical, plant operators and clean energy professionals from the new critical mineral deposits discovered in NW Ontario.
5. Underground mines present unique common core training challenges, with local labour either not having completed the common core training prior to applying for jobs, or having difficulty acquiring the training due to lack of local options.
6. Workers lacking a drivers' license, or the facilities to complete the driving test, introduces barrier to employment.
7. Directory of positions and skills required to work in mining would provide guidance to students and training centers on what training areas to focus on to support the industry.
8. Thunder Bay's post-secondary training is mostly known for exploration type skill development (e.g. geology programs) and less known for direct mining training.
9. Create awareness about opportunities to work in skilled trades and in the mining sector at the high school level to ensure local students work and remain in the city.
10. Focus on entrepreneurial training to help develop local businesses that could become a supporting business for the exploration and mining sector.
11. Support students with transitioning from high school to post-secondary schooling, including life-skill training opportunities and up-skill training for anyone who lacks a grade 12 high-school diploma.
12. Hire locally for mine construction, training workers in the meantime to transition into the operations phase.
13. Experienced workers lacking official schooling or trades paperwork are valuable to the mining sector and require support to transfer careers and work in mining.
14. Programs such as Supercom and Wataynikaneyap with Valard Construction are known to be successful Indigenous partnerships.



What we Heard: Transportation and Electrical Infrastructure

1. The city is known as a transportation hub due to the existence of an international airport, major port, highway network and railways.
2. Nighttime flights are not currently available out of the Thunder Bay international airport, which cause schedule inconveniences for flying out of the region.
3. Indigenous joint ventures are often utilized in access road maintenance contracts.
4. Power pricing and reliability are top infrastructure concerns.
5. Multiple exploration sites taking advantage of existing forestry roads in the northwest.
6. Cellular service and internet connection are a barrier directly outside of the city and in remote and Indigenous communities.
7. Electrical infrastructure planning is required early in exploration phase as it can take five years to develop.
8. NW Ontario's large geographical area presents challenges for improving and maintaining infrastructure at an affordable cost.
9. Tailored transportation programs to the mine sites would benefit local workers, especially for those lacking a drivers' license.
10. Extension of the Northern Industrial Electricity Rate (NIER) program and Industrial Conservation Initiative program are crucial to keeping electricity prices competitive.



What we Heard: Economic Impact of New and Existing Mine Development

1. Exploration and mining companies are invested in the region. 50 percent of responses stated major spending (\$2M+ per year) in Thunder Bay and the surrounding region, and 31 percent stated a moderate level of spending (up to \$2M per year).
2. Abundant exploration activity is occurring in the northwest with over \$110M being spent by 15 of the exploration and mining companies, primarily on drilling costs.
3. Thunder Bay is well perceived as a full-service community with most amenities (housing, hotels, recreation, health services, etc.) required for residents and visitors.
4. Thunder Bay is well positioned to attract and retain mining sector workers and their families due to the city's premier amenities and opportunities.



What we Heard: Research and Development

1. Exploration and mining companies are all willing to partner with local university and college research centers if or when the opportunity arises.
2. Industry matching funds are available for R&D projects.



What we Heard: Gaps and Barriers to Exploration and Mine Development

1. Permitting timelines are the biggest concern and barrier to mine development in Northwestern Ontario (regulatory and environmental).
2. Understanding of how and when to involve Indigenous communities in the mining sector is a current gap and potential barrier to mine and infrastructure development.
3. The vast area of Northwestern Ontario presents infrastructure challenges including lack of all-season roads and electricity infrastructure for the more remote areas.

The stakeholder response themes which MNP has consolidated above were utilized in understanding the mine supply and service companies the city could attract, employment opportunities for the northwestern region, economic opportunities and strategic recommendations for the CEDC to support exploration and mining in Northwestern Ontario.

5.0 Mine Supply and Service Opportunities

Thunder Bay is currently home to an estimated 400-500 mine supply and service companies and has a continued opportunity to host additional businesses in the city to support the exploration and mining sector in Northwestern Ontario. The city has an advantage due to its proximity to many of the mine sites in the region and due to its relatively large amount of available commercial and industrial land. Through stakeholder interviews, specific types of businesses were identified that are best suited to be in Thunder Bay, which included businesses focused on quicker customer service times, general mine support businesses, training centers, structural mining materials, delivery services and chemical processing. Business types not recommended for the city to attract included specialty mine equipment manufacturers and drilling companies that already have a strong base outside of the region.

City of Thunder Bay Land Assets

Thunder Bay completed an Employment Land Study in late 2020 that analyzed the city's available industrial, commercial, and institutional land supply. The number of sites and area of available land is outlined in Table 2.²⁶

Table 2: Number of Sites and Size of Vacant Land in Thunder Bay, 2020

Industrial:	Commercial:	Institutional:
<ul style="list-style-type: none"> Nearly 450 total sites Light industrial: 520 gross hectares Heavy industrial: 202 gross hectares Business area: 47 gross hectares 	<ul style="list-style-type: none"> Over 350 individual sites 84 gross hectares 	<ul style="list-style-type: none"> 16 individual sites 24 gross hectares

The city's land demand analysis identified a considerable supply of vacant, designated lands in the city, indicating that future land requirements can be accommodated on existing sites, and therefore does not require the conversions of any non-employment lands for employment purposes.

Strategic recommendations from the land assessment include:

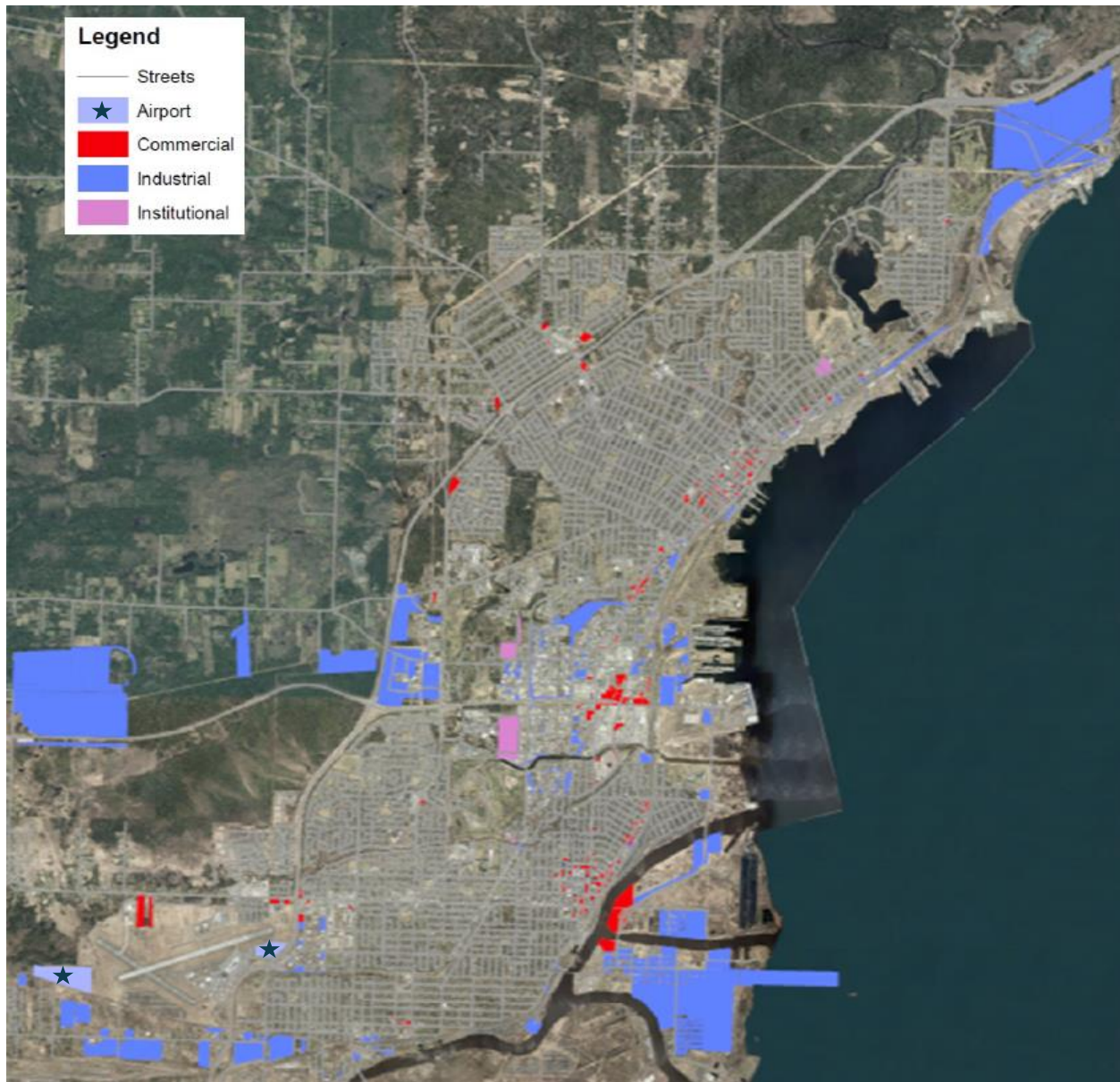
- The city has a more than adequate supply of employment land across all land use designations.
- The city must maintain the designation of its supply of undeveloped, centrally situated Light Industrial lands.
- The city's established heavy industrial base is an asset which requires protection to ensure ongoing operations. However, the vast supply of vacant and underutilized Heavy Industrial sites can withstand some conversion to Light Industrial uses, if such applications arise.

²⁶ Thunder Bay Employment Land Strategy 2020

- Office space could be a feature of a mixed-use redevelopment of a site in the Strategic Cores or along the waterfront.
- Occupied large Institutional sites/campuses contain undeveloped lands that are suited to accommodate future institutional and related development.
- Promote opportunities for development along the waterfront, while protecting the Port function.

The location of the available vacant designated land in Thunder Bay is provided in Figure 14.

Figure 14: Map of Available Vacant Land in Thunder Bay, 2020

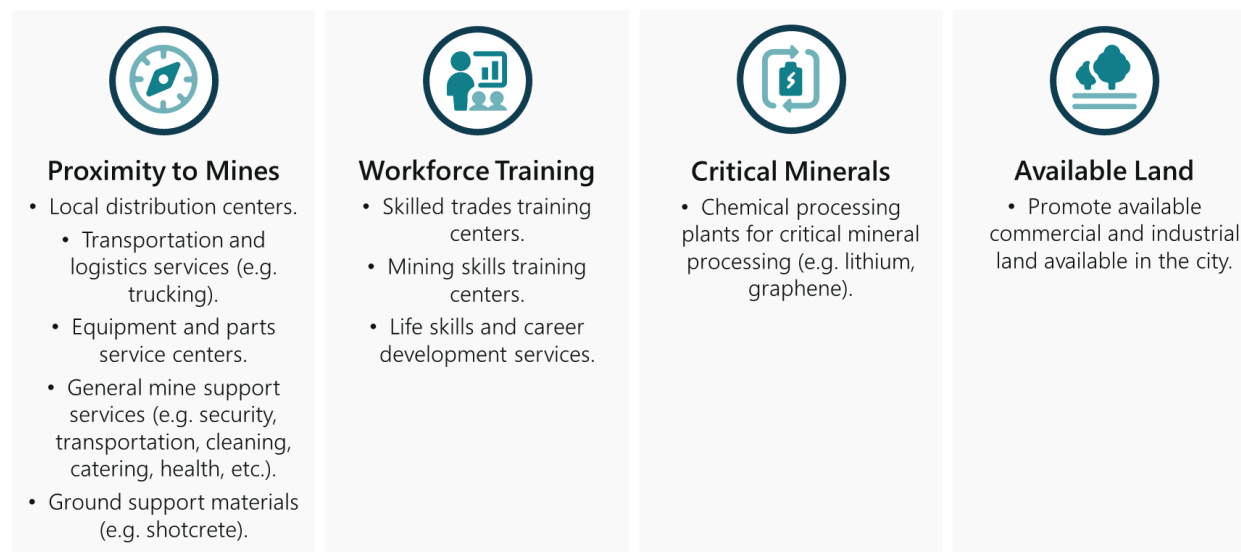


Source: Thunder Bay Employment Land Strategy 2020

Strategic Businesses for Thunder Bay's Economy

Stakeholder consultations and document research identified several mine supply and service businesses that Thunder Bay should focus on attracting to the city. The suggestions are primarily centered around themes including the city's proximity to the mine sites, quicker turnaround times, workforce training, new opportunities in critical minerals, and the available commercial and industrial land (Figure 15).

Figure 15: Mining Supply and Service Business Recommendations for Thunder Bay



Mine supply and service businesses that Thunder Bay may see of a lesser priority include:

- Specialty heavy mining equipment, which is procured globally from already established suppliers and has inconsistent procurement timelines (e.g. large mining equipment with useable life over 20 years).

6.0 Employment Forecast and Analysis

In 2020, Thunder Bay was home to over 800 mine employees that were working in the six operating mines in Northwestern Ontario. With the potential of 15 major exploration projects converting to operating mines over the next 10 years, Thunder Bay has an opportunity to host many more direct mining and mining support employees.

The exploration and mining sector overall require employees with skillsets in the following areas:

- Production: mine labourers, trucker drivers, heavy equipment operators, machine operators, drillers and blasters, mineral and metal processing, etc.
- Skilled trades: heavy-duty mechanics, carpenters, plumbers, pipefitters, millwrights, electricians, welders, etc.
- Professional and physical sciences: engineers (mechanical, electrical, civil, geological, metallurgical, materials, mining, industrial), scientists, etc.
- Supervisors: engineering managers, mine supervisors, construction managers, trades supervisors, etc.
- Technical: engineering technologists (drafting, civil, electronics, mechanical, industrial, chemical, biological), land surveyors, IT consultants, etc.
- Support workers: administration, logistics, inspectors, testers, general office support, etc.
- Human resources and finance: HR professionals, accountants, financial managers, etc.

Stakeholder interview feedback echoed the needs of the above-mentioned occupations for exploration and mining projects. The distribution of skills hired by the mining industry is outlined in Table 3 below.

Table 3: Occupations Required by the Mining Sector, 2020 Data

Occupation Category	Distribution
Other Occupations*	35%
Production Occupations	24%
Trades Occupations	11%
Professional and Physical Science Occupations	9%
Supervisors, Coordinators, and Foremen	7%
Technical Occupations	7%
Support Workers	4%
Human Resources and Financial Occupations	3%

Source: [Canadian Mining Labour Market 10-Year Outlook \(2020\)](#), Mining Industry Human Resources Council

*Other Occupations refers to a group of occupations that are not exclusive to mining operations (e.g. registered nurses, light duty cleaners, security guards) but are still employed by the mining sector.

6.1 Northwestern Ontario Employment

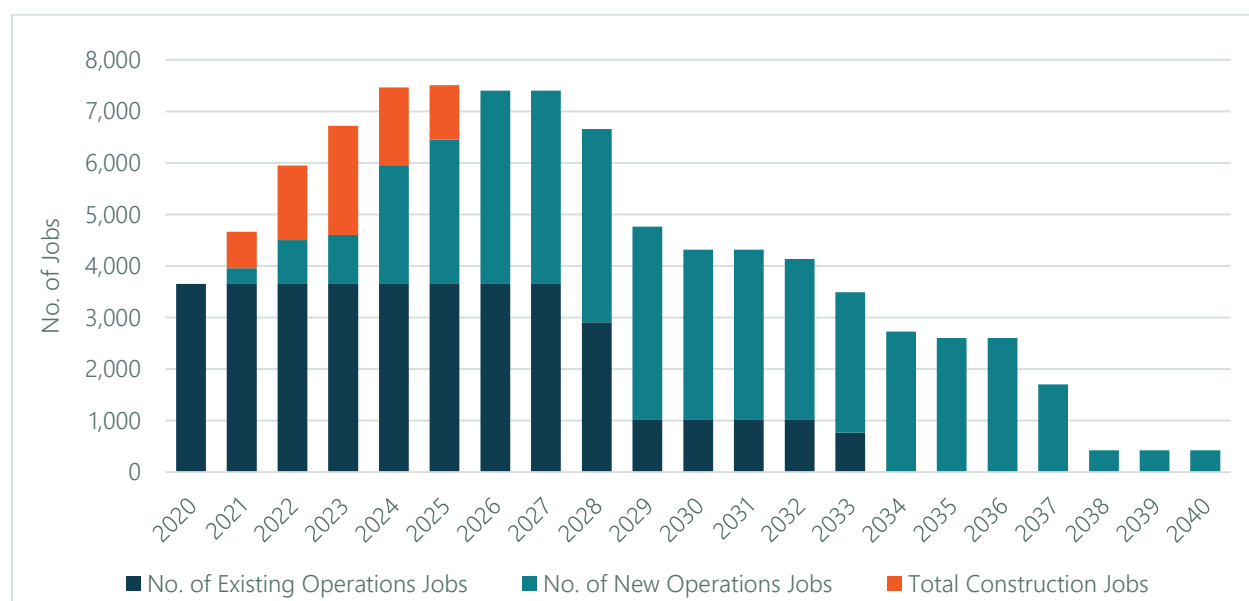
Employment in the mining sector in Northwestern Ontario is currently driven by the 6 operating mines in the region and is poised for growth with 15 exploration sites potentially transitioning to operating mines over the next 5-10 years. Based on current publicly available life of mine projections, employment in construction is estimated to be primarily required between 2021 to 2025 as most of the exploration sites are developed into operating mines. Employment in operations at the existing mines is estimated to remain constant to 2027, and subsequently decline as multiple mines begin decommissioning and closure from 2028 to 2033. New mine operations jobs are projected to grow year-over-year until 2026, before declining to present day levels in 2032. Actual start dates for construction and operations of new mine sites are subject to factors including metal prices, permitting timelines/approvals, discovery rates, project maturity of existing exploration projects, and new exploration projects advancing other than the sites covered in this study (Figure 16).

Figure 16: Estimated Current and Future Mining Employment Trends in Northwestern Ontario



Total projected annual flow of construction and mine operations jobs is outlined in Figure 17 below.

Figure 17: Estimated 20-Year Employment Outlook for Construction and Operations Jobs in Northwestern Ontario

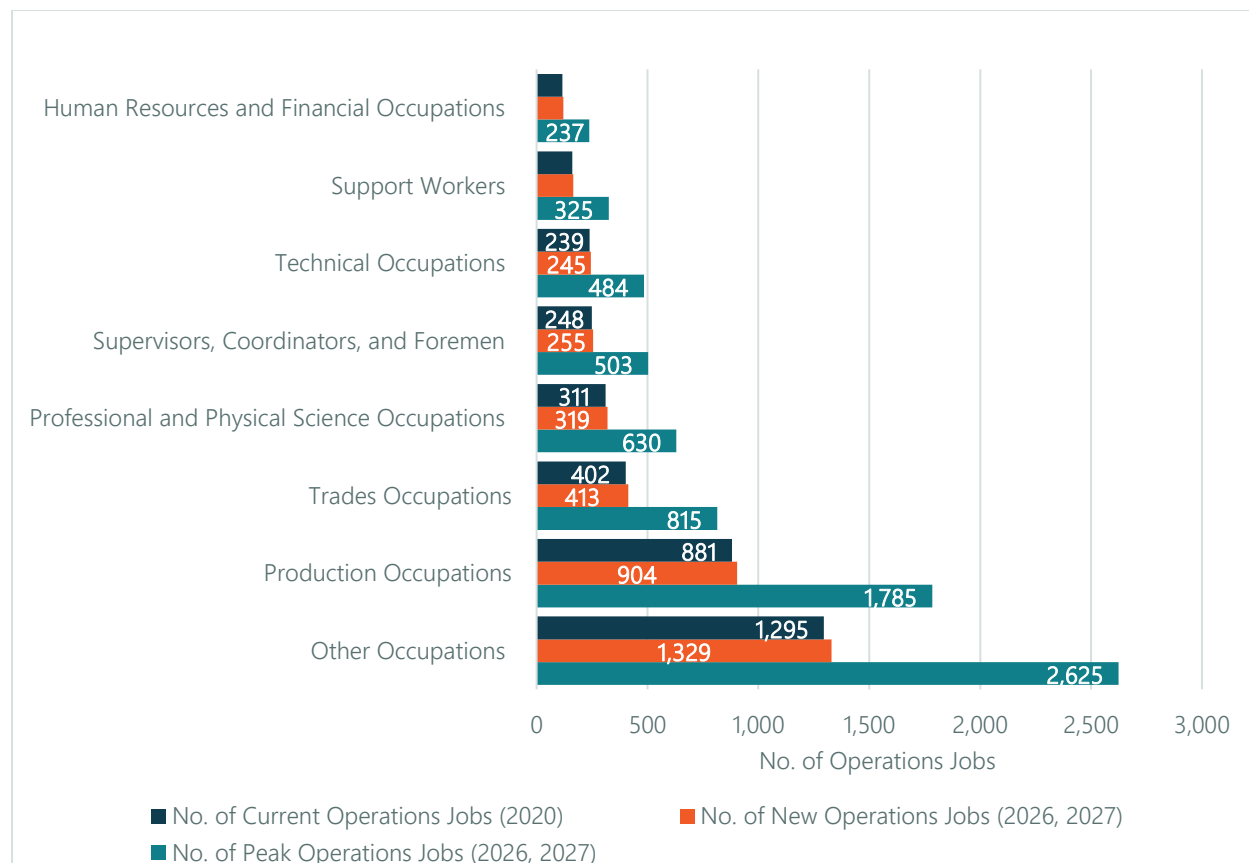


Source: Stakeholder interviews and public documentation.

Northwestern Ontario Employment Distribution

The types and quantities of positions required for mining operations in Northwestern Ontario is estimated using the above-mentioned occupation distribution data and 20-year employment forecast to estimate the current and peak workforce requirements for the region, and the number of new operations jobs becoming available during peak operations (Figure 18).

Figure 18: Estimated Northwestern Ontario Employment Distribution at Current (2020) and Peak Operational Levels



By 2026, operations jobs are projected to double in all occupational categories, with 3,600 estimated jobs being required to fill.

7.0 Transportation and Electrical Infrastructure

The transportation and electrical infrastructure requirements for the 15 exploration sites was reviewed to understand the range of requirements for each site to move the projects into the mine operation phase. Data was collected via stakeholder interview responses and reviews of the public technical and feasibility reports of each mine site to determine the needs of each site.

7.1 Transportation Requirements

Transportation to exploration and mine sites is made possible by a combination of air travel from Thunder Bay and other local airports to sites, major highway network and various winter and all-season access roads.

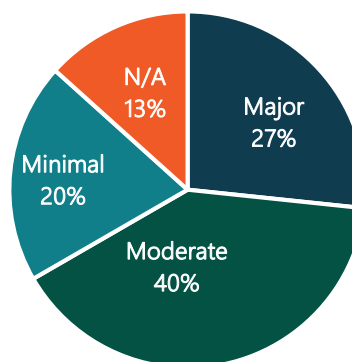
To evaluate each site's transportation infrastructure requirements to be prepared for future mine operations, a four-criteria rating system was developed, including:

- Major: requires brand new road construction to the site.
- Moderate: requires construction to update the existing access road.
- Minimal: requires implementing an access road maintenance plan.
- N/A: information was not available during stakeholder interview or has not yet been published in public reports.

Of the 15 exploration sites reviewed, 60 percent had minimal or moderate access road construction requirements, due mostly to their advantageous location close to the major highway network in Northwestern Ontario (Figure 19). Sites requiring major construction include:

- Access to the Ring of Fire.
- Realigning existing Highway 11 road and electricity infrastructure that is currently passing through the site.
- Construction of all-season roads to improve current access restrictions of air travel and winter road only access (Frontier Lithium's PAK project, and First Mining Gold's Springpole Lake project).

Figure 19: Access Road Construction Requirements for 15 Major Exploration Sites



7.2 Electricity Requirements

Electricity is provided to mine sites via connecting to the provincial grid, constructing power plants on site, or a combination of both in the case where the grid lacks capacity to supply the entire mine site.

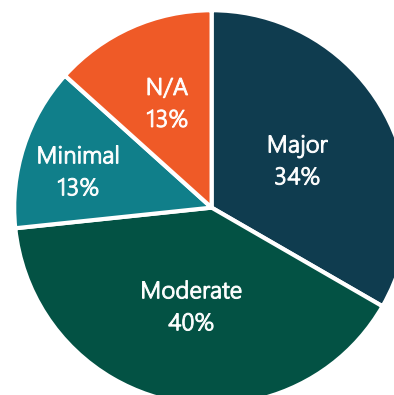
To evaluate each site's electricity infrastructure requirements to be prepared for future mine operations, a four-criteria rating system was developed, including:

- Major: construction of a transmission line is required 10 km or further away from the site, or a power plant is required to be built on site.
- Moderate: construction of a transmission line is required under 10 km from the mine site.
- Minimal: electricity infrastructure is already in place and requires minor connection work.
- N/A: information was not available during stakeholder interview or has not yet been published in public reports.

Of the 15 exploration sites reviewed, 53 percent had minimal or moderate electricity infrastructure requirements, due to their proximity to nearby transmission lines (Figure 20). Sites requiring major electricity infrastructure construction include:

- Multiple sites requiring over 25 km of new transmission lines.
- Multiple sites requiring power plants to be built due to lack of available local transmission lines or capacity.

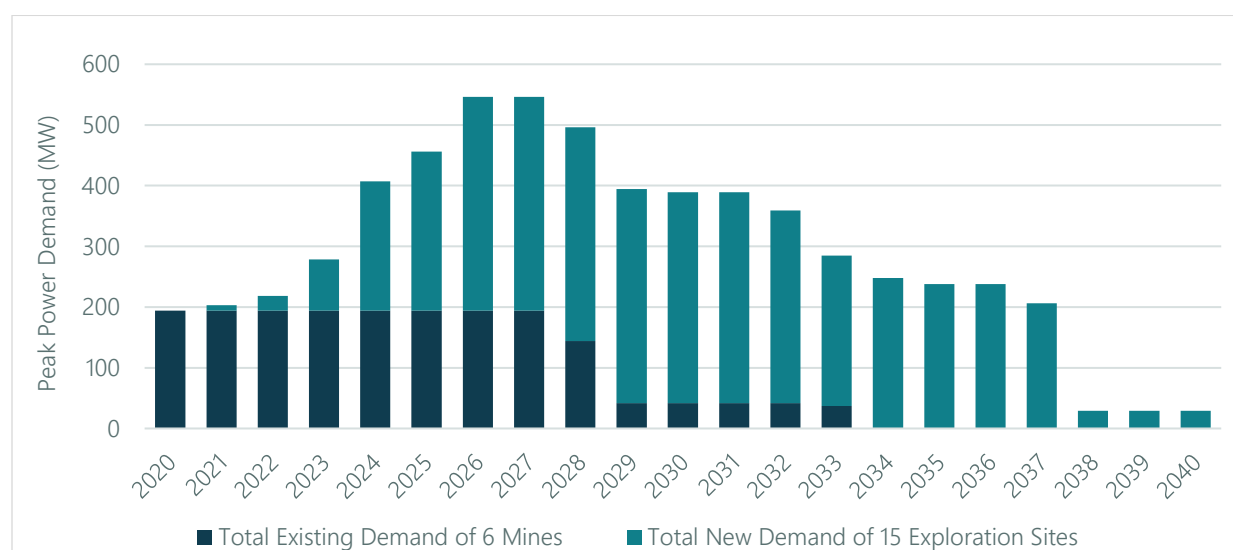
Figure 20: Electricity Infrastructure Construction Requirements for 15 Major Exploration Sites



Electricity Demand

Peak electricity demand requirements for both the operating mines and exploration site's projected future demand was gathered to estimate power requirements in Northwestern Ontario over the next 20 years. Demand is expected to peak around 2026 to 2027 as the current operating mines remain in full operation, and numerous exploration sites are coming online, leading to a 180 percent increase in Northwestern Ontario electricity demand. Demand is then expected to decrease around 2029 when several of the current operating mines begin decommissioning (Figure 21).

Figure 21: Estimated Northwestern Ontario Peak Power Demand for Existing 6 Mines and 15 Major Exploration Sites



Source: Stakeholder interviews and public documentation.

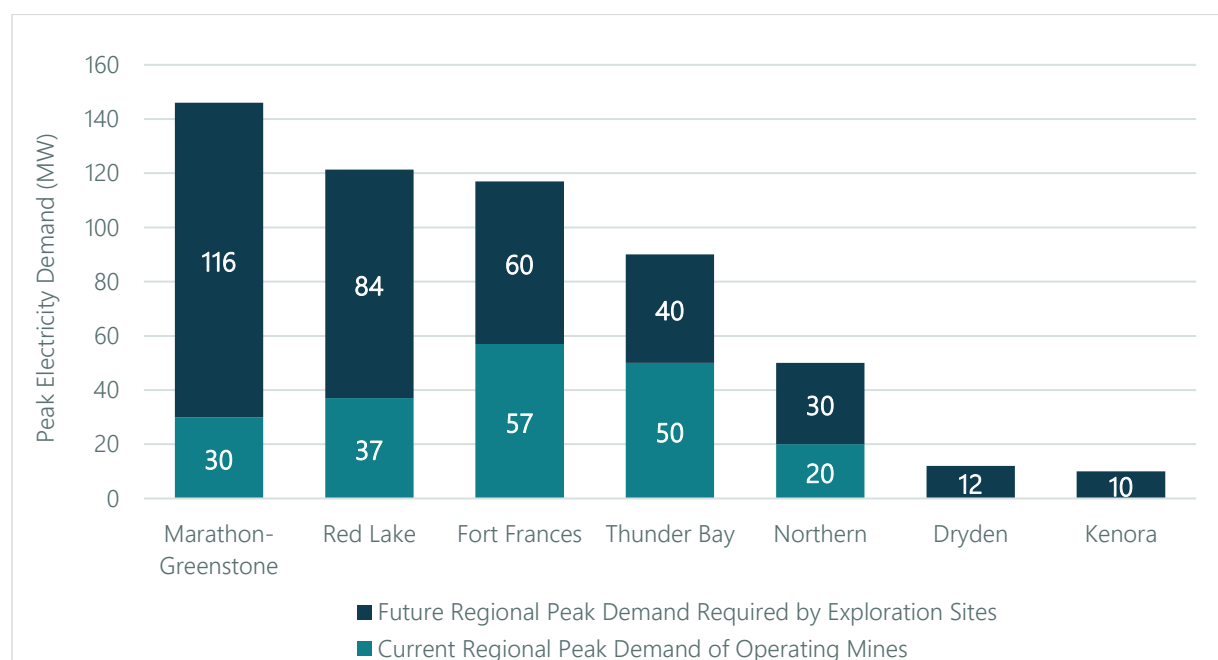
The estimated peak demand requirements for the existing and future mine sites was then filtered into various regions to assist with regional capacity planning initiatives, described in Table 4.

Table 4: Regional Electricity Demand Definitions

<p>Dryden:</p> <ul style="list-style-type: none"> Goliath and Goldlund Deposits <p>Fort Frances:</p> <ul style="list-style-type: none"> Rainy River Mine <p>Kenora:</p> <ul style="list-style-type: none"> Separation Rapids Deposit <p>Marathon-Greenstone:</p> <ul style="list-style-type: none"> Albany Deposit Hardrock Deposit Hemlo Mine Marathon Deposit Sugar Zone Mine 	<p>Northern:</p> <ul style="list-style-type: none"> Eagles Nest Deposit Musselwhite Mine PAK Deposit <p>Red Lake:</p> <ul style="list-style-type: none"> Bateman Deposit Dixie Lake Deposit Madsen Deposit Red Lake Mine Spingpole Lake Deposit 	<p>Thunder Bay:</p> <ul style="list-style-type: none"> Georgia Lake Deposit Lac des Iles Mine Sunday Lake Deposit Thunder Bay North Deposit
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The regional peak demand projections are presented in Figure 22.

Figure 22: Estimated Northwestern Ontario Regional Peak Demand Requirements



The regions experiencing the highest rate of future growth include Marathon-Greenstone (380 percent), Red Lake (220 percent), and Northern (150 percent).

8.0 Economic Impact

8.1 Approach

To estimate the economic impacts of mining in Northwestern Ontario, MNP employed an input-output methodology that uses provincial multipliers published by Statistics Canada. Input-output modeling is a widely used and accepted approach, making it recognizable by many different stakeholders and audiences. The structure of the approach also facilitates easy comparisons between reported results for different projects, organizations or industries.

In general, economic impacts are viewed as being restricted to quantitative, well-established measures of economic activity. The most used of these measures are GDP, employment, labour income, and government revenues:

- Output is the total gross value of goods and services produced by a given organization, industry or project, measured by the price paid to the producer. This is the broadest measure of economic activity.
- Gross Domestic Product ("GDP"), or value added, refers to the additional value of a good or service over the cost of inputs used to produce it from the previous stage of production. Thus, GDP is equivalent to the unduplicated value of goods and services produced.
- Employment is the number of additional jobs created.
- Government Revenues are the total amount of tax and other revenues generated for different levels of government. Please note that because tax revenues can change due to modifications in tax policy, the tax revenue impacts in this report are estimates only and subject to change. They should be viewed as approximate in nature.

Economic impacts may be estimated at the direct, indirect and induced levels.

- Direct impacts are changes that occur in "front-end" businesses that would initially receive expenditures and operating revenue as a direct consequence of the operations and activities of a facility.
- Indirect impacts arise from changes in activity for suppliers of the "front-end" businesses.
- Induced impacts arise from shifts in spending on goods and services as a consequence of changes to the payroll of the directly and indirectly affected businesses.

8.2 Economic Impacts in Northwestern Ontario

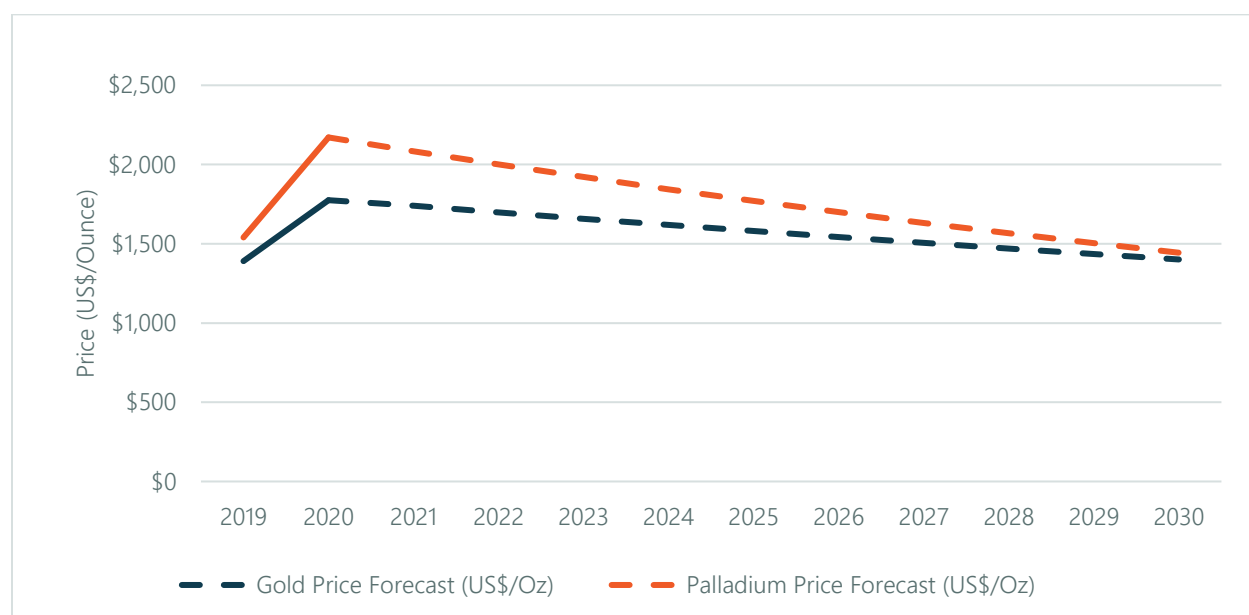
The economic impacts of the mining sector are generated by the operations of the operating mines, exploration and construction activities associated with advanced exploration projects as well as the production activities of these projects when they become operating mines. The economic impacts are created due to the direct expenditures on goods and services by mining and exploration companies and through the spending by suppliers and employees.

To estimate the economic impact of the mining sector in Northwestern Ontario between 2019 and 2030 MNP developed projections of production from operating mines based on proven and probable reserves, the expected life of mine (LOM) and forecast metal prices. For advanced exploration projects MNP estimated production based on information published in annual reports and feasibility studies.

Production Projections

In 2019 the operating mines in Northwestern Ontario produced approximately 650,000 ounces of gold and 227,000 ounces of palladium (Figure 4). In 2020 gold production is expected to rise to over 900,000 ounces due to increases in market prices as a result of investors seeking safe assets amid the COVID pandemic. Palladium production is expected to remain relatively stable. Gold and palladium prices are expected to remain elevated through 2021 as the world economy recovers from the COVID pandemic before gradually declining through 2030 (Figure 23).²⁷

Figure 23: Forecast Gold and Palladium Prices (US\$/Ounce) – 2019 to 2030



Source: World Bank Commodity Market Outlook, October 2020; LBMA Platinum and Palladium Price Data²⁸

Operating Mines

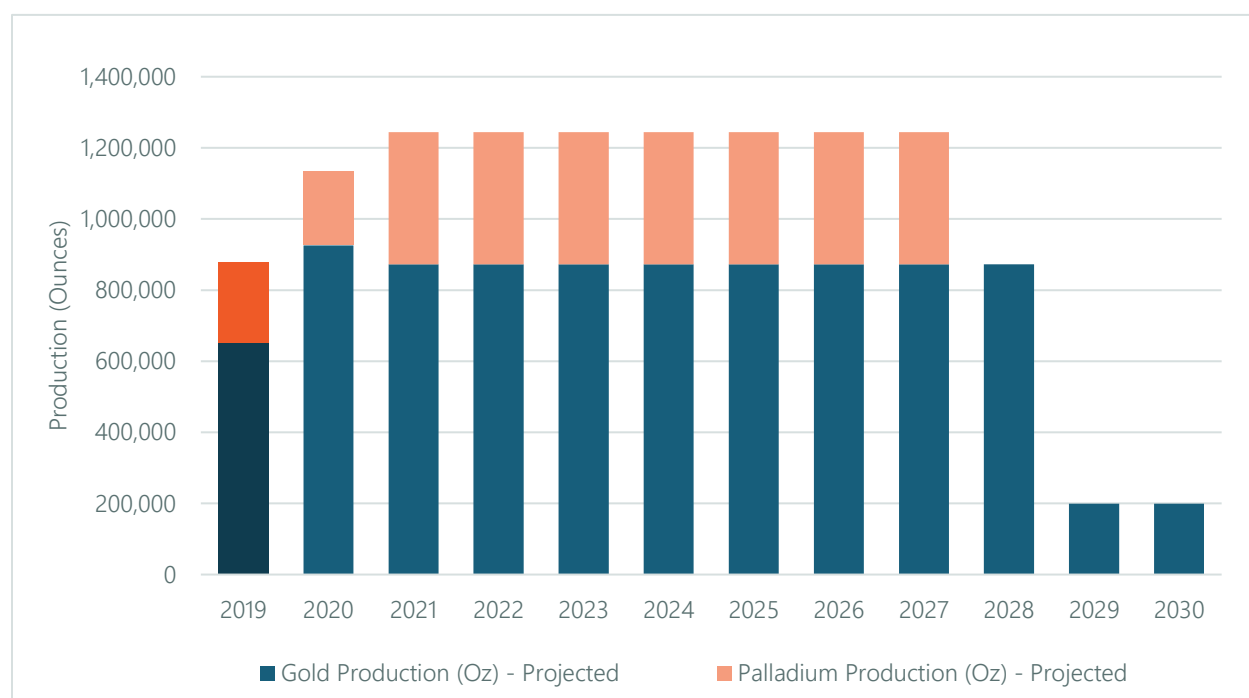
As shown in Figure 24 production was expected to increase between 2019 and 2021 due to the increase in prices. Production was projected to remain stable between 2021 and 2027 before declining in 2028 due to the closure of three gold and one palladium mine that would reach their end-of-life.

²⁷ World Bank, Commodity Market Outlook, October 2020. Available here:

<https://openknowledge.worldbank.org/bitstream/handle/10986/34621/CMO-October-2020.pdf>

²⁸ Available here: <https://www.lppm.com/data/#c=pd&y=2020&t=monthly>. Date Accessed: 25th November 2020.

Figure 24: Projected Gold and Palladium Production from Operating Mines (Ounces) – 2019 to 2030



Source: Company Annual Reports and Economic Feasibility Reports; Ontario Prospectors Association; World Bank Commodity Market Outlook, October 2020; LBMA Platinum and Palladium Price Data²⁹

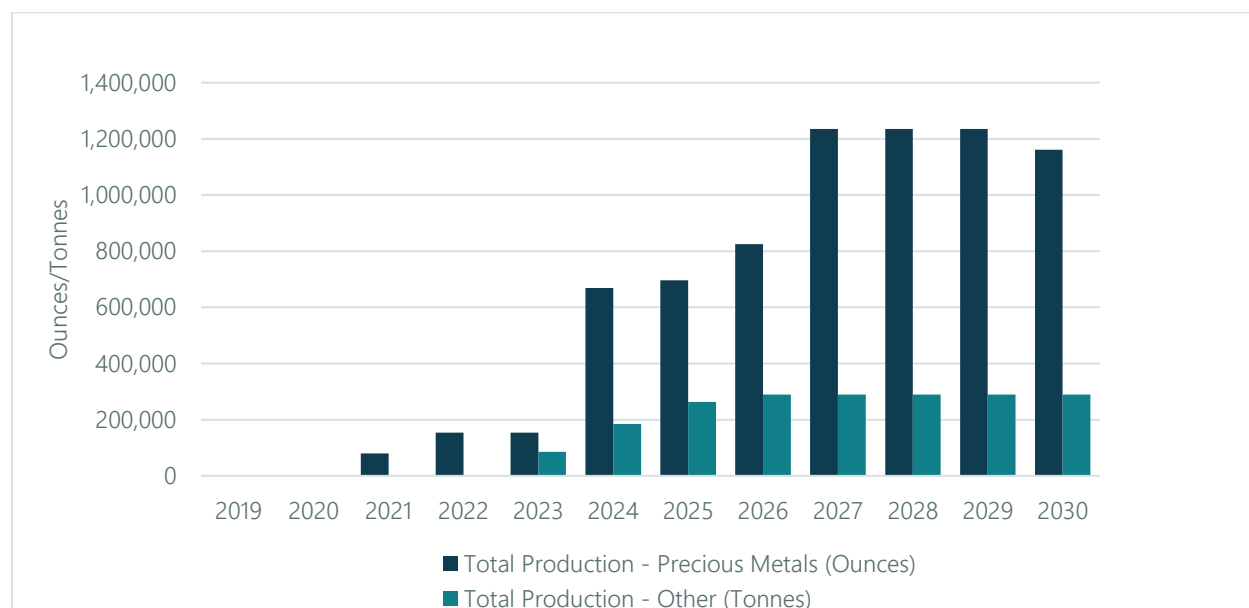
Advanced Stage Exploration Projects

Of the 15 advanced exploration projects data on construction and development spending were available for 13, and production estimates were available for 11. Between 2020 and 2025 approximately \$5.9 billion is expected to be spent on the construction and development of the 13 advanced stage exploration projects for which data were available. These include seven gold and six palladium, lithium, graphite and nickel-copper-platinum group elements (PGE) exploration projects. Production from 11 of these advanced exploration projects is expected to begin between 2022 to 2026. Figure 25 shows the expected annual production from those 11 advanced exploration projects for precious metals which includes gold, palladium and platinum and other metals including copper, zinc and lithium.³⁰

²⁹ Available here: <https://www.lppm.com/data/#c=pd&y=2020&t=monthly>. Date Accessed: 25th November 2020.

³⁰ Please note that production data was not available for two gold, one palladium and one graphite project.

Figure 25: Estimated Metal and Mineral Production from Advanced Exploration Projects – 2019 to 2030

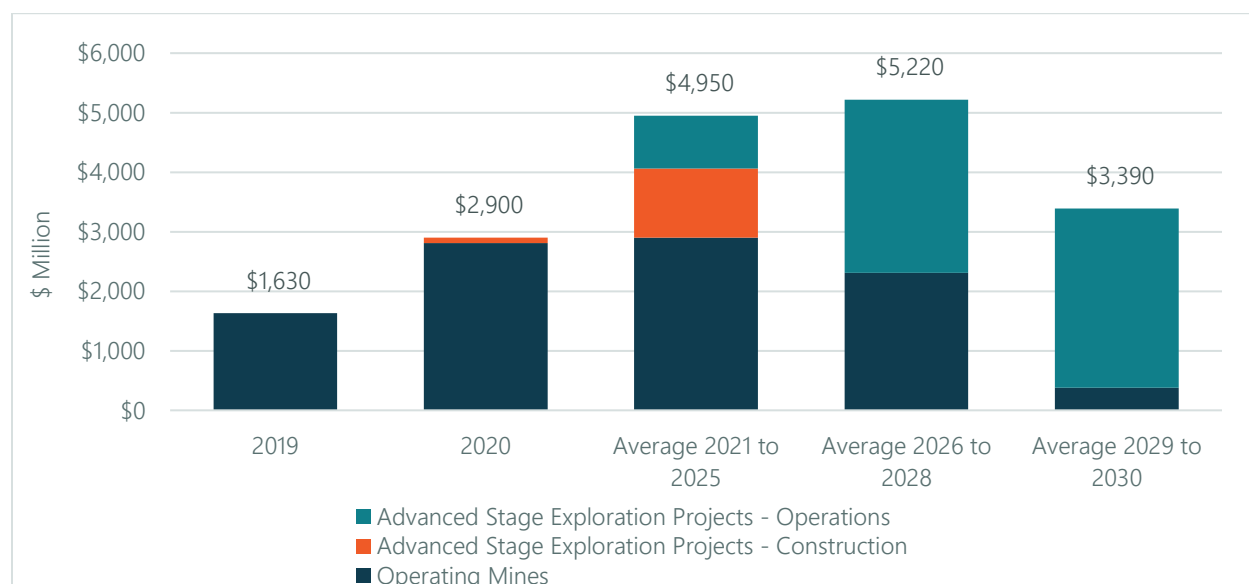


Source: Economic Feasibility Reports for Advanced Exploration Projects

Total Economic Impacts to Northwestern Ontario

Projected direct output ³¹from the mining sector in Northwestern Ontario between 2019 and 2030 is shown in Figure 26. This creates economic impacts in the Thunder Bay area as well as in other parts of Canada through supply chain linkages.

Figure 26: Direct Output (\$Million) – 2019 to 2030



³¹ Direct output is the value of production measured estimated based on forecast prices and production levels.

According to mining representatives interviewed for the study most labour is sourced locally and the operating mines purchase most goods and services in the local area. Goods and services purchased outside the local area are typically related to specialized equipment or services. Using average expenditure profiles for gold and silver ore mines in Ontario published by Statistics Canada³² and the goods and services interviewees reported purchasing outside the local area we estimated that approximately 70 percent of spending takes place in Northwestern Ontario. The resulting economic impacts that were created in Northwestern Ontario in 2019 are shown in Table 5. Mining in Northwestern Ontario was estimated to contribute direct impacts of approximately \$1,030 million of GDP, 2,675 jobs and \$160 million of revenue for all levels of government. In addition, indirect and induced impacts of approximately \$560 million in GDP, 4,480 jobs and \$170 million in revenue for all three levels of government were created in the local area.

Table 5: Economic Impacts to Northwestern Ontario – 2019

	Output (\$ Million)	GDP (\$ Million)	Wages and Salaries (\$ Million)	Employment (Jobs)	Government Revenue (\$ Million)
Direct	\$1,630	\$1,030	\$400	2,765	\$160
Indirect and Induced	\$990	\$560	\$250	4,480	\$170
Total	\$2,620	\$1,590	\$650	7,245	\$330

The increase in production at operating mines and the development of advanced stage exploration projects would increase the economic impact of mining in the local area. Based on the projected direct output between 2019 and 2030 (Figure 26) the total economic impacts in the local area were projected to increase by over 65 percent in 2020 and then almost double between 2021 and 2028 (see Figure 27 through Figure 31). In 2030 the economic impacts were projected to decline as some operating mines reach their end-of-life but were projected to be approximately 35 percent higher than in 2020.

³² The expenditure profiles used were from the Supply and Use Tables, 2016.

Figure 27: Total Output - Direct, Indirect and Induced (\$ Million) – 2019 to 2030

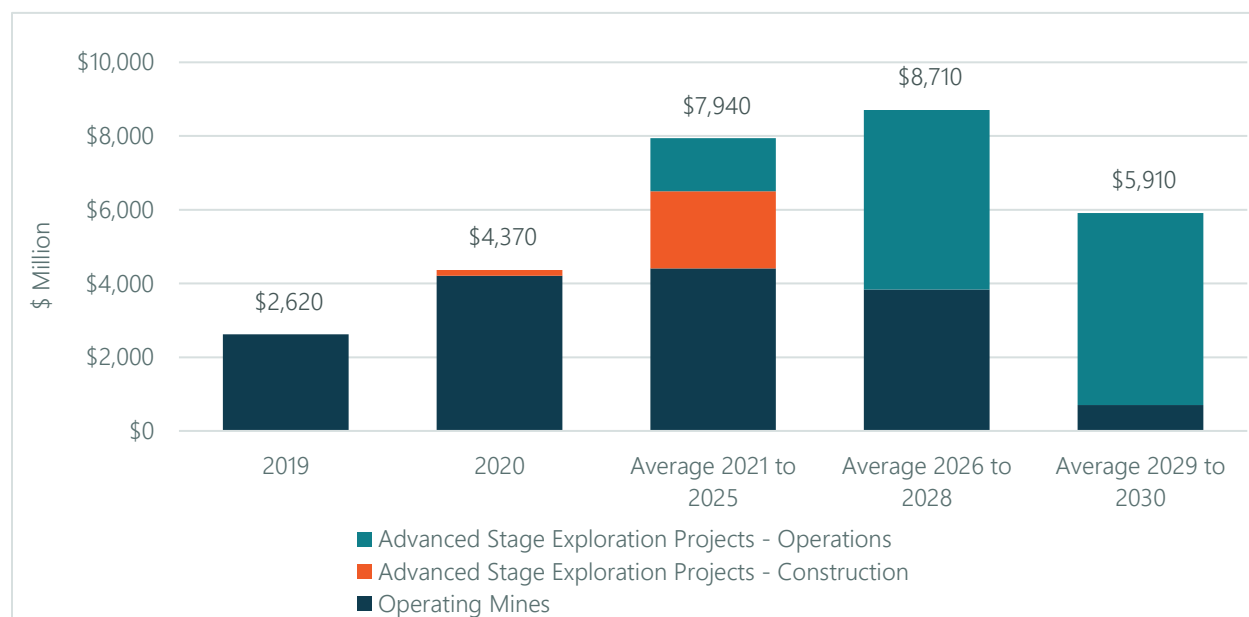


Figure 28: Total GDP - Direct, Indirect and Induced (\$ Million) – 2019 to 2030

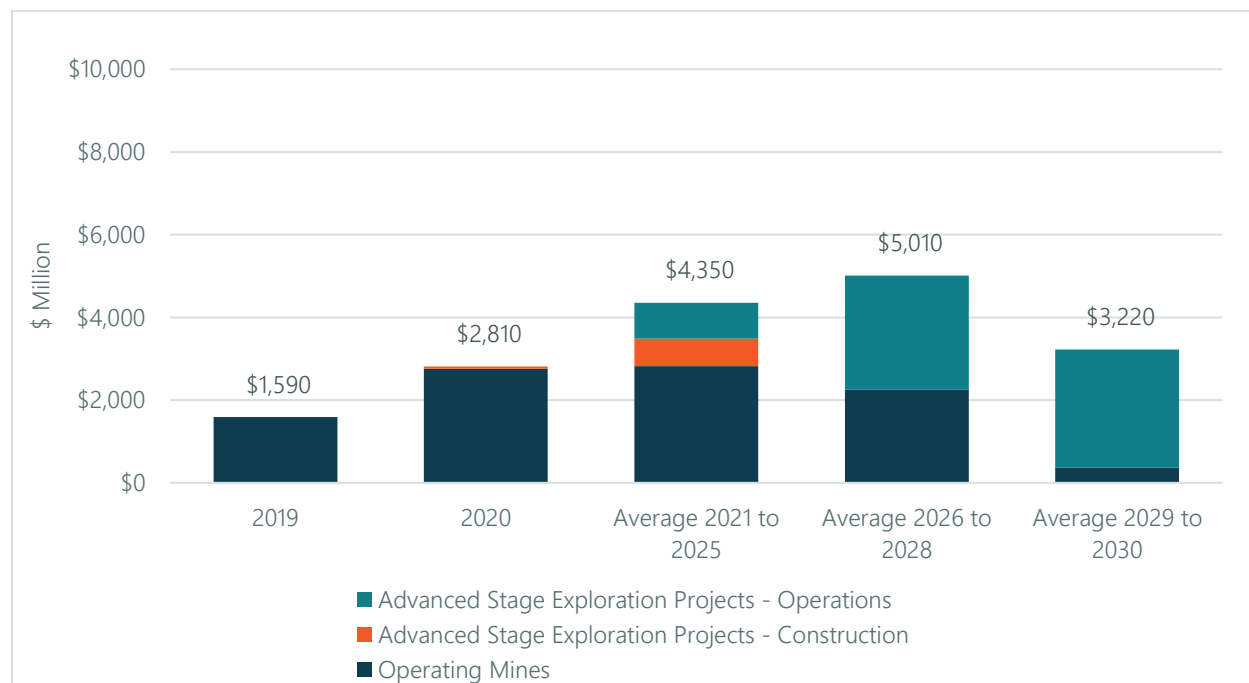


Figure 29: Total Wages and Salaries - Direct, Indirect and Induced (\$ Million) – 2019 to 2030

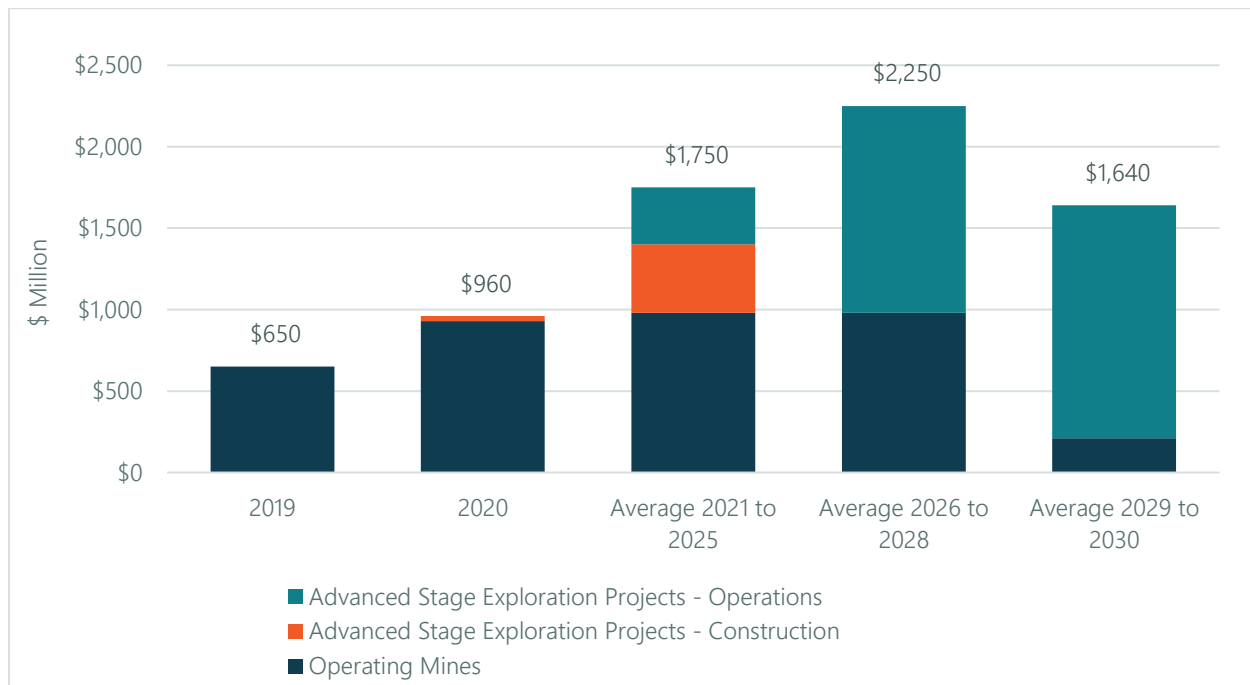


Figure 30: Total Employment- Direct, Indirect and Induced (Jobs) – 2019 to 2030

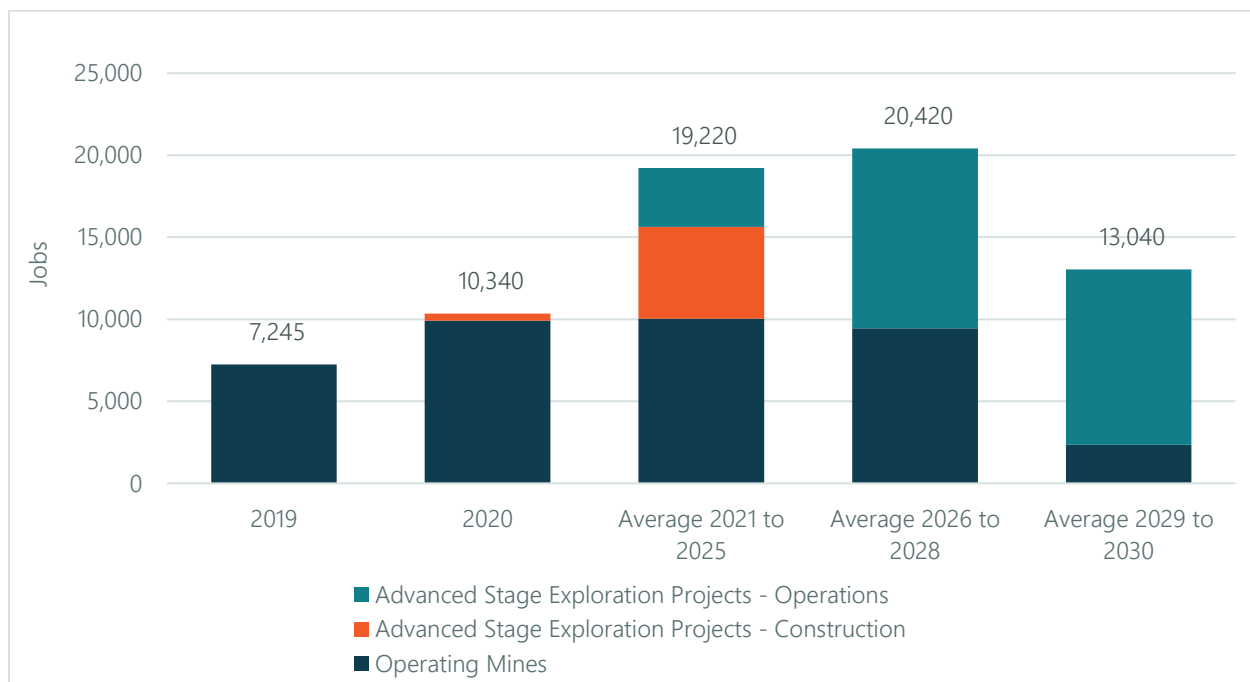
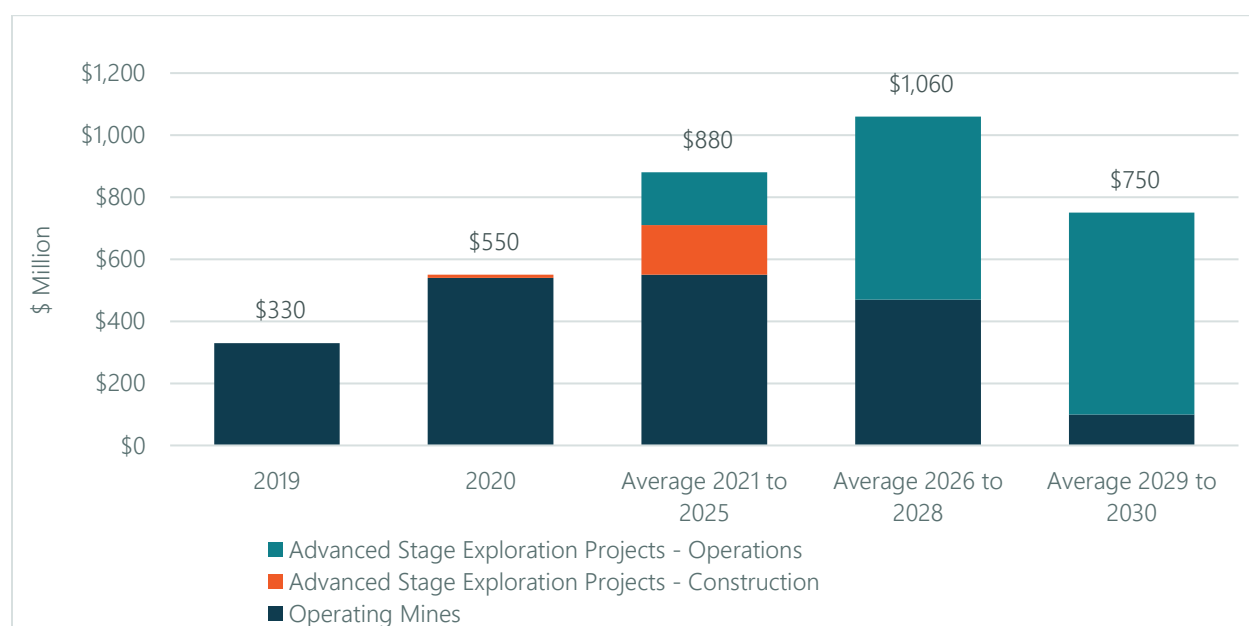


Figure 31: Total Government Revenue - Direct, Indirect and Induced (\$ Million) – 2019 to 2030³³

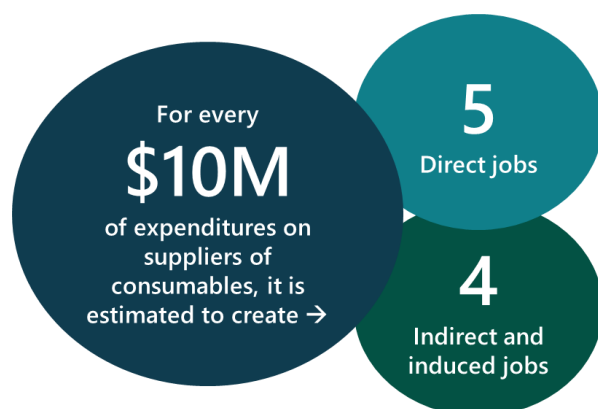


8.3 Local Supply and Services

Industry representatives interviewed reported purchasing most goods and services in the local area. The goods and services purchased outside the area include specialized engineering services, specialized processing equipment, drilling services, design and construction services. Goods and services purchased within the local area were estimated to account for approximately 70 percent of spending on vendors by the operating mines. In 2019 this was estimated to be approximately \$500 million.

Increased production in the direct mining operations activities is expected to lead to increased demand for consumables such as small tools, safety supplies, fuels, lubricants, construction materials, equipment rentals, and logistics services amongst numerous other types of indirect production costs (Figure 32).

Figure 32: Typical economic impacts in consumables and product distribution type activities



³³ Government revenue includes corporate income tax, personal income tax on wages, sales tax, royalties as well as property taxes.

9.0 Strategic Recommendations

The strategic recommendations developed by MNP are designed to align with stakeholder feedback, the CEDC's mandate, and the Mining Readiness Strategy's priority scope categories to ensure each strategic recommendation is measurable, achievable and supports the mining sector in Northwestern Ontario. Due to the imminent growth of the mining sector in Northwestern Ontario, the recommendations by MNP are concise and optimized to ensure they could be implemented by the CEDC in one to two-year timeframe prior to the mining sectors anticipated major growth expected in a few years.

9.1 Recommendations Summary

The strategic recommendations based on MNP's research and analysis are intended to be the cost effective and concise actions which the City/CEDC can take to improve the overall regional industry awareness and involvement in supporting the impending growth in the exploration and mining sector. Although there may be some variation in permitting and approvals timelines for the advance stage exploration projects, there is still a benefit to acting early and getting ahead of the forecast curve.

Note: MNP understands the CEDC is currently undergoing a website update initiative and may have already implemented some of the suggestions outlined in the recommendations.

The strategic recommendations and the specific tasks which the City/CEDC should undertake are detailed in Table 6.

Table 6: Mining Readiness Strategic Recommendations

1. The City/CEDC should act quickly to implement the strategic recommendations due to the near-term anticipated growth in the exploration and mining sector.
1.1. Strategic actions should be implemented within the next 12 months as exploration and mining activity will begin ramping up in 2021.
2. Leverage technology and digital media by enhancing the CEDC Mining website. Allows ease of access to contemporary information and facilitate the exchange of data which showcases Thunder Bay as the exploration and mining hub. Stakeholders indicated that one of the most important needs is an easy means to find supply and services listings. A robust website is a cost effective, efficient means to achieve this end.
2.1. Create and implement a website and digital marketing plan that pushes information out to the public in the areas of focus related to the Mining Readiness Strategy: 2.1.1. Attracting and expanding supply and service businesses. 2.1.2. Available vacant land in the city. 2.1.3. Existing mining supply and services already located in the city. 2.1.4. Workforce training resources.

- 2.1.5. Job opportunities in mining.
- 2.1.6. Local education, research and training centers.
- 2.1.7. Road construction infrastructure updates.
- 2.1.8. Electrical infrastructure projects, and regional electricity demand forecasts.
- 2.1.9. Economic contributions of the mining sector on the local economy.
- 2.1.10. Government initiatives that support the mining sector nationally, provincially, and in Northwestern Ontario.

3. Develop or Expand on the City/CEDC mining readiness Marketing and Communications plan to ensure the CEDC is widely known as the node for facilitation, collaboration, training and information for the mining sector. The plan should have the key attributes as follows:

- 3.1. Facilitate introductions between the various mining companies and associations through working groups, webinars, panel discussions and quarterly virtual sessions to improve local mining sector communications, expand local business opportunities, and better understand training requirements.
- 3.2. Provide quarterly Northwestern Ontario mining sector email communications with a dashboard of activity in the region (status of exploration projects, job availabilities at the operating mines, infrastructure updates, etc.).
- 3.3. Develop case studies of successful Indigenous community engagements, including operating mines with a high percentage Indigenous workers and Indigenous joint venture businesses to communicate successes, challenges, and best practices to overcome barriers.
- 3.4. Develop strategies to continue to promote Thunder Bay as full-service community that has all the required services available to attract and retain mining workers and their families.
- 3.5. Communicate Northwestern Ontario mining sector updates to all levels of government using industry gathered data on topics such as infrastructure requirements, and exploration and mining permitting barriers.
 - 3.5.1. CEDC to take active role in bringing awareness to the applicable government agencies for the need to improve the efficiency of the permitting process.

4. Advanced facilitation and knowledge transfer about the regional Mining Supply and Services offerings. Promote new opportunities by making prospective clients and companies aware of who's in the region and able to support the growing mining industry.

- 4.1. Promote the capabilities of the existing 400+ mine supply and service businesses in Thunder Bay through enhancing the existing CEDC mining directory, mining website and implementing communication and marketing initiatives.
- 4.2. Focus on communicating and developing the critical mineral processing opportunities that are becoming available due to the Northwestern Ontario lithium and graphite deposits (e.g. Rock Tech Lithium and Avalon Advanced Materials letter of intent).

- 4.3. Update the existing mining supply and services directory on the CEDC Mining website with additional business information such as specialty service offerings, facility sizes and capabilities, and brief business descriptions.
- 4.4. Provide information on the mining supply chain on the CEDC Mining website (mine supply and services) to enhance public knowledge of the mining sector, attract mining related businesses to the region or assist existing businesses transition to the mining sector.
- 4.5. Add the city's available vacant commercial and industrial land to the CEDC website, including location, type, contact and size information. Highlight special economic zones or tax incentives where applicable.

5. Promote Thunder Bay as the Workforce Training and Development hub for mining sector and inform the education and training associations of what types of jobs are needed in the future.

- 5.1. Regular communications with the exploration and mining companies to gather information and data on existing skills gaps, and current and future workforce requirements for their operations.
- 5.2. Facilitate a working group with local training and education providers to breakdown perceived, current or past barriers. CEDC to represent the demand side (mining industry) through providing employment data gathered from existing mining operations.
 - 5.2.1. Communicate mining workforce and training requirements with local education and training centers to assist in job placement services and creating or enhancing training programs.
 - 5.2.2. Engage with educational institutions in planning program offerings.
- 5.3. Promote the skills, positions and training required by existing mining operations to educate locals on how to achieve employment in the local mining sector.
- 5.4. Provide a list of local training centers (university, college, training centers, etc.) on the CEDC website to showcase Thunder Bay as the hub for education in the region.
 - 5.4.1. Create a separate section on the CEDC Mining website that specifies the city's specialized exploration and mining related education opportunities and specialized research centers (e.g. CESME).

6. Improve the regional mining industry stakeholders' awareness of the Transportation and Electrical Infrastructure needs and planned or in-progress projects.

- 6.1. Prioritize regular communications with the exploration and mining companies to gather information and data related to their specific transportation and electricity requirements.
- 6.2. Communicate infrastructure requirements, concerns, and barriers to the appropriate business and government parties.
- 6.3. Provide public updates on infrastructure initiatives in the region:
 - 6.3.1. Electricity requirements for existing and future mining operations to assist with regional capacity planning.

6.3.2. New transportation networks being developed in the region (e.g. developments at the port, Ring of Fire road constructions, airport infrastructure improvements).

6.4. Prioritize the City's International Airport runway and lighting upgrades to facilitate additional flights throughout the day which better align with mining staff's travel needs.

7. Evaluate strategic incentives and municipal infrastructure priorities which incentivize Business and Economic Development for the Mining Sector.

7.1. Consider strategic incentives for mining supply and services companies (community improvement plans, zoning bylaws, support for emerging critical minerals industry, designated special economic zones at the waterfront, mining business support grants, etc.). A further detailed economic study of the cost/benefit of such incentives should be undertaken in early 2021.

7.2. Prioritize municipal infrastructure development for undeveloped commercial properties as new tenants/owners confirm their new business is for the mining sector. In the City's Official Plan, realign resources to facilitate the needed infrastructure on an expedited basis.

7.3. Develop or expand the existing City/CEDC COVID-19 economic recovery plan to prioritize the facilitation of mining supply and service companies in the City.

9.2 Recommendations Business Case Summary

Each of the 23 strategic recommendations above was analyzed against value, complexity, investment, and timeline by MNP in order to summarize in the business case table based on the criteria definitions below:

- Value
 - Low: Minimal number of groups (1-2) are impacted, reached or benefit from the action.
 - High: Large number of groups (2+) are impacted, reached or benefit from the action.
- Complexity
 - Low: Minimal CEDC resources or stakeholder group participation (1-2) required.
 - High: Large number of CEDC resources or stakeholder group participation (2+) required.
- Investment
 - Low: Less than \$10k of CEDC investment, or less than 100 hours of internal or contractor time.
 - Medium: Between \$10k to \$50k of CEDC investment, or between 100 to 500 hours of internal or contractor time.
 - High: More than \$50k of CEDC investment, or more than 500 hours of internal or contractor time.

The results of evaluating each recommendation to the above-mentioned criteria is outlined in Table 7 and the CEDC should evaluate and prioritize strategic actions based on the available budget and resources:

Table 7: Business Case Summary of Strategic Recommendations

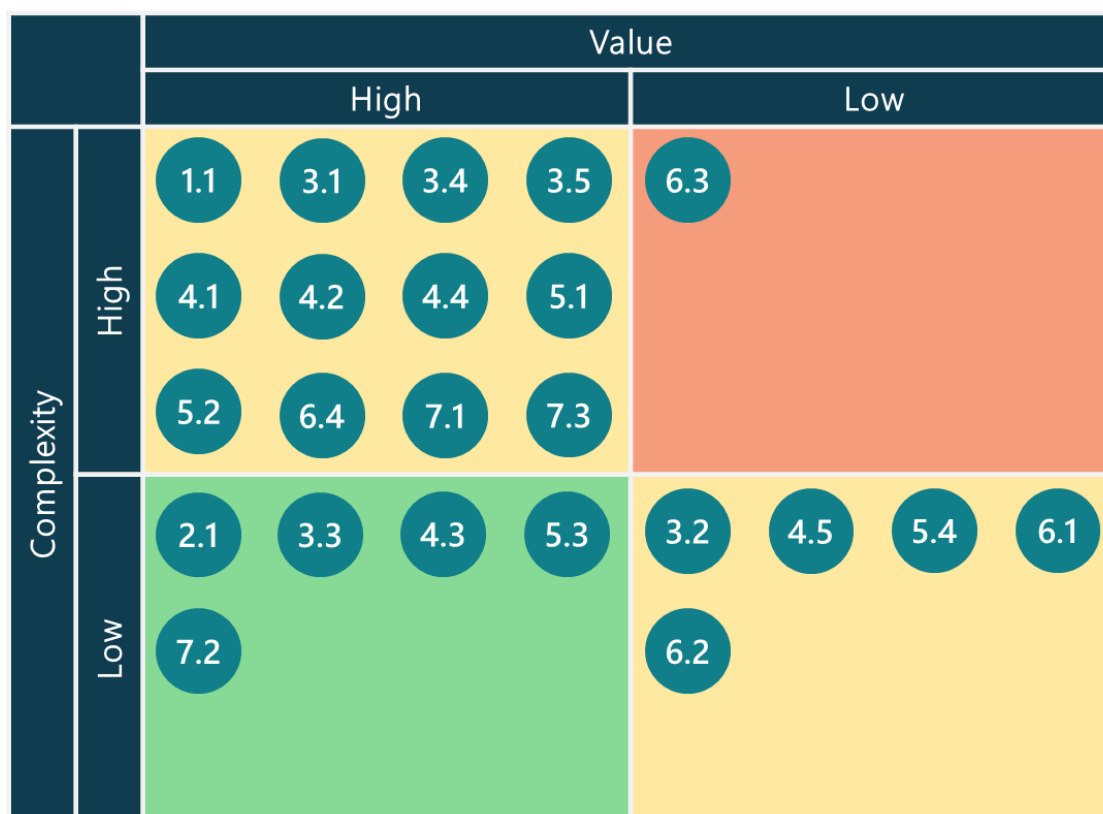
No.	Recommendation	Value (L/H)	Complexity (L/H)	Investment (L/M/H)	Timeline (months)
1.1	Implement strategic actions within next 12 mths	H	H	L	12
2.1	Digital media and website enhancement plan	H	L	L	6
3.1	Facilitate industry introductions	H	H	H	12
3.2	Provide quarterly dashboard emails	L	L	L	3
3.3	Case studies of successful indigenous relations	H	L	L	3
3.4	Promote Thunder Bay as a full-service community	H	H	M	12
3.5	Regular government communications on mining	H	H	M	12
4.1	Promote existing mining sector supply/services	H	H	H	12
4.2	Communicate/develop critical mineral processing	H	H	H	6
4.3	Enhance existing mining supply/service directory	H	L	H	9
4.4	Mining sector supply chain info on CEDC website	H	H	M	6

No.	Recommendation	Value (L/H)	Complexity (L/H)	Investment (L/M/H)	Timeline (months)
4.5	Available vacant land info on CEDC website	L	L	L	3
5.1	Gather skills gaps and current/future job data	H	H	M	12
5.2	Facilitate working groups with trainers/educators	H	H	M	9
5.3	Promote mining skills, positions and training	H	L	M	12
5.4	Provide information on local education/training	L	L	L	6
6.1	Gather data on site infrastructure requirements	L	L	L	3
6.2	Communicate infrastructure gaps and barriers	L	L	M	3
6.3	Public updates on infrastructure initiatives	L	H	M	6
6.4	Prioritize updating the International Airport	H	H	L	12
7.1	Strategic incentives for attracting businesses	H	H	H	12
7.2	Prioritize municipal infrastructure developments	H	L	L	6
7.3	Develop/expand COVID-19 economic recovery	H	H	H	12

9.3 Recommendation Priority Heat Map

The strategic recommendations priorities are summarized in the below heat map and are based on their ratio between Value and Complexity, with low complexity and high value as the readily achievable option (Figure 33). One of the reasons that MNP has assessed many recommendations as high complexity is due to the number of participants or stakeholders, but this should not dissuade the CEDC from undertaking. High complexity, high values recommendations may seem as less preferred, but will provide longer term and more impactful benefits if undertaken.

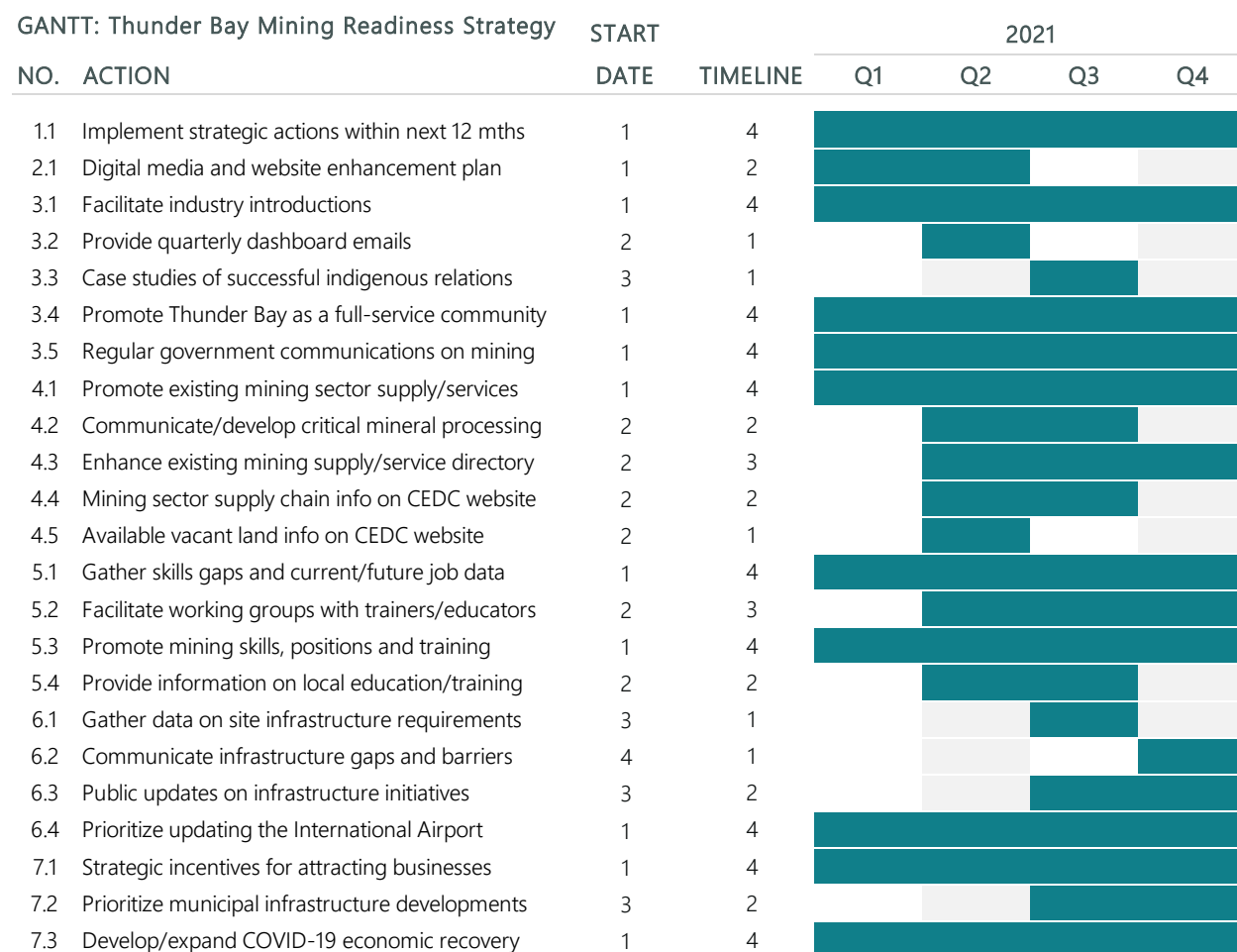
Figure 33: Strategic Recommendations Heat Map



9.4 Estimated Implementation Plan

The implementation plan outlines the expedited need to implement the strategic actions to ensure Thunder Bay and the CEDC are prepared to support the impending mining sector growth in the immediate years (starting 2021), outlined in Figure 34.

Figure 34: GANNT Chart Implementation Plan, 2021



9.5 SMART Performance Metrics

MNP has prepared the following table of recommended SMART performance metrics for each of the noted strategic recommendations (Table 8). There is flexibility to what the final CEDC approved measures and performance metrics will be, but it is important for management reporting and overall governance purposes to have an agreed set in order to effectively manage the implementation program.

Table 8: Key Performance Indicators (KPIs) for Strategic Actions

No.	Recommendation	Measure	Performance Indicator
1.1	Implement strategic actions within next 12 months	Number of approved strategic actions	Target 80% completion
2.1	Digital media and website enhancement plan	Website upgrade to design scope completeness (Y/N)	Complete by target date
3.1	Facilitate industry introductions	Number of introductions	Target 5 new business relationships per exploration & mining co.
3.2	Provide quarterly dashboard emails	Quarterly updates complete	Quarterly updates complete over for 36 months
3.3	Case studies of successful indigenous relations	Case studies presented or published	One per quarter
3.4	Promote Thunder Bay as a full-service community	Publications or presentations complete	One per quarter
3.5	Regular government communications on mining	Number of assistance meetings or facilitations complete	Turnaround request within 30 days
4.1	Promote existing mining sector supply/services	Complete enhanced website listing (Y/N)	Complete by target date
4.2	Communicate/develop critical mineral processing strategic support	Complete detailed plan to support critical minerals (Y/N)	Complete by target date
4.3	Enhance existing mining supply/service directory	Complete to directory specifications (Y/N)	Complete by target date
4.4	Mining sector supply chain info on CEDC website	Complete to specifications (Y/N)	Complete by target date
4.5	Available vacant land info on CEDC website	Complete to specifications (Y/N)	Complete by target date
5.1	Gather skills gaps and current/future job data	Complete and upload list to website (Y/N)	Update complete and posted each quarter

No.	Recommendation	Measure	Performance Indicator
5.2	Facilitate working groups with trainers/educators	Number of working groups in progress or planned	Complete quarterly updates per each group
5.3	Promote mining skills, positions and training	Number of publications or website articles complete	Complete one per quarter
5.4	Provide information on local education/training	Number of publications or website articles complete	Complete by target date
6.1	Gather data on site infrastructure requirements	Complete & publish compilation of infrastructure needs	Complete by target date
6.2	Communicate infrastructure gaps and barriers	Number of meetings arranged with government entities	Meetings confirmed within a quarter timeframe
6.3	Public updates on infrastructure initiatives	Number of publications or website articles complete	Complete one per quarter
6.4	Prioritize updating the International Airport infrastructure	Confirm City approval to proceed with upgrade	Complete by target date
7.1	Strategic incentives for attracting businesses	Complete study & specifications of incentives (Y/N)	Complete by target date
7.2	Prioritize municipal infrastructure developments	Complete list of priority municipal development zones (Y/N)	Complete by target date
7.3	Develop/expand COVID-19 economic recovery	Exploration & mining priority actions to support Covid-19 economic recovery are incorporated in the master plan (Y/N)	Complete by target date