Ring of Fire Regional Assessment

Development Scenario Mapping Final Report

Regional Assessment Working Group

March 31, 2026

Overview

This report presents scenarios of plausible future development in the Ring of Fire (ROF) Regional Assessment Area, including associated mapping products.

These scenarios have been developed to support the Regional Assessment Working Group (RAWG) in identifying and describing how development may occur across the region under different conditions and over multiple timeframes. As described in the ROF Regional Assessment (RA) Terms of Reference, the identification of development scenarios supports the assessment of potential effects and the development of recommendations.

The development scenarios were informed by base mapping, review of available data and literature, and scenario-planning discussions held with the Regional Assessment Working Group (RAWG) between March 2025 and February 2026. A participatory scenario matrix approach was used to define four contrasting scenarios based on two key dimensions: **Indigenous Governance and Development Pressure**. These dimensions form the axes of a 2×2 matrix that generates four contrasting scenarios:

- **Scenario 1: Indigenous-Led Planning** – Strong Indigenous governance and low development pressure, with First Nations guiding land use, stewardship, and community-based development.

- **Scenario 2: Gradual Change** – Low development pressure and limited Indigenous governance, resulting in slow, uneven growth and ongoing community service, infrastructure, and governance gaps.

- **Scenario 3: Co-Governed Growth** – High development pressure and strong Indigenous governance, leading to managed development under shared decision-making and stewardship.

- **Scenario 4: Accelerated Development** – High development pressure with limited Indigenous governance, resulting in rapid, externally driven expansion of mining and infrastructure.

These scenarios and associated mapping products are intended to illustrate plausible development configurations and support the Regional Assessment process. They do not assess the potential impacts of development, but provide a structured basis for subsequent analysis, including integration of community and ecological data and evaluation of cumulative effects.

The remainder of this document explains the approach to scenario analysis used, outlines the steps taken to develop the scenarios, and presents each scenario in more detail. It concludes with a description of how the scenarios are operationalized into spatial maps and how they will support the next stages of the RA.

Approach to Scenario Analysis

Scenario analysis is a structured process used to explore how a system might change under different plausible futures. In environmental assessment and planning, scenario analysis supports regional and cumulative effects assessment, long-term planning, and decision-making by examining how different combinations of driving forces may influence future regional conditions (Duinker & Greig 2007; Qortado 2023).

There are several established approaches to scenario analysis, including exploratory narrative methods, quantitative modelling, and structured frameworks such as scenario matrices that organize scenarios around key drivers of change (Amer et al., 2013). Participatory scenario approaches have increasingly been used to integrate local and Indigenous knowledge in environmental planning and sustainability assessments (Natcher et al. 2021; Cordova-Pozo et al. 2023).

For the ROF RA, a participatory scenario-matrix approach was used to explore how the region could plausibly evolve under different futures, including the nature and intensity of potential development. This approach is grounded in the understanding that **scenarios**, **parameters** (**types of change)**, **external drivers (outside forces)**, and **community priorities** represent interlinked concepts that together describe how complex systems can unfold over time.

- **Scenarios** are descriptions of different possible futures used to explore how regional conditions may change over time (Duinker and Greig 2007). They are not predictions, but an exploration of what might happen given certain trends, uncertainties, and choices.

- **Parameters (types of change)** are the types of things that change over time. They provide the tangible building blocks of each scenario, such as infrastructure development, community growth, or land and water stewardship. Each parameter is represented by mappable features.

- **External drivers (outside forces)** are the factors that shape how change occurs. External drivers are outside of our control and include broad influences such as policy directions, market dynamics (e.g., mineral prices), demographic shifts, technological change, and governance approaches. While parameters describe what changes, drivers explain why and how change occurs.

- **Community priorities** represent the values, goals, and desired outcomes that communities seek to realize in the future (e.g., enhanced community services). They provide a values-based complement to the external drivers of change, expressing what communities consider to be desirable.

A 2×2 scenario matrix (or four box framework) was used to develop scenarios for the ROF RA (see Figure 1). Scenario-matrix methods are widely used in environmental planning and foresight to examine how interactions between two critical and uncertain dimensions can shape

future conditions (Rhydderch 2017; Duinker and Greig 2007). Crossing the two drivers in a matrix produces four contrasting yet internally consistent scenarios, each representing a distinct combination of parameter states.

Scenario Development Process

This section describes the process undertaken to develop the scenarios. The scenario development followed six main steps:

1. Defining Spatial and Temporal Boundaries;
2. Identifying Key Parameters (Types of Change);
3. Identifying External Drivers of Change;
4. Identifying Community Priorities;
5. Selecting Two Key Dimensions for the Scenario Matrix; and
6. Scenario Confirmation and Operationalization.

This process built directly on the earlier scenario planning discussions led by the RAWG in March and June 2025. The March and June workshops explored possible development intensities, timeframes, and community priorities for the region. A subsequent workshop in October 2025 expanded on this work to identify tangible parameters of regional change, external drivers, and community aspirations to support development of the scenario framework.

Each step is described in detail below.

Step 1. Defining Spatial and Temporal Boundaries

The scenario development process began with defining the spatial and temporal boundaries for the analysis, grounded in the Regional Assessment Terms of Reference (TOR) and guided by the input received from the RAWG during the March, June, and October 2025 workshops.

Spatial Boundary

The spatial boundary for scenario mapping is the Regional Assessment Area (RAA) as defined in the TOR. RAWG members emphasized that scenarios should reflect conditions across the full RAA, viewed through the lenses of homelands, land use, and stewardship responsibilities. The scenario maps will therefore illustrate future conditions across the entire assessment area rather than focusing on localized project footprints.

Temporal Boundaries

The TOR requires that the RA identify potential development scenarios “with attention to different development intensities and timeframes.” RAWG workshop discussions further reinforced the importance of considering multiple temporal horizons, noting that regional futures vary from near-term project activity to long-term intergenerational change.

Based on the TOR and RAWG guidance, four temporal boundaries were selected:

- Near-Term: 5–10 Years;
- Medium-Term: ~30 Years;
- Long-Term: ~60 Years; and
- Intergenerational-Term: ~150+ Years ("Seven Generations").

Step 2. Identifying Parameters (Types of Change)

Parameters (types of change) were identified through a facilitated RAWG workshop held on October 21, 2025, and were informed by review of available spatial data and materials from previous RAWG meetings. During the workshop, participants reflected on the human activities, infrastructure, and stewardship actions they expect to see in the region over the coming decades. Working in small groups, participants discussed these potential future developments and then reported back in plenary.

RAWG input was recorded on a Miro digital whiteboard using virtual sticky notes, which captured a wide range of ideas related to infrastructure, industrial activity, community services, and environmental management. During the workshop, these notes were synthesized and organized into four thematic clusters[1] representing broad types of change of regional change, including:

- **Access and Infrastructure** – transportation, energy, and communication systems such as roads, rail, ports, pipelines, and airstrips;
- **Cumulative Industrial Development** – sectors including mining, forestry, hydroelectricity, nuclear (SMRs), and emerging technologies such as AI and automation;
- **Community Growth** – services, housing, and facilities that support population change and community well-being, including health care, housing, work camps, and cultural infrastructure; and
- **Conservation and Indigenous Economy** – land and water stewardship initiatives, protected areas, renewable energy projects, wild rice harvesting, fish farms, and ecotourism.

An image of the Miro board summarizing the grouped parameters (types of change) is provided in Appendix A.

Step 3. Identifying External Drivers of Change

The next step of the process focused on identifying the outside forces and uncertainties most likely to influence how regional conditions evolve. The discussion drew on the PEESTL

[1] A fifth cluster was identified (appearing in grey in the Miro board displayed in Appendix A) that relates more to external drivers than to parameters.

framework (Political, Economic, Environmental, Social, Technological, and Legal) suggested by a RAWG delegate to help thinking about external change.

Working in plenary, participants reflected on factors that could shape development pathways in the region, such as market demand and international trade; energy prices; population growth; immigration; labour and union dynamics; regulatory and legislative change; Indigenous governance and self-determination; and environmental commitments. These ideas were recorded on a Miro board using virtual sticky notes (Appendix A) and later grouped into thematic categories of influence (Table 1)[2].

This step provided a set of drivers of change that represent the external context against which community decisions and regional development will unfold. These drivers were subsequently considered alongside community-defined priorities to establish the key dimensions for the scenario matrix.

Table 1: Thematic Grouping of Key External Drivers

TERMS IDENTIFIED IN OCT 2025 RAWG WORKSHOP	THEMATIC GROUPING OF KEY EXTERNAL DRIVERS
Population growth; Immigration	**Demographic Change**
Labour, employment, economy; Unions	**Labour Dynamics**
Self-determination and Indigenous governance; Assertion of rights	**Indigenous Governance and Rights**
Legislation (Bills 5 and C-5); Regulations and legislation; Governance	**Crown Policy and Legislation**
Environmentalism; Canada's environmental commitments; Water scarcity	**Climate and Environmental Change**
Defense spending; Geopolitics and international markets; International trade; U.S. tariffs; Mineral value; Metal prices; Energy demands; Shipping ports and routes	**Geopolitics, Trade, and Global Commodity Markets**

Step 4. Identifying Community Priorities

Building from the discussion of external drivers, the RAWG turned its attention to community priorities, referring to the outcomes, values, and future conditions that communities wish to achieve. This conversation also took place in plenary, with feedback captured on the Miro board (Appendix A). Community aspirations were later grouped into thematic areas (Table 2).

Participants identified a broad set of aspirations related to health and well-being; clean water and reliable heating; community infrastructure and housing; cultural continuity and language preservation; youth engagement; and economic participation and self-reliance. These reflections express community priorities for future change in the region.

[2] While key drivers are interdependent (e.g., demographic change may result from development driven by global commodity markets), they are grouped independently for the purpose of the scenario framework.

Table 2: Thematic Grouping of Key Community Aspirations

TERMS IDENTIFIED IN OCT 2025 RAWG WORKSHOP	THEMATIC GROUPING OF KEY COMMUNITY ASPIRATIONS
Access to quality health care; Well-being; Healing and healthy communities; Equality with all Canadians (health, education, etc.); Community cohesion and family skills training	**Health, Well-Being, and Quality of Life**
Community infrastructure; Elders facilities; Recreational facilities; Heating; Clean water	**Community Infrastructure and Services**
Cultural resiliency; Language preservation; Land-based seasonal activities (particularly for youth)	**Cultural Continuity and Resilience**
Participation in economic development; Own-source revenue	**Economic Participation and Self-Reliance**
More land and additions to reserve lands; Capacity; Ability to participate	**Land, Governance, and Self-Determination**

Step 5. Selecting Two Key Dimensions for the Scenario Matrix

Following the workshop, the project team reviewed and synthesized the feedback gathered through the Miro board discussions on external drivers and community aspirations.

The RAWG identified a wide range of forces potentially shaping the region's future. When examined together, these inputs clustered into two overarching dimensions that consistently emerged as likely to be the most influential in shaping divergent regional futures:

- **Indigenous Governance** – representing the degree to which Indigenous Nations exercise decision-making power, jurisdiction, and stewardship responsibility over land use, development, and community futures. Indigenous governance was chosen for this dimension as it is a key structural condition that enables communities to achieve the stated aspirations.
- **Development Pressure** – representing the external forces (particularly global market demand, investment patterns, and political dynamics) that influence the scale and pace of industrial development and infrastructure expansion in the region.

Climate change also emerged as a key dimension but will be incorporated into scenario development as a cross-cutting overlay rather than as a scenario-defining axis. Unlike other external drivers identified in the workshop, climate change does not align neatly with the two meta-categories. Instead, it represents a pervasive external condition that will influence all futures regardless of the level of development pressure or the degree of Indigenous governance.

Step 6. Scenario Confirmation and Operationalization

The draft 2×2 scenario matrix (*Indigenous Governance X Development Pressure*) was presented to the RAWG for review and confirmation on November 26, 2025. RAWG feedback

was used to refine the narrative framing of each of the four scenarios, ensuring that the descriptions accurately reflect community priorities, concerns, and expectations about how regional conditions could evolve under different futures.

The project team will operationalize each scenario by translating the qualitative narratives into spatially and temporally explicit representations of future regional conditions.

Scenarios

The scenario matrix below presents four plausible futures for the Ring of Fire region based on the two key dimensions identified through the workshop process and subsequent synthesis: Indigenous Governance and Development Pressure. These scenarios will serve as the foundation for spatial scenario mapping. Climate change will be incorporated as a cross-cutting overlay during scenario elaboration to illustrate how climate-related stressors interact with each scenario.

1. Indigenous Governance

This dimension reflects the degree to which Indigenous Nations exercise jurisdiction, governance, stewardship responsibility, and decision-making power over land, water, and development activities.

- **Limited Indigenous Governance**: Limited recognition of and limited active protection of rights; procedural participation in Crown-led processes; and constrained Indigenous capacity to influence development pathways or stewardship regimes.

- **Strong Indigenous Governance**: Strong recognition and protection of Indigenous rights; substantive co-governance; community-led planning; and expanded Indigenous stewardship of land and water.

2. Development Pressure

This dimension reflects the level of external pressure for regional development arising from factors such as global commodity markets, political and geopolitical dynamics, investor activity, and national mineral strategies.

- **Low Development Pressure**: Weak or fluctuating commodity demand and prices; limited investment; slower or stalled infrastructure expansion; high cost per unit of production compared to international sources; and fewer project proposals.

- **High Development Pressure**: Strong global demand for critical minerals and high prices; active investment; accelerated infrastructure development; lower cost per unit of

production compared to international sources; and multiple overlapping project proposals.

Figure 1 presents the scenario matrix, followed by descriptions of each scenario.

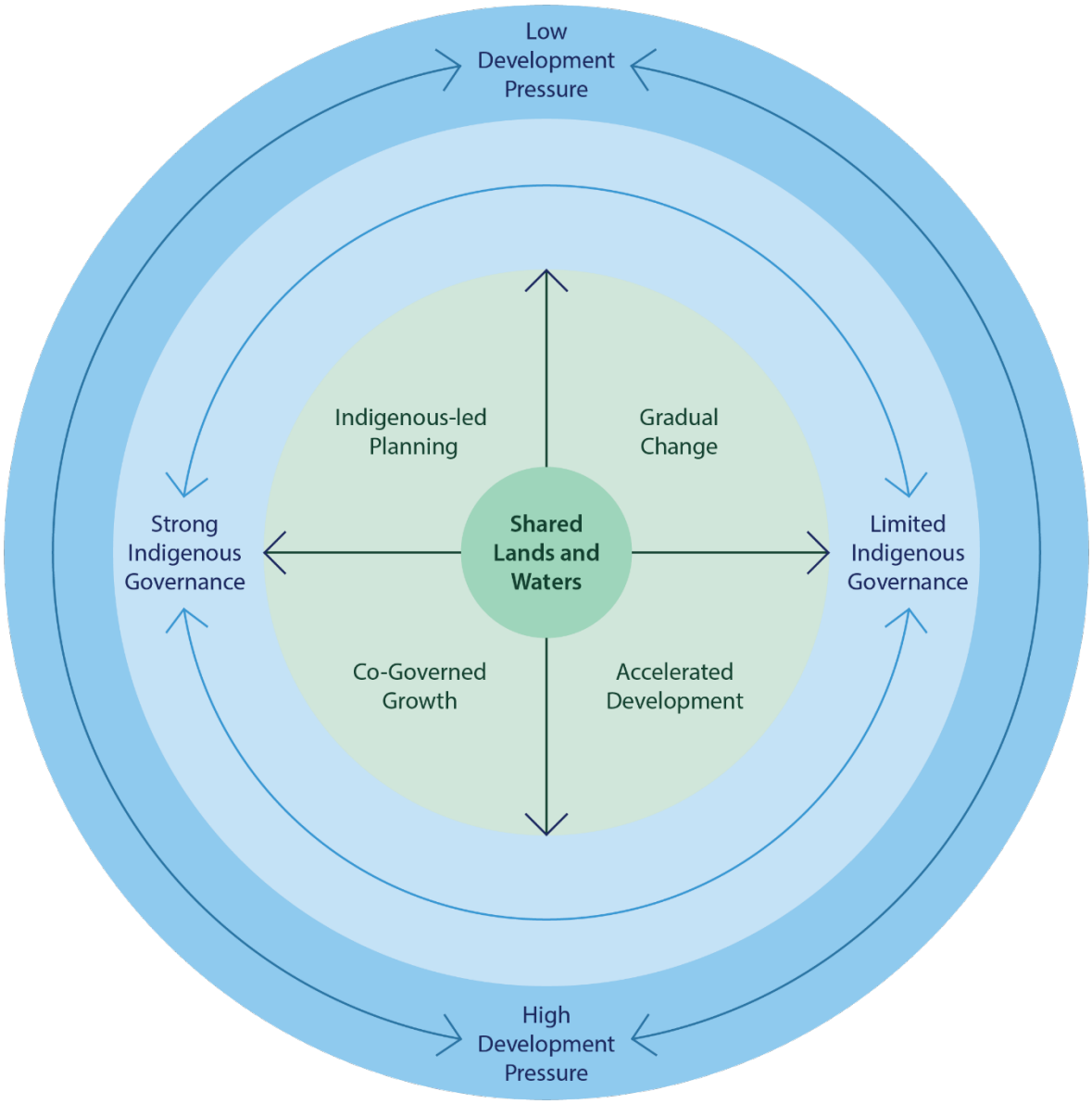

Figure 1: Scenario Matrix for the Ring of Fire Regional Assessment

Scenario 1: Indigenous-Led Planning

Low development pressure coincides with strong Indigenous governance, enabling Nations to advance land stewardship, cultural revitalization, and community-defined economic development. Land use planning, conservation initiatives, and Indigenous economic activities (e.g., renewable energy, cultural tourism, wild rice, fisheries) expand. Infrastructure development is strategic and community-led (or at least community-endorsed). The regional future is shaped primarily by Indigenous values, governance structures, and long-term stewardship goals.

Scenario 2: Gradual Change

With low development pressure and limited Indigenous governance, the region experiences slow economic activity, limited new infrastructure, and few major project proposals. Decision-making remains primarily Crown-driven, and opportunities for expanding Indigenous governance or stewardship capacity are constrained. Indigenous communities may face ongoing challenges in accessing infrastructure, services, and economic opportunities.

Scenario 3: Co-Governed Growth

Strong Indigenous governance coincides with high development pressure. Nations play a central role in decisions about land use, project approvals, conditions, monitoring, and stewardship, supported by appropriate capacity. Development proceeds, but under co-governed frameworks that ensure cultural values, rights, land use priorities, and community benefits shape development outcomes. Infrastructure expansion is negotiated to support a mixture of Indigenous and national/provincial economic and community goals. Stewardship regimes are strengthened, and cumulative effects are actively managed.

Scenario 4: Accelerated Development

High external demand drives rapid project proposals, infrastructure expansion, and exploration activity across the region. With limited Indigenous governance, development proceeds under existing Crown regulatory structures with procedural consultation but limited shared decision-making, and on an expedited timeline. Industrial footprints expand quickly and access corridors are developed primarily to facilitate mineral extraction. Community benefits are uneven (in part due to the difficulty of developing Indigenous “ability to take advantage” within tight timeframes) with high benefit leakage away from local and Indigenous communities. Indigenous stewardship priorities struggle to keep pace with development pressures.

Scenario Mapping Methodology

To produce the four scenarios described above and visualize how they can be expected to differ across the four time periods, various geospatial operations and processes were used to modify different types of map features that represent current-day (baseline) and plausible future developments. These operations and processes have been organized into a model (referred to as the Scenario Model) that can be used to vary the input map features and see different output scenarios. The use of this model follows similar approaches used in the past to explore different land use outcomes in northern Ontario (Carlson & Chetkiewicz, 2013).

The Scenario Model uses a grid-based approach (hexagons) for summarizing different selected (and optionally buffered) map features within the Regional Assessment Area using a geographic information system (GIS). These map features represent cumulative (baseline) disturbances, as well as plausible disturbances that could occur if proposed projects are implemented. Each hexagon represents an area of 10 square kilometres (km^2) and is used to approximate the geographical extent and density of current and plausible future development. This information was used to develop the scenarios, as described below. A complete GIS model diagram of the methodology is provided in Appendix B, with input dependencies in Appendix C through F. A Baseline Map is available from use of the Scenario Model (see Figure 7). The remainder of this section provides a general overview of the workflow available to display different scenarios.

1. Baseline Map

First, a summarized Baseline Map was established (see Figure 7) by counting past and present access, linear, and industrial features within the grid, as seen in the diagram below (Figure 2). The features included are based on those that are publicly available (see Appendix D). Buffers were applied to features to reflect cumulative/areal disturbances (also see Appendix D).

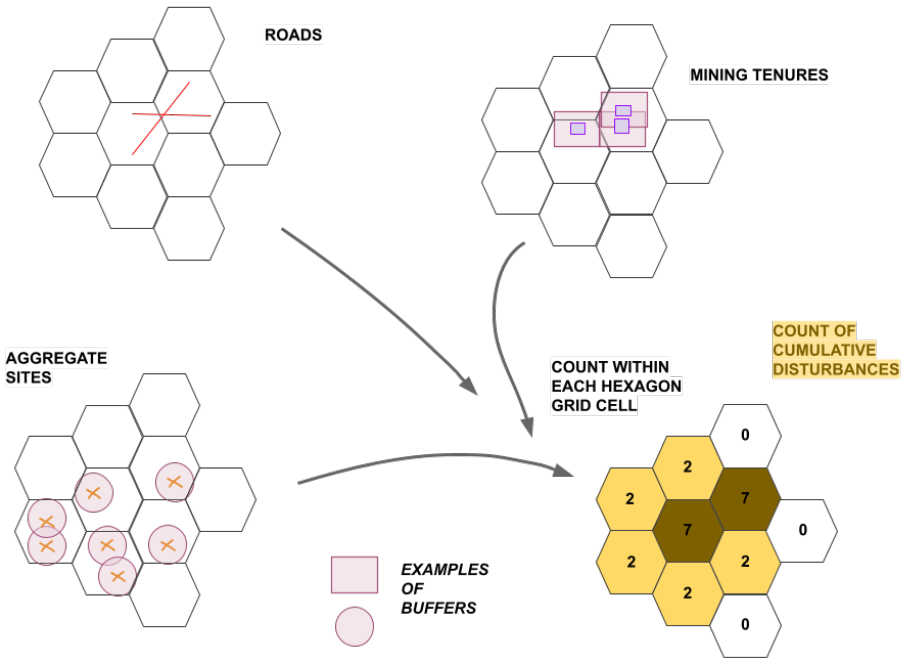

Figure 2: Example of the baseline footprint workflow.

2. Scenario Maps

Second, map features were prepared to spatially represent different proposed plans and future development goals, pulled from publicly available reports (referred to as plausible map features**,** Appendix E and F). For example, Firelight digitized image maps of proposed roads, transmission lines, communication lines, and work camp locations.

To support scenario-based analysis of potential mining activity in the ROF, a structured approach was developed to estimate the relative timing and extent of mineral development across scenarios. This approach evaluated mineral deposits based on available information related to resource characterization and technical studies. These two criteria were combined to assign each deposit to a level of development readiness (e.g., high, moderate, early-stage), which informed its inclusion in each scenario.

The assessment applied a scenario-based sequencing approach grounded in current knowledge of the ROF mineral systems, infrastructure constraints, and proponent plans. This included the assumption that development is likely to proceed in a staged manner, beginning with the most advanced and accessible deposits and expanding outward over time.

Development was represented spatially as mineral development areas, with each area centred on a named deposit and encompassing a surrounding zone of influence. In some cases, a development area may include multiple nearby deposits within a shared geological system (e.g., Eagle's Nest and Blackbird within the Esker intrusive complex).

The following assumptions were applied:

- Indigenous-Led Planning: No mineral development occurs in any timeframe;
- Gradual Change: Development is limited to a single high-readiness deposit (Eagle's Nest) developed late in the long-term (~60 years);
- Co-Governed Growth: Development includes high-readiness (Eagle's Nest) in the medium-term (~30 years) and select moderate-readiness (Blackbird and Black Thor) deposits in the long-term; and
- Accelerated Development: Development proceeds earlier and expands to include all major deposit areas. Eagle's Nest is assumed to be developed in the near-term (5-10 years), followed by Blackbird, Black Thor, and Black Label in medium-term, and Big Daddy and additional deposits (e.g., McFaulds Lake, Thunderbird, Triple J, Wabassi) in the long-term.

No new or ongoing active mining is assumed in the intergenerational-term (~150+ years) for any scenario. However, the effects of prior development (including landscape disturbance,

infrastructure, and ecological change) are assumed to persist into the intergenerational-term as post-closure or legacy conditions, consistent with typical mine life cycles and recovery timelines.

Also, the Government of Ontario publishes a spatialized dataset on alienated land areas, or lands considered withdrawn from prospecting or mining claim registration. The dataset has notes indicating why specific areas were alienated, such as for research initiatives or for land claim negotiations. These notes were qualitatively coding to assume specific types of plausible activities (see Appendix F). These different map features were also buffered similarly to the baseline map.

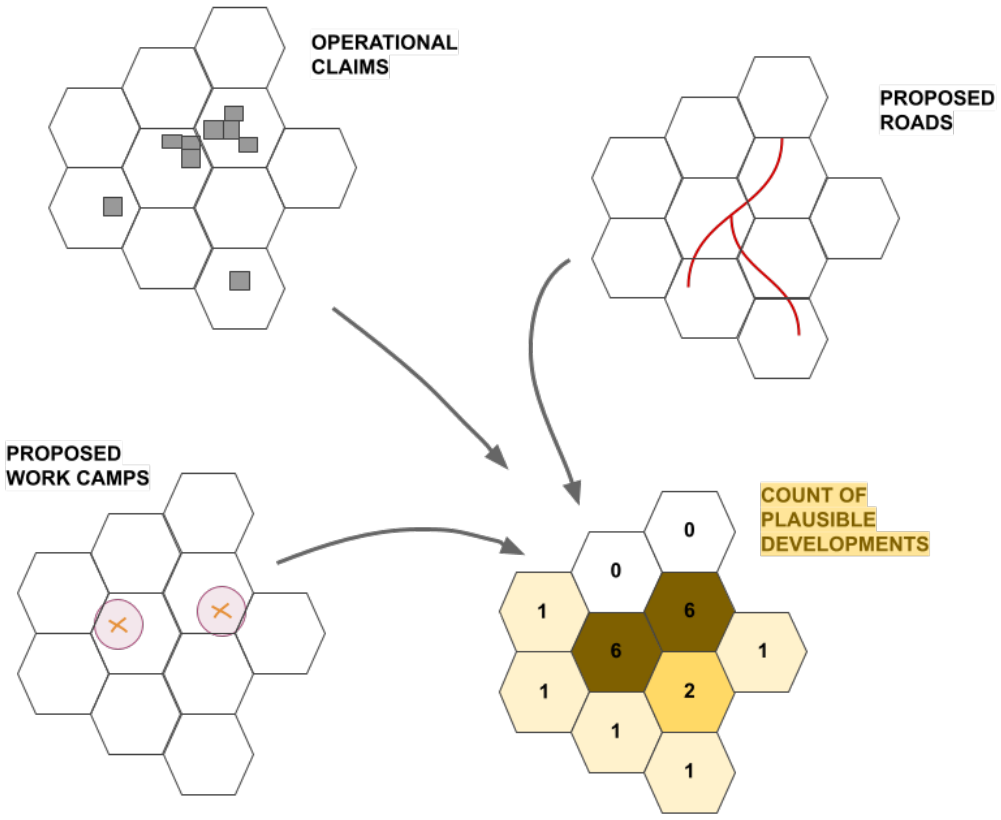

Figure 3: Example of the scenario mapping workflow.

After counting each plausible map feature per hexagon, different multipliers (or coefficients) can be applied in the Scenario Model to assume future intensity of development. Multipliers greater than one can be applied to assume growth. For proof of concept, +0.25 increments could be applied per each scenario and time.

For example, multipliers for each scenario could be as follows:

- Scenario 1 (Indigenous-Led Planning): 1.25

- Scenario 2 (Gradual Change): 1.50
- Scenario 3 (Co-governed Growth): 1.75
- Scenario 4 (Accelerated Development): 2.00

Also, multipliers for each time period could include:

- Near-Term (5–10 Years): 1.25
- Medium-Term (~30 Years): 1.50
- Long-Term (~60 Years): 1.75
- Intergenerational Term (~150+ Years): 2.00

Then, the overall coefficient for each hexagon would be as follows: scenario coefficient × time period coefficient. For instance, S1T1 = 1.25 × 1.25; S1T2 = 1.25 × 1.5. Varying the different inputs and multipliers (i.e., parameters) in the Scenario Model will yield alternative scenarios.

These multiplied values can then be classified into “Low”, “Medium” or “High” groups (Figure 4). The thresholds between categories can be determined based on the distribution of the data or can be informed by Indigenous perspectives and ecological thresholds.

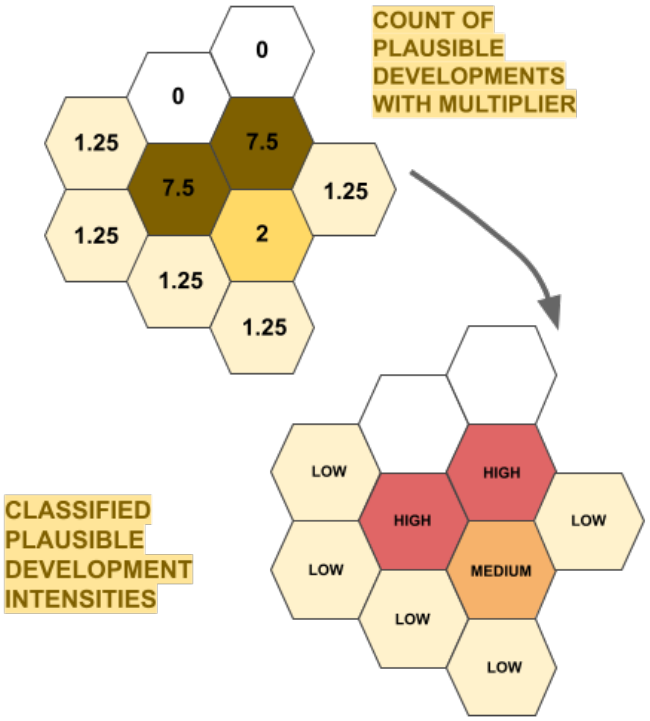

Figure 4: Classification of plausible development features.

Additionally, Firelight digitized maps of proposed, planned, and prospective protected areas. These can be input into the Scenario Model differently, with a multiplier of -1 (Figure 5).

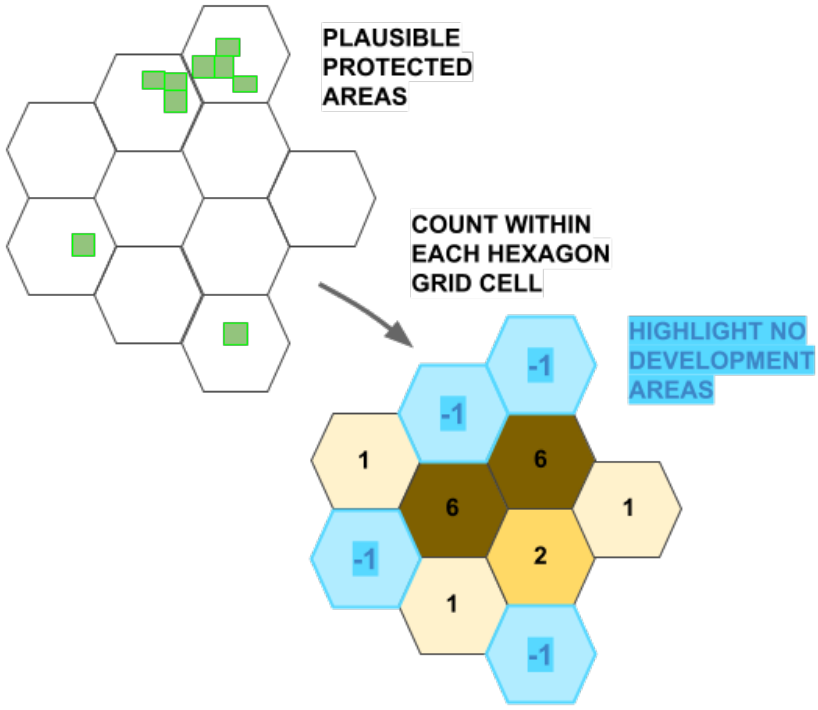

Figure 5: Application of -1 multipliers for plausible protected areas.

These areas are valued differently as they are assumed future areas of no development for some scenarios. They can be styled and presented differently on maps and applied as an overlay (or mask) over baseline or plausible map features (Figure 6).

In summary, the combination of these different map features with optional buffering, multiplying, classifying, and masking display different scenarios outputted from the Scenario Model. Given different inputs, or different map features and different parameters (i.e., multipliers, classification breaks), new outputs will be presented. Note, only buffering and masking methods were applied for the resulting Scenario Maps presented in the subsequent section.

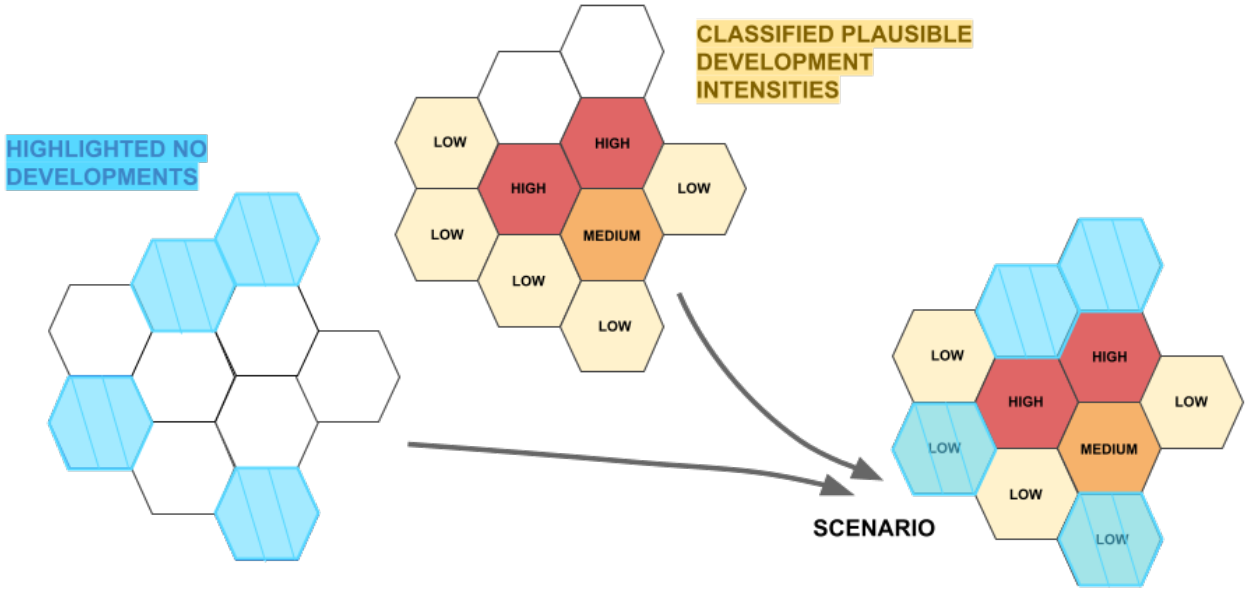

Figure 6: Application of the plausible protected areas mask.

Map Results

Baseline Map

The Baseline Map in Figure 7 is an overview of the current cumulative disturbance per 10-km^2 hexagon within and around the Regional Assessment Area, based on available data. On the Baseline Map, the yellow/orange hexagon areas represent one or more instance of existing (or cumulative) disturbance within and around Regional Assessment Area. For example, left of Attawapiskat indicates the existing road and mining activity. Also, south of the Far North Boundary highlights the forestry, mining, and trail networks that currently exist.

The Baseline Map can be compared against the Scenario Maps.

An absence of disturbance data in the map does not mean no disturbance exists, only that there is no data at this time captured in the Baseline Map.

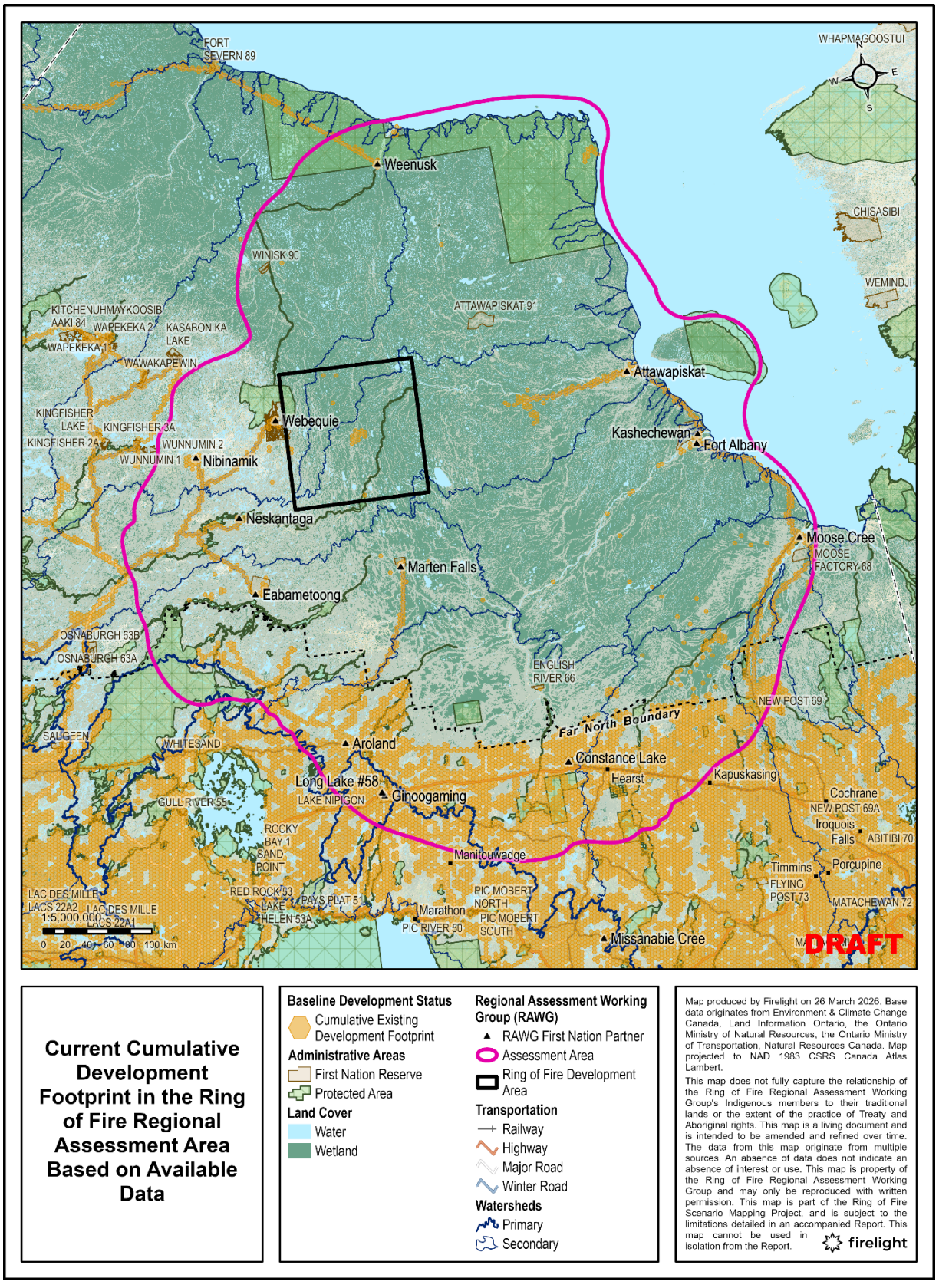

Figure 7: Preliminary baseline development footprint and intensity map.

Scenario Maps

This section describes the assumptions provided in the sixteen (16) Scenario Maps. Refer to Appendix E and Appendix F for the specific inputs and assumptions that were applied for each scenario and time period.

Scenario 1: Indigenous-Led Planning

The Indigenous-Led Planning Scenario Maps display areas in orange that indicate “Potential Development” (i.e., areas that overlap with plausible development activities) and purple areas that indicate “Potential No Development” (i.e., areas that overlap with plausible protective activities).

Short-Term

In the short-term (5-10 years from now), present mining and aggregate extraction activity are assumed to be in process of reclamation while other supply, access, and primary roads could be developed. Projects underway but not yet complete, such as Hydro One’s Waasigan Transmission Line, as well as parcels of land reserved, withdrawn, or otherwise alienated from mineral claims due to their potential for hydroelectric development, are included here. Other notable projects include the Webequie Supply Road (WSR), the Marten Falls Community Access Road (MFCAR), and primary forestry roads in the Ogoki-Armstrong area, as well as associated work camps, aggregate sites, and temporary access roads for the construction of said projects.

Planned and proposed protected areas and areas of significance for research and conservation are identified as areas of potential no development. These areas are likely to permit minimal development for access and services. This scenario notably includes the proposed National Marine Conservation Area in the Weeneebeg (James Bay) and the Washaybeyoh (Hudson Bay) including an area around the coast, as well as areas reserved for conservation and research initiatives not yet associated with specific projects (Figure 8).

Medium-Term

In the medium-term (10-30 years from now), present mine sites are assumed to be reclaimed while aggregate extraction continues at existing sites. Several new road connections are assumed to be developed, such as the Northern Road Link (NRL) connecting the MFCAR and WSR, the Anaconda, and Painter Lake Roads. Telecommunication and electricity distribution infrastructure will connect remote communities (Watay Power’s Wataynikaneyap Transmission Project, the Rapid Lynx Broadband Project, and other unspecified telecommunication alienations). Current alienations for renewable energy projects are assumed to also be developed.

Conservation areas identified in the near-term are assumed to be maintained, and no new mines are assumed to be opened (Figure 9).

Long-Term

In the long-term (30-60 years from now), a north-south rail connection will be developed in the MFCAR/NRL corridor, connecting the area to the national rail network. Aggregate extraction operations are assumed to wind down, and community access infrastructure remains in place (Figure 10).

Intergenerational-Term

In the intergenerational-term (60-150+ years from now), the supporting infrastructure for the construction of the MFCAR corridor will be removed, as well as the resource roads opened in the Ogoki-Armstrong area. No major new developments are assumed (Figure 11).

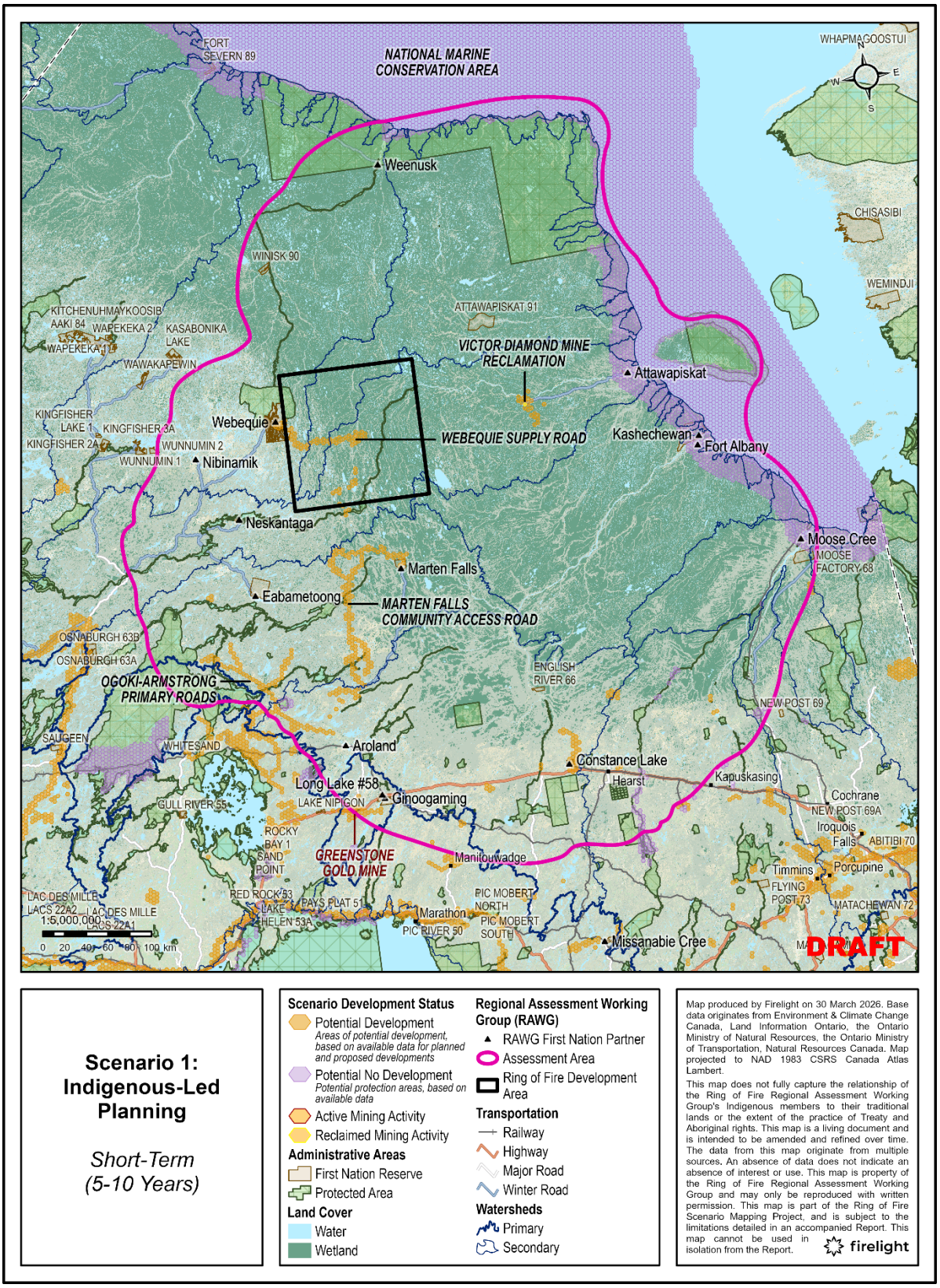

Figure 8: Potential future development footprint in the short-term within an Indigenous-led Planning scenario.

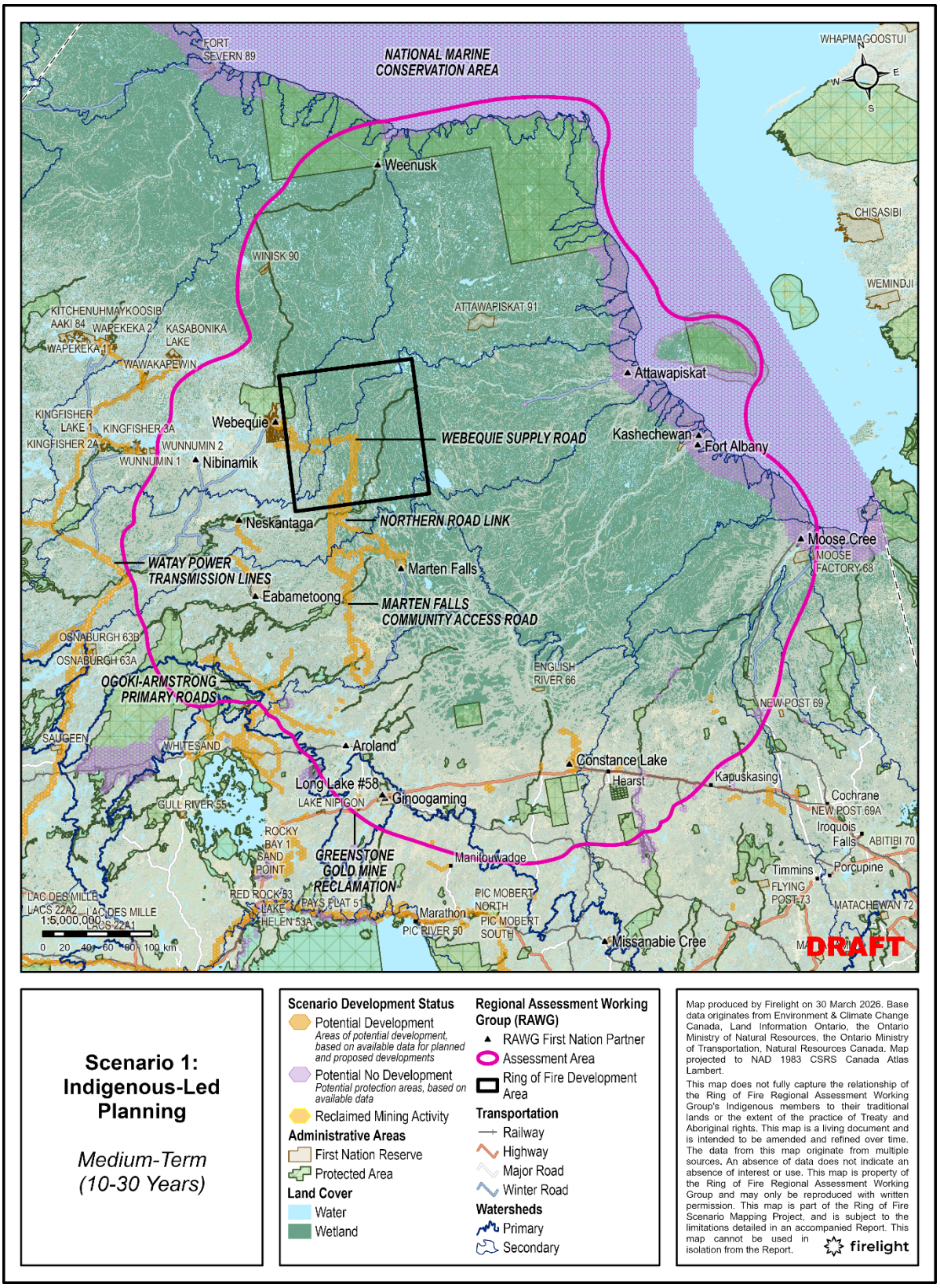

Figure 9: Potential future development footprint in the medium-term within an Indigenous-led Planning scenario.

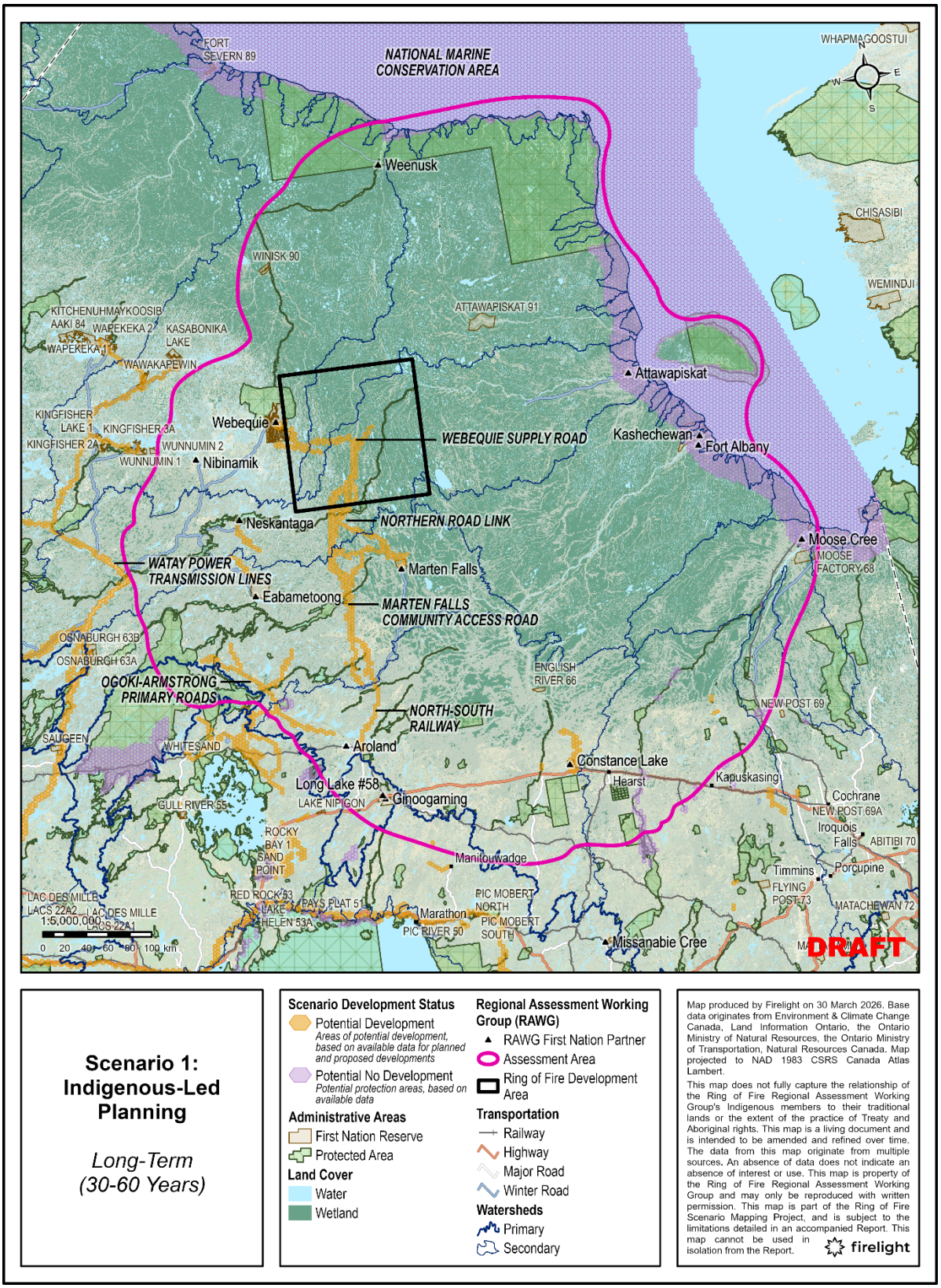

Figure 10: Potential future development footprint in the long-term within an Indigenous-led Planning scenario.

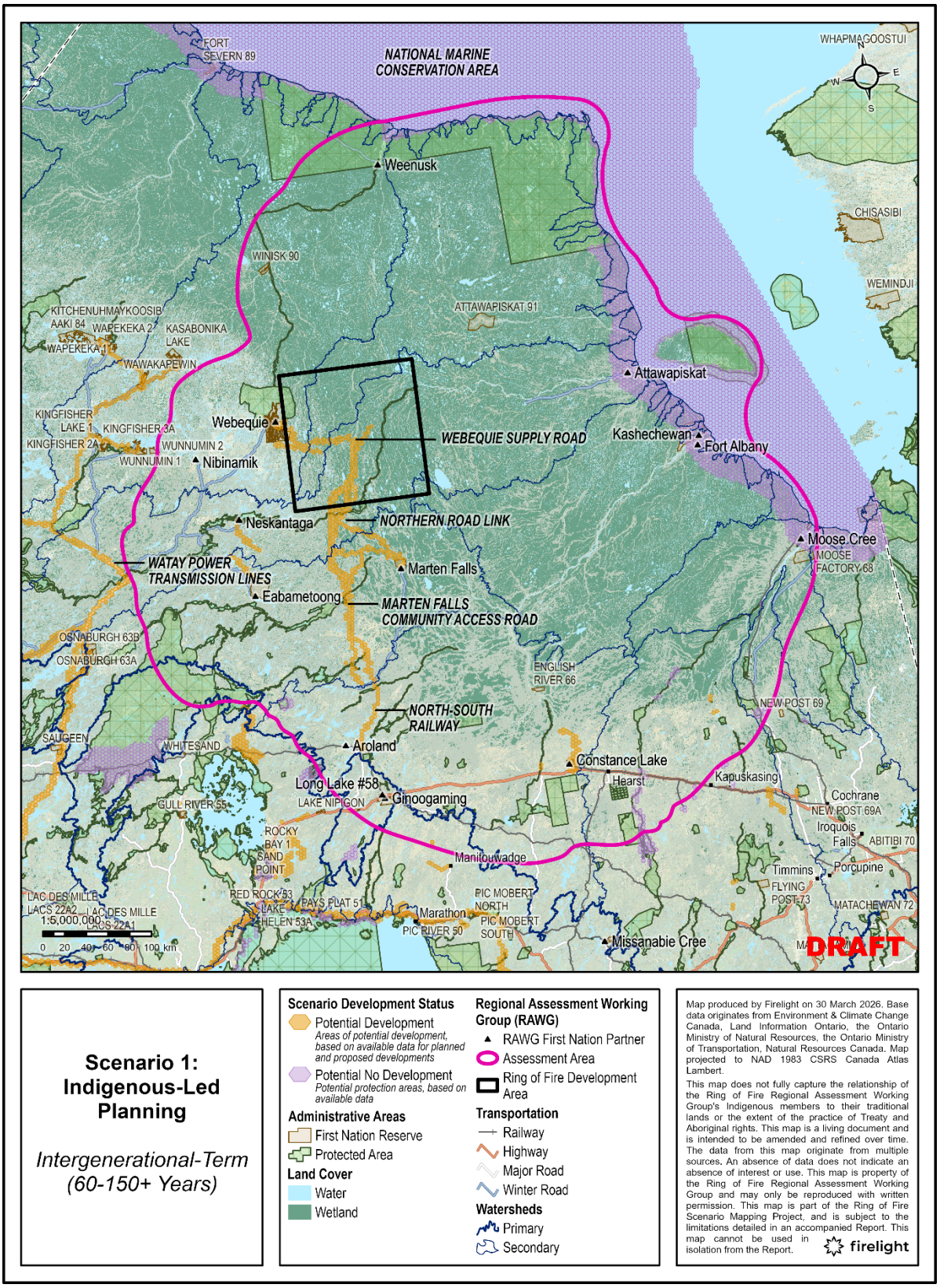

Figure 11: Potential future development footprint in the intergenerational-term within an Indigenous-led Planning scenario.

Scenario 2: Gradual Change

The Gradual Change Scenario Maps display areas in orange that indicate “Potential Development” (i.e., areas that overlap with plausible development activities). New protection and conservation areas are not included in this scenario.

Short-Term

In the short-term (5-10 years from now), present mining and aggregate extraction activity as well as exploration of existing claims, plans, and permits are assumed to continue. The Victor diamond mine is assumed to move towards reclamation, and the Greenstone gold mine is assumed to continue operating. Supply, access, and primary roads could be developed. Projects underway but not yet complete, such as the Waasigan Transmission Line, as well as parcels of land reserved, withdrawn, or otherwise alienated from mineral claims due to their potential for hydroelectric development, are assumed to be included here. Logging is assumed to be permitted within range of existing roads and new primary roads in the Ogoki-Armstrong area. Other notable projects include the Webequie Supply Road (WSR) and the Marten Falls Community Access Road (MFCAR), as well as those projects’ associated work camps, aggregate sites, and temporary access roads (Figure 12).

Medium-Term

In the medium-term (10-30 years from now), existing mine sites will largely be in reclamation while exploration and aggregate extraction continue. Several new road connections are assumed to be developed, such as the NRL connecting the MFCAR and WSR, the Anaconda and Painter Lake Roads, and the James Bay All-Season Road. Telecommunication and electricity distribution infrastructure are assumed to connect remote communities (Watay Power’s Wataynikaneyap Transmission Project, the Rapid Lynx Broadband Project, and other unspecified telecommunication alienations). Existing alienations for renewable energy projects are assumed to also be developed. Forestry activity is assumed to occur in proximity to new roads and to expand around new primary roads in the Ogoki-Armstrong area (Figure 13).

Long-Term

In the long-term (30-60 years from now), a north-south rail connection is presumed to be developed in the MFCAR/NRL corridor, as well as east-west railway and road links connecting the Webequie Supply Road and the Ring of Fire to the current rail terminus at Moosonee. A seaport is assumed to be built on James Bay for import and export, now connected by road and rail. Aggregate extraction and forestry harvest operations continue. One new mine is assumed to open in the Ring of Fire, centred on the Eagle’s Nest deposit (Figure 14).

Intergenerational-Term

In the intergenerational-term (60-150+ years from now), the supporting infrastructure for the construction of the MFCAR corridor is assumed to be removed, as well as the resource roads in the Ogoki-Armstrong area. Forestry elsewhere is assumed to continue while aggregate extraction at current sites ceases. The mine at Eagle's Nest is assumed to be reclaimed, and no other mines will have been developed. (Figure 15).

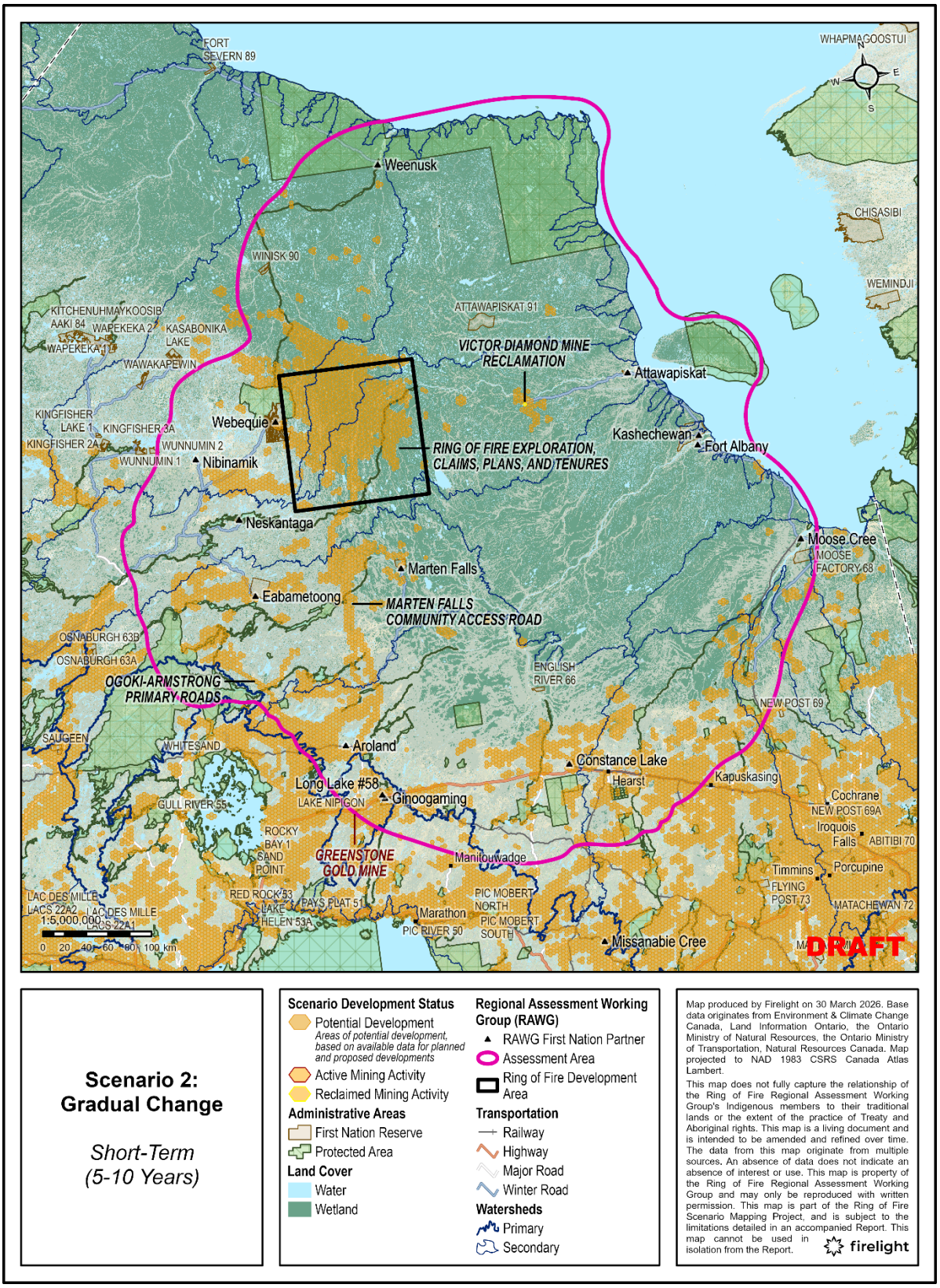

Figure 12: Potential future development footprint in the short-term within a Gradual Change scenario.

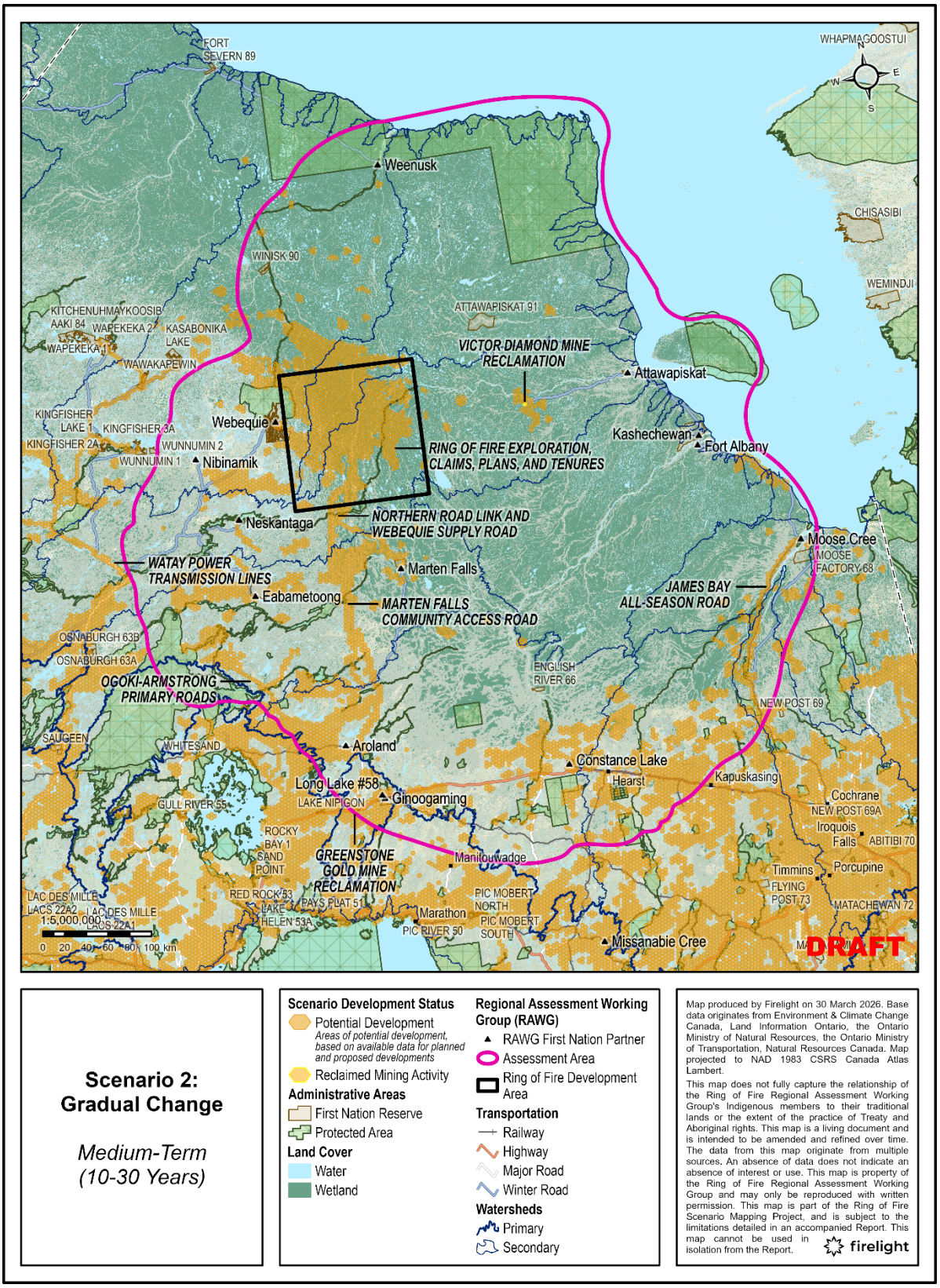

Figure 13: Potential future development footprint in the medium-term within a Gradual Change scenario.

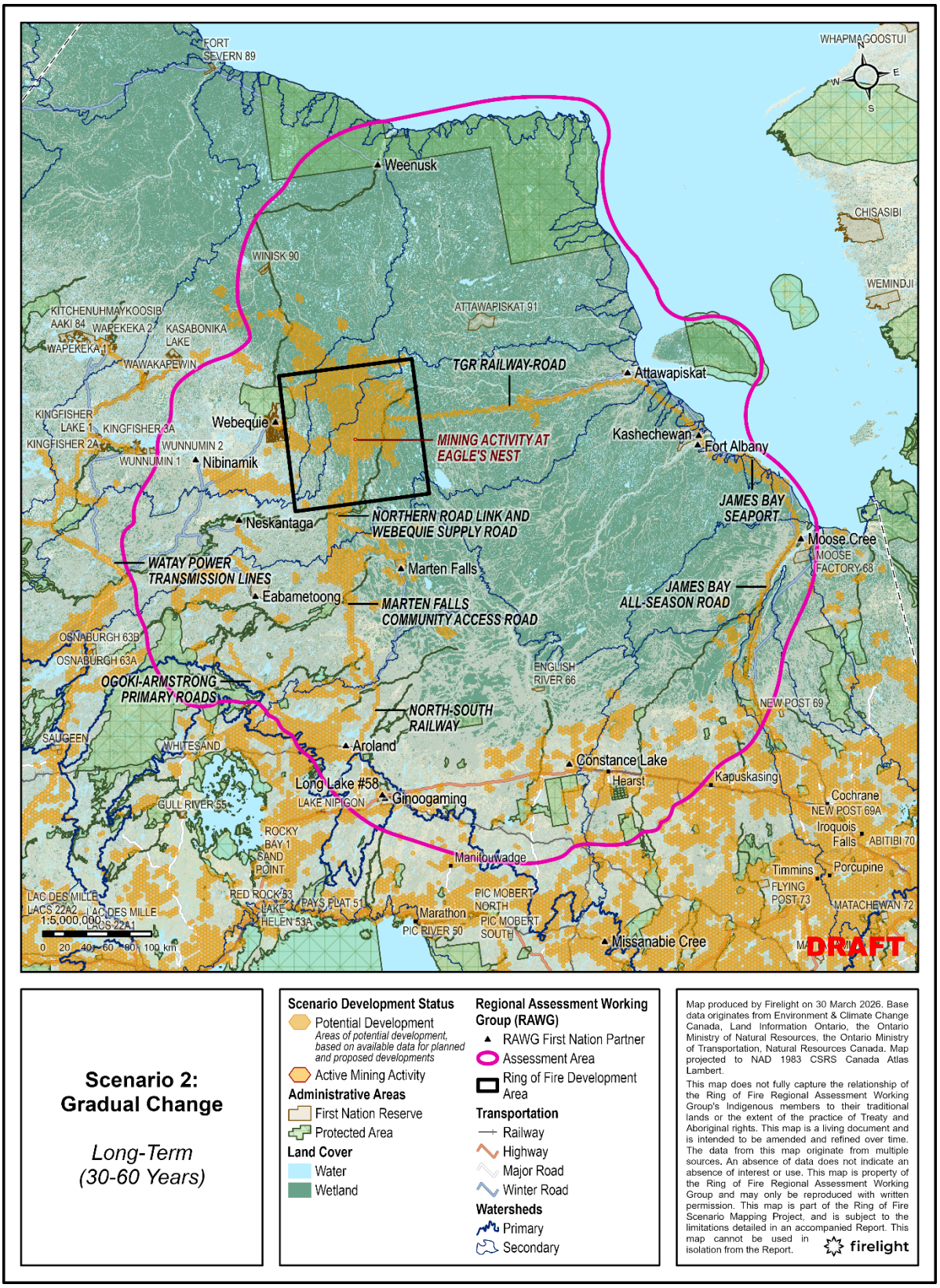

Figure 14: Potential future development footprint in the long-term within a Gradual Change scenario.

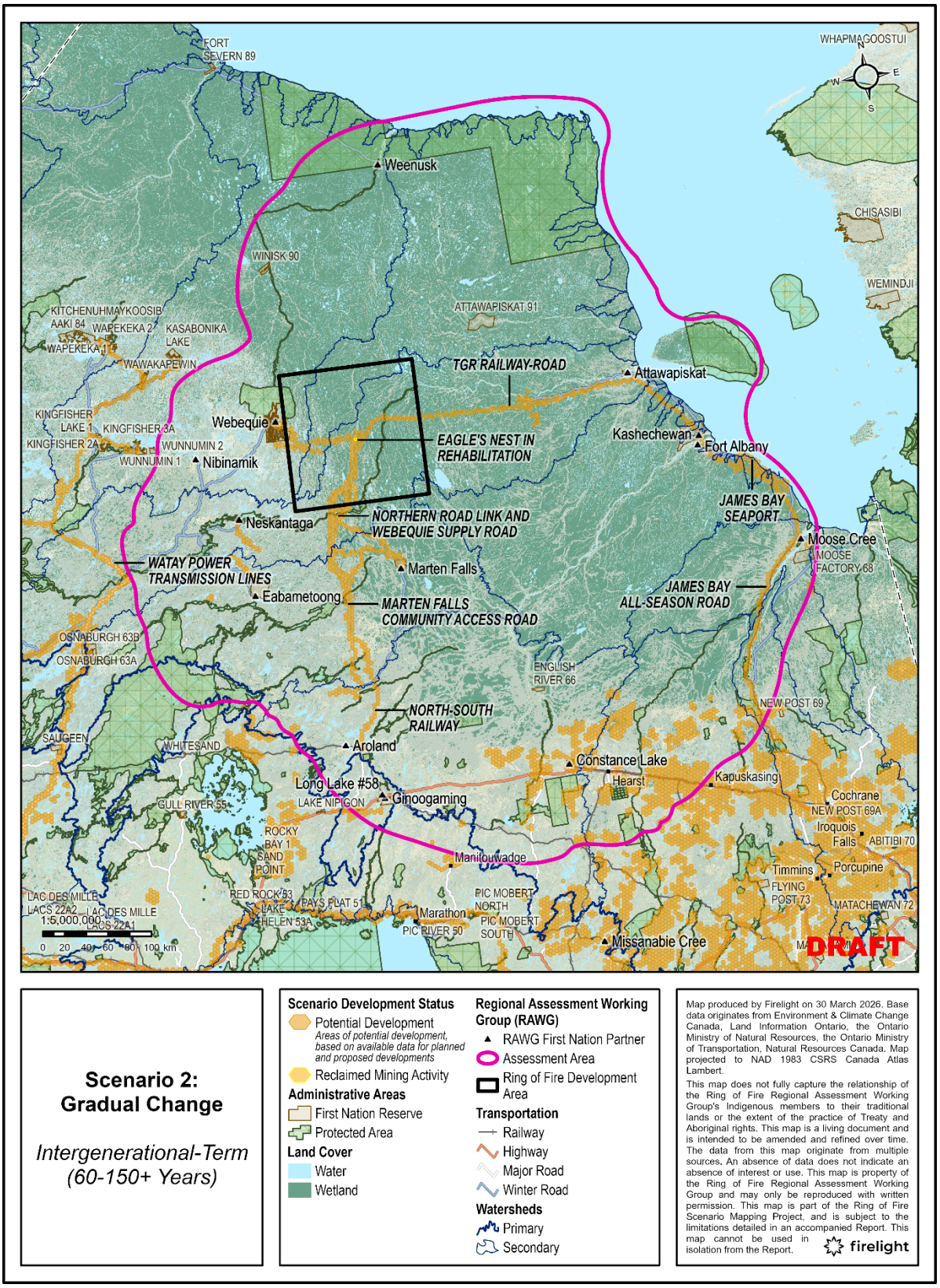

Figure 15: Potential future development footprint in the intergenerational-term within a Gradual Change scenario.

Scenario 3: Go-Governed Growth

The Co-Governed Growth Scenario Maps display areas in orange that indicate “Potential Development” (i.e., areas that overlap with plausible development activities) and purple areas that indicate “Potential No Development” (i.e., areas that overlap with plausible protective activities).

Short-Term

In the short-term (5-10 years from now), present mining and aggregate extraction activity are assumed to be focused on reclamation while other supply, access, and primary roads are developed. Projects underway but not yet complete, like the Waasigan Transmission Line, as well as parcels of land reserved, withdrawn, or otherwise alienated from mineral claims due to their potential for hydroelectric development, are included here. Other notable projects include the Webequie Supply Road (WSR), the Marten Falls Community Access Road (MFCAR), and primary forestry roads in the Ogoki-Armstrong area, as well as those projects’ associated work camps, aggregate sites, and temporary access roads. Mineral exploration will continue around already-issued claims. Forestry harvest is assumed to occur but is restricted to areas outside of caribou habitat.

Planned and proposed protected areas and areas of significance for research and conservation are identified as areas of potential no development. These areas are likely to permit minimal development for access and services. This scenario assumes the National Marine Conservation Area in the Weeneebeg (James Bay) and the Washaybeyoh (Hudson Bay) covers only to the coastline (Figure 16).

Medium-Term

In the medium-term (10-30 years from now), present mine sites are assumed to be in reclamation while exploration of existing claims and aggregate extraction continue. Several new road connections are assumed to have been developed, such as the NRL connecting the MFCAR and WSR, the Anaconda and Painter Lake Roads, and the James Bay All-Season Road. Telecommunication and electricity distribution infrastructure connect remote communities (Watay Power’s Wataynikaneyap Transmission Project, the Rapid Lynx Broadband Project, and telecommunication alienations). Current alienations for renewable energy projects are included. Forestry activity outside of caribou ranges is continued.

Conservation areas identified in near-term are maintained, but mineral development begins slowly, starting at Eagle’s Nest in the Ring of Fire (Figure 17).

Long-Term

In the long-term (30-60 years from now), a north-south rail connection is assumed to be developed in the MFCAR/NRL corridor, as well as a road link from the Ring of Fire to the current

terminus at Moosonee. A seaport is assumed to be built on James Bay for import and export. Aggregate extraction and forestry harvest operations continue. New mines in the Ring of Fire are assumed to open around deposits such as Blackbird 1, Blackbird 2, and Black Thor, while Eagle's Nest is reclaimed (Figure 18).

Intergenerational-Term

In the intergenerational-term (60-150+ years from now), the supporting infrastructure for the construction of the MFCAR corridor will be removed, as well as the resource roads in the Ogoki-Armstrong area. Forestry elsewhere will continue outside of caribou ranges, while aggregate extraction at current sites ceases. The mines opened in the Ring of Fire are assumed to be reclaimed, while no other mines will have developed. Exploration of current claims also ceases. (Figure 19).

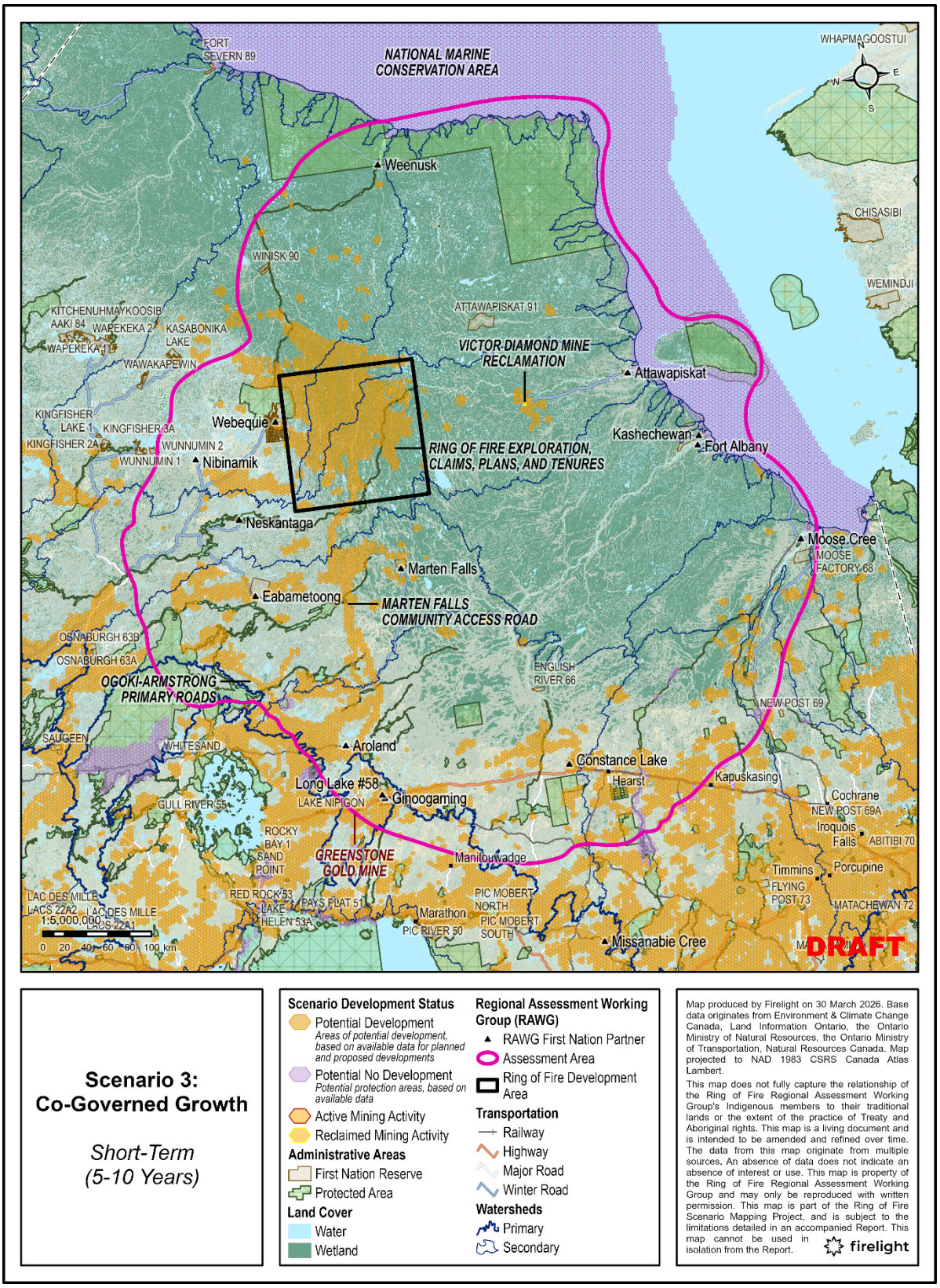

Figure 16: Potential future development footprint in the short-term within a Co-Governed Growth scenario.

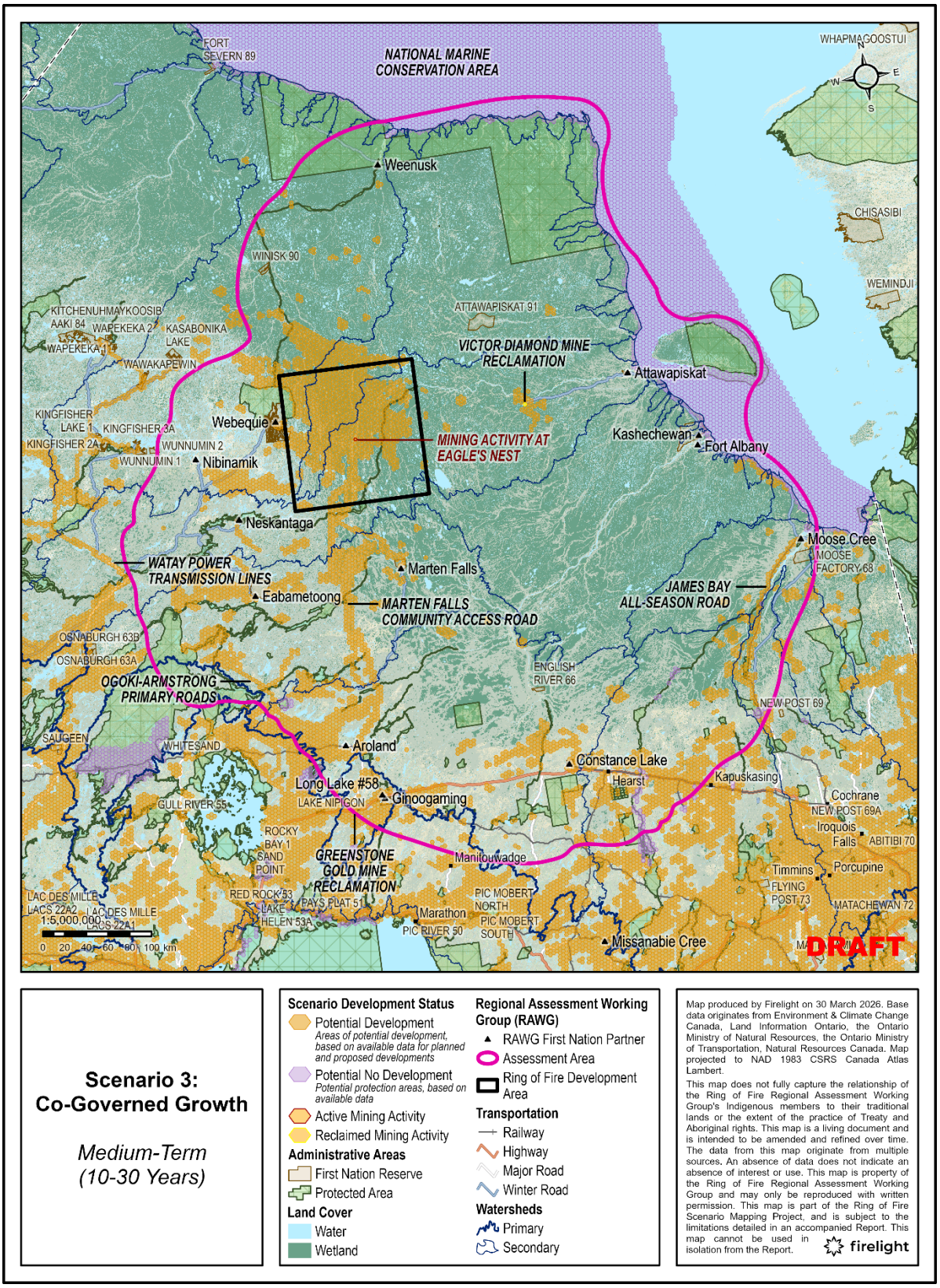

Figure 17: Potential future development footprint in the medium-term within a Co-Governed Growth scenario.

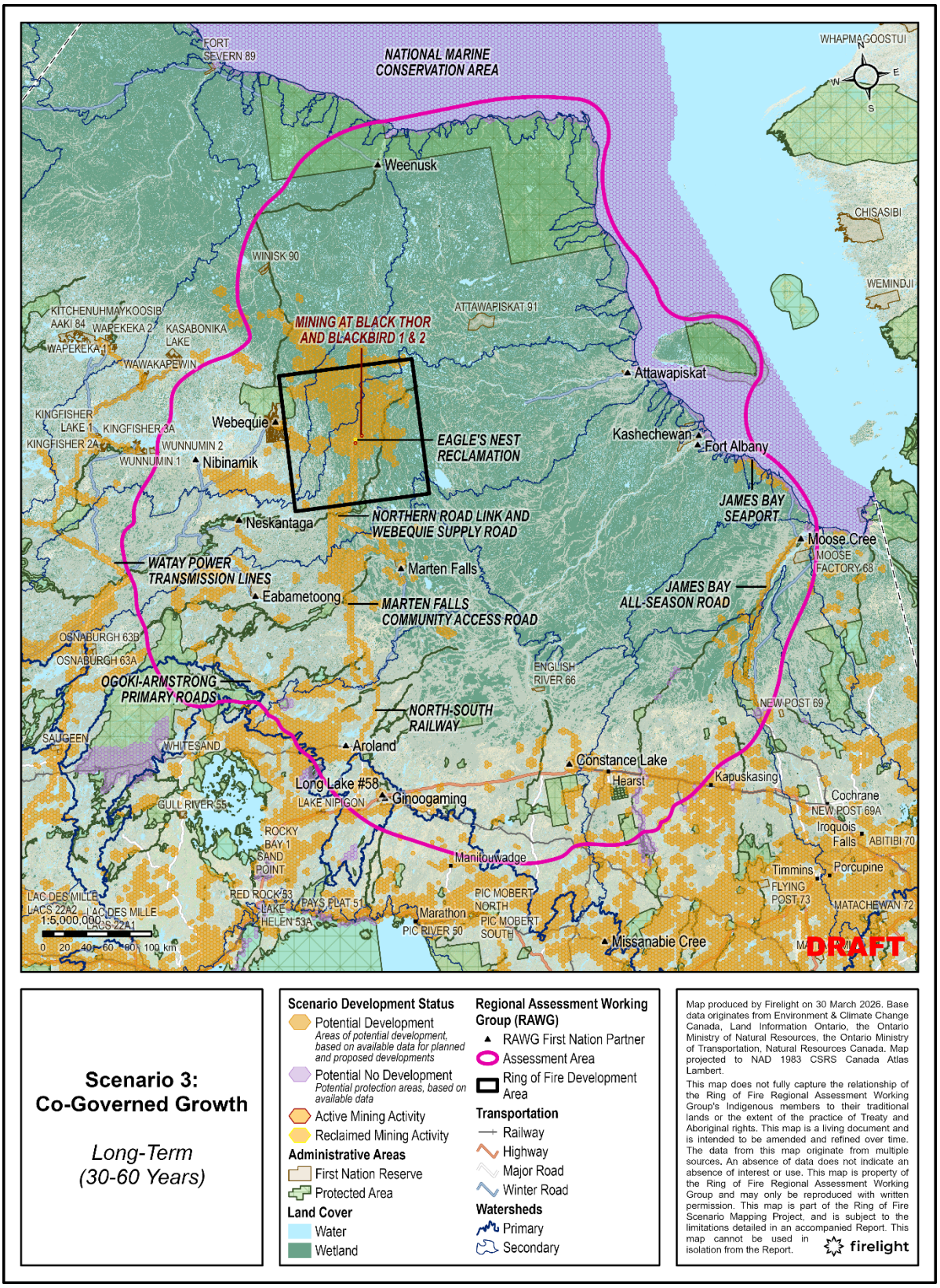

Figure 18: Potential future development footprint in the long-term within a Co-Governed Growth scenario.

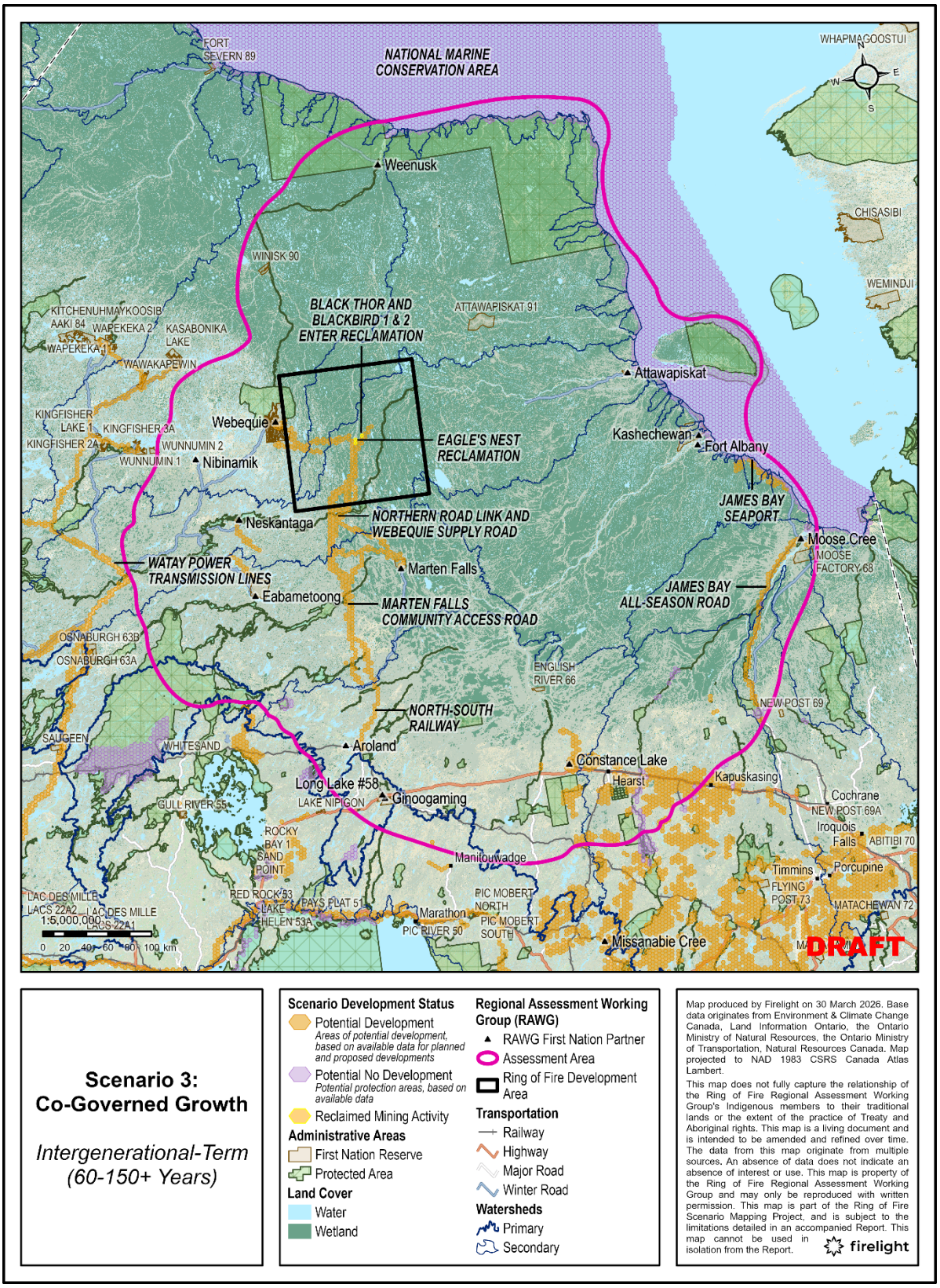

Figure 19: Potential future development footprint in the intergenerational-term within a Co-Governed Growth scenario.

Scenario 4: Accelerated Development

The Accelerated Development Scenario Maps display areas in orange that indicate “Potential Development” (i.e., areas that overlap with plausible development activities). New protection and conservation areas are not included in this scenario.

Short-Term

In the short-term (5-10 years from now), present mining and aggregate extraction activity will be focused on reclamation, but existing claims, plans, and permits will be maintained and explored. The first mine that is assumed to be developed in the Ring of Fire is at Eagle’s Nest. Supply, access, and primary roads are assumed to be developed. Projects underway but not yet complete are also included here, as well as parcels of land reserved, withdrawn, or otherwise alienated from mineral claims due to their potential for hydroelectric development.

Forest harvest will be permitted in all areas, and new primary roads are assumed to be built to support access in the Ogoki-Armstrong area. Notable projects include the Webequie Supply Road (WSR), the Marten Falls Community Access Road (MFCAR), forestry roads in the Ogoki-Armstrong area, and the Waasigan Transmission Line (underway), as well as those projects’ associated work camps, aggregate sites, and temporary access roads (Figure 20).

Medium-Term

In the medium-term (10-30 years from now), present mine sites are assumed to be reclaimed while aggregate extraction continues. Mining in the Ring of Fire grows, with developments at the Big Daddy, Black Label, Blackbird One, Blackbird Two, and Black Thor deposits. Several new road connections are assumed to be developed, such as the Northern Road Link (NRL) connecting the MFCAR and WSR, the Anaconda and Painter Lake Roads, and the James Bay All-Season Road. Infrastructure to support import and export from the Ring of Fire will be developed in this scenario, such as the James Bay Seaport connected to the Ring of Fire by an east-west rail and road corridor. Telecommunication and electricity distribution infrastructure will connect remote communities and the Ring of Fire to the larger grid (Watay Power’s Wataynikaneyap Transmission Project, the Rapid Lynx Broadband Project, and telecommunication alienations). Existing alienations for renewable energy (e.g., Coastal James Bay between the mouths of the Albany and Moose Rivers) and hydroelectricity projects (e.g., Kabinakagami River, Rat River, and Jackfish River) will be developed. Forestry activity will continue and is assumed to expand around new primary roads in the Ogoki-Armstrong area (Figure 21).

Long-Term

In the long-term (30-60 years from now), extractive activities will continue. New mines in the Ring of Fire are assumed to open around other deposits, including Black Creek, Butler, McFauld’s Lake, Thunderbird, and Triple J. Meanwhile, Eagle’s Nest, Black Label, Blackbird, and Black Thor are assumed to be closed and reclaimed. Exploration will continue, leading to

new mines outside of the Ring of Fire such as at the Albany Graphite and Wabassi deposits (Figure 22).

Intergenerational-Term

In the intergenerational-term (60-150+ years from now), the supporting infrastructure for the construction of the MFCAR corridor will be removed, as well as the resource roads in the Ogoki-Armstrong area, but other infrastructure will remain. Forestry and aggregate extraction will continue across the region. The mines opened in and around the Ring of Fire will close and be reclaimed, but exploration is assumed to continue and lead to the development of other sites (Figure 23).

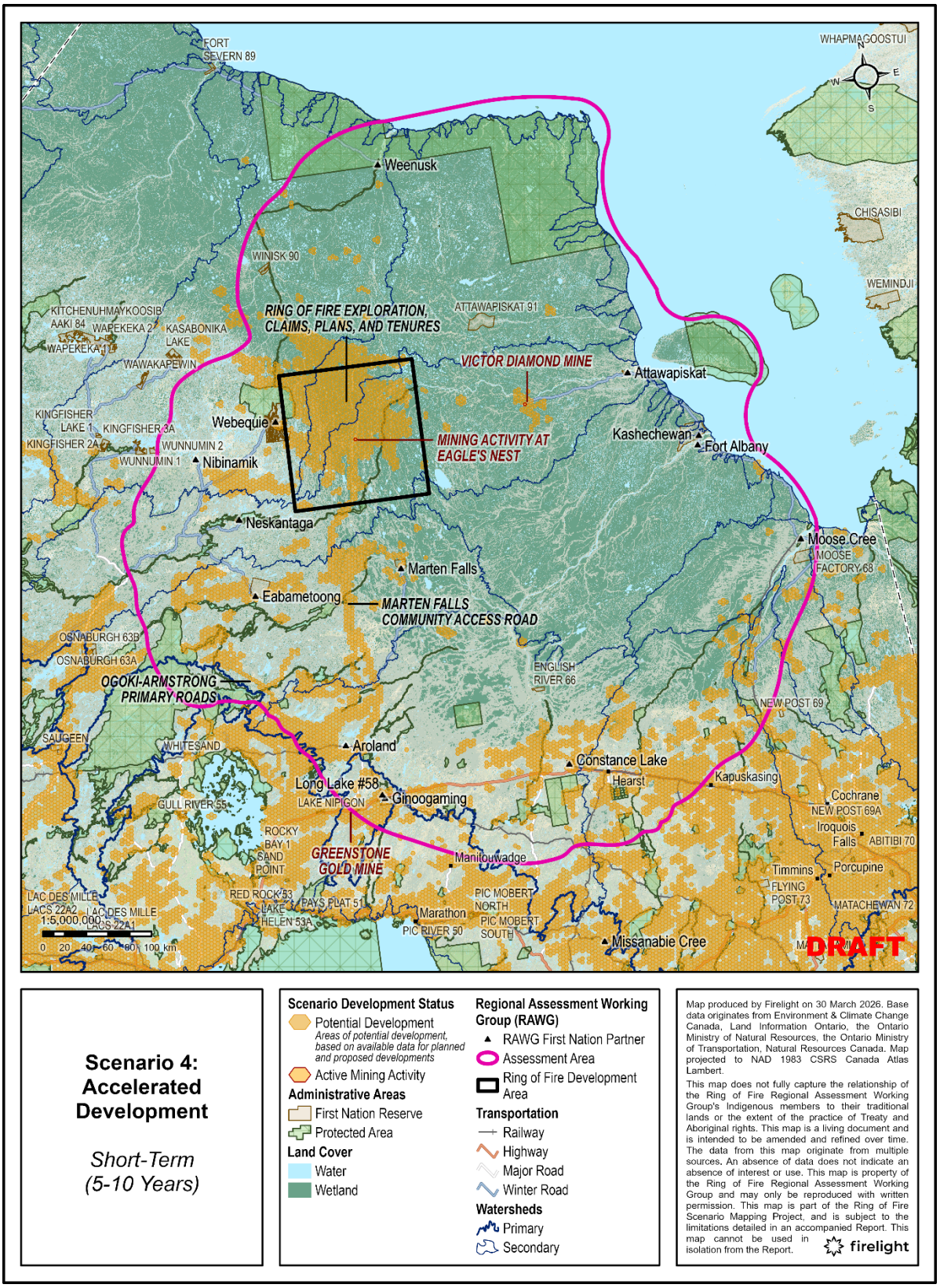

Figure 20: Potential future development footprint in the short-term within an Accelerated Development scenario.

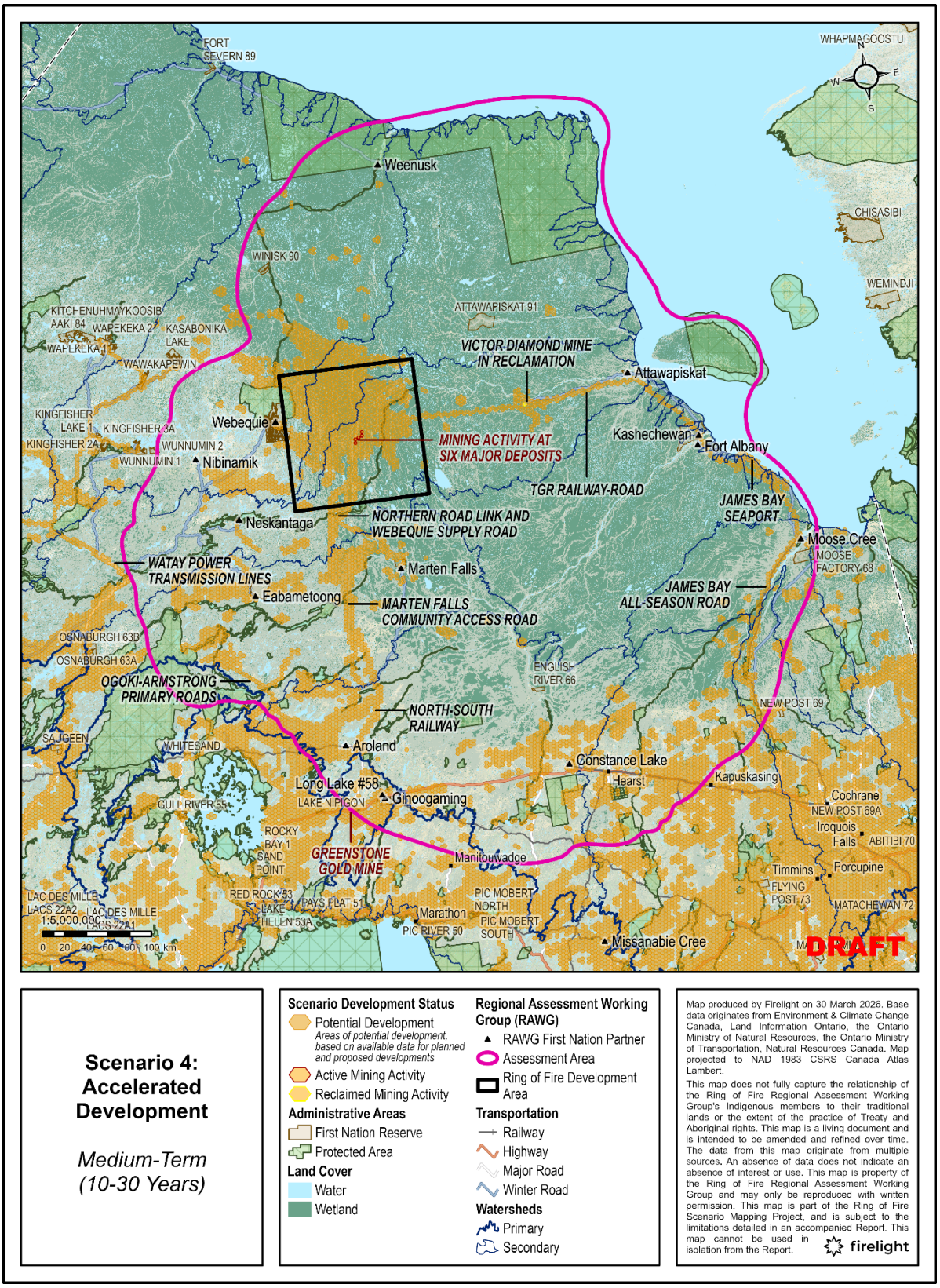

Figure 21: Potential future development footprint in the medium-term within an Accelerated Development scenario.

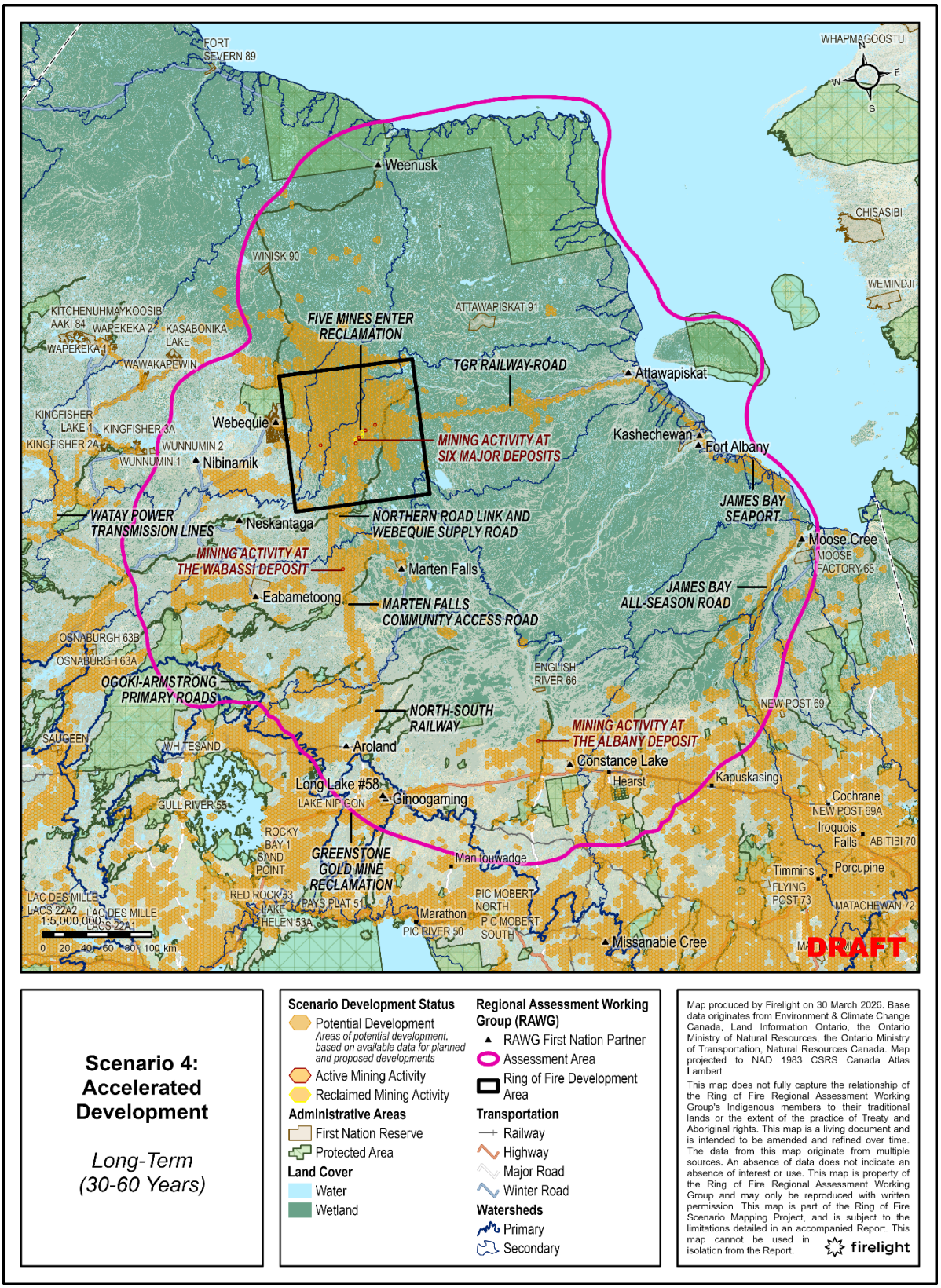

Figure 22: Potential future development footprint in the long-term within an Accelerated Development scenario.

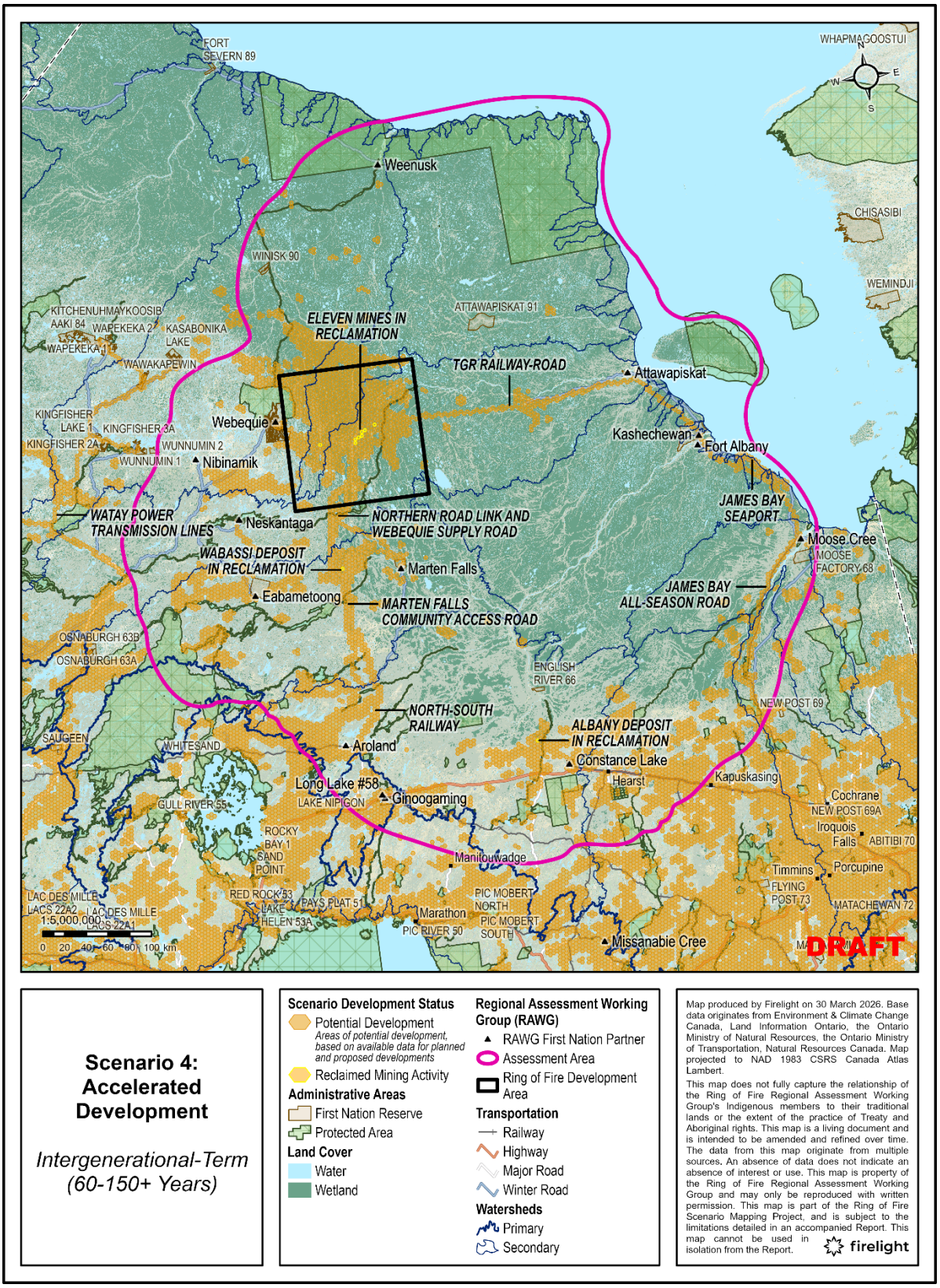

Figure 23: Potential future development footprint in the intergenerational-term within an Accelerated Development scenario.

Limitations, Challenges and Opportunities

The scenario mapping methodology is subject to a number of limitations. As the Scenario Model can be re-run by modifying the datasets and parameters (see Appendix C-F), there are opportunities to make adjustments and see different scenarios to support various decision-making needs and interests. These opportunities are raised throughout the following limitations, gaps, and assumptions:

- Minimal Indigenous Knowledge, values, uses, and activities are currently captured in the Scenario Maps. For example, the proposed Marine Conservation Area of James Bay is included, but not the Fawn River or North French River Indigenous Protected Areas (Chetkiewicz et al., 2022). Moreover, the Wahkohtowin Development Group and Missanabie Cree First Nation *Height-of-Land Ecological Corridor* conservation project is excluded. However, the Scenario Model is available for local use and can be updated based on additional inputs related to community-specific plausible development activities or protection activities. Further, the Scenario Maps and the plausible development activities can be overlayed and spatially assessed against any Indigenous values (e.g., harvesting or cultural areas).

- Data is aggregated to a hexagon grid. This is well-suited for any forthcoming connectivity studies, but data is grouped to an area of 10-km^2. Alternative resolutions could be applied to explore alternative outputs.

- In order to develop scenarios and timelines, assumptions were made about development likelihood and timelines for mineral development projects. A wide range of factors influence mineral development. As more information becomes available, mineral development potential within each scenario could be further refined.

- Scenario maps currently depict areas of plausible development or protection in and around the Regional Assessment Area. The maps do not describe in detail specific impacts that may occur to the rights and values of the RAWG member Nations as a result of development. Additional assessments could identify values of importance in relation to the ROF and assess potential impacts from development within each scenario.

- All buffers are the same for each scenario. In future iterations, buffers could be adjusted based on other values present within a hexagon. This would require additional data sources and continued participatory inputs from RAWG members.

- Forestry map features presented in the baseline map only include chemically tended cut blocks between 2002 and 2021. Further, only planned harvested data between 2022-2032 was available to be included into the Scenario Model.

- No biophysical and climate change features have been input into the Scenario Model. Moreover, no ecological values (e.g., sensitive wildlife habitat, rare ecosystems) are

currently captured in the Scenario Maps. Ecological value layers could be compared against the potential development features displayed on the Scenario Maps to estimate impacts. Furthermore, existing climate change map features could be compared against the potential development features shown in the Scenario Maps to show potential risks or hazards.

- The plausible map features were derived from various data sources and based on data available at the time of drafting. Firelight digitized from proposed projects sourced online and qualitatively coded notes from spatial data sources available from the Government of Ontario. There are opportunities to enrich this data through feedback from each member of the RAWG, as well as incorporate input from proponents and government agencies. For example, the *Northern Ontario Connection Study*'s transmission draft maps being proposed by the Independent Electricity System Operator were excluded, but could be included as part of the scenario focused on accelerated development. Feedback from RAWG members was not incorporated due to time limitations.

- The following datasets are excluded but could yield useful information for the Scenario Model:

    - Indigenous Mining Agreements (https://atlas.gc.ca/imaema/en/index.html); and

    - Areas of Scientific and Natural Interest, specifically qualitatively coding the "General Comments" attribute to infer cultural activities / heritage sites.

    - Further review of the Alienation map features provided by Government of Ontario's Ministry of Energy and Mines.

Map Uses and Other Applications

The output baseline and plausible map layers (i.e., scenarios) can be integrated with other types of spatialized information to support analysis and decision-making. For example, these layers can be overlaid with community harvesting areas or with ecological values (e.g., moose wintering and aquatic feeding areas) for community-specific assessments or studies. Table 3 describes some applications for how the datasets, methods, and outputs may be applied.

Table 3: Examples of Use Cases with Scenario Maps.

USE	DESCRIPTION	EXAMPLE
Integrate Additional Indigenous Uses and Activities	Indigenous use and activity layers could be further integrated within the Baseline Map and the Scenario Maps. This could help in showing additional differences in the levels of Indigenous governance and community development interests in the scenarios, particularly Indigenous-Led Planning.	Create and include into the Scenario Model additional geospatial datasets of Indigenous-led protection areas or development areas focused on specific community capacity-building goals for the Indigenous-Led Planning Scenario.
Integrate Ecological Uses and Activities	Ecological uses could be applied within the Scenario Model. This could help show differences in the levels of Indigenous governance interests in the different scenarios where ecological values could be weighted to have more or less priority over development activities.	Source and include into the Scenario Model additional geospatial datasets containing community-collected information that may indicate “no potential development areas” (e.g., moose herd patterns, migratory bird tracks, waterfalls spots, key rivers, etc.).
Evaluate Against Indigenous Values	If existing Indigenous values are spatialized, they could be overlapped and evaluated against the plausible development activities in the Scenario Maps.	Cultural (e.g., education or burial sites), ecological (e.g., moose habitat areas), subsistence (e.g., hunting, fishing), transportation (e.g., boating, trading) activities and values could be mapped and the area of overlap calculated against the plausible development activities in the Scenario Maps.
Evaluate Against Environment and Climate Change Risks	Natural hazards, extreme weather, climatic events (e.g., wildfires, flooding, etc.) and other climate change related	The Scenario Maps could be evaluated against climate change projections, such as extreme hot days (e.g., days exceeding 30

	spatialized information could be overlayed and compared against the potential development activities shown on the Scenario Maps to assess potential risks/hazards.	degrees Celsius) available to download from the Climate Atlas of Canda from 2021 to 2050 or 2051 to 2080 (Prairie Climate Centre 2026).

Closure

The development scenarios and maps described in this report illustrate how development may occur across the Ring of Fire Regional Assessment area under different conditions and over time. The scenarios and maps provide a basis for comparing potential development pathways and supporting further analysis.

This work is intended to inform subsequent components of the Regional Assessment, including the integration of community and ecological information, the assessment of potential and cumulative effects, and the development of findings and recommendations.

Key opportunities to strengthen and refine this work include:

- Incorporating additional Indigenous Knowledge and community-based data;
- Integrating ecological and climate-related datasets;
- Refining development assumptions and spatial inputs through continued engagement with the RAWG and other knowledge holders; and
- Applying the scenario framework to assess potential impacts and cumulative interactions.

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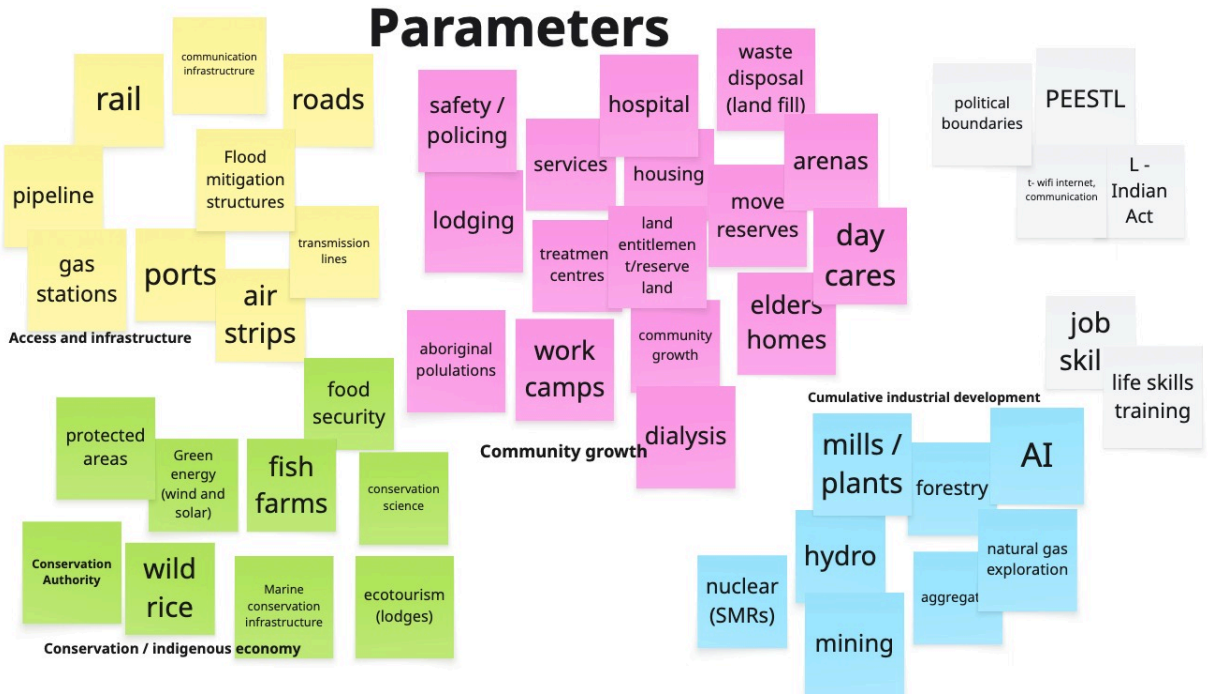
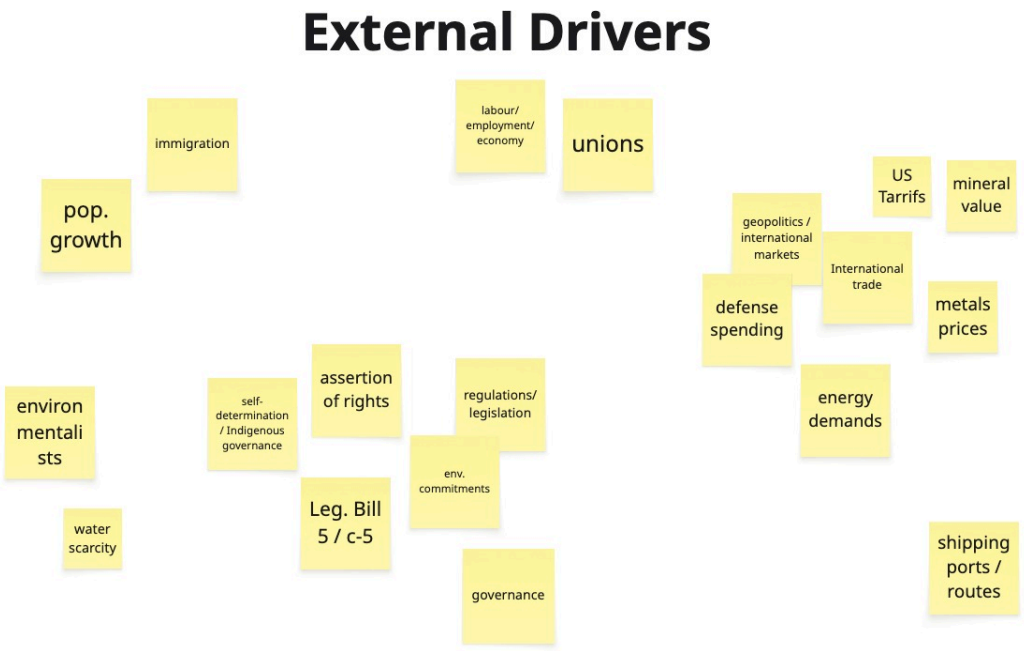
Appendices

Appendix A: October 21 RAWG Workshop Materials

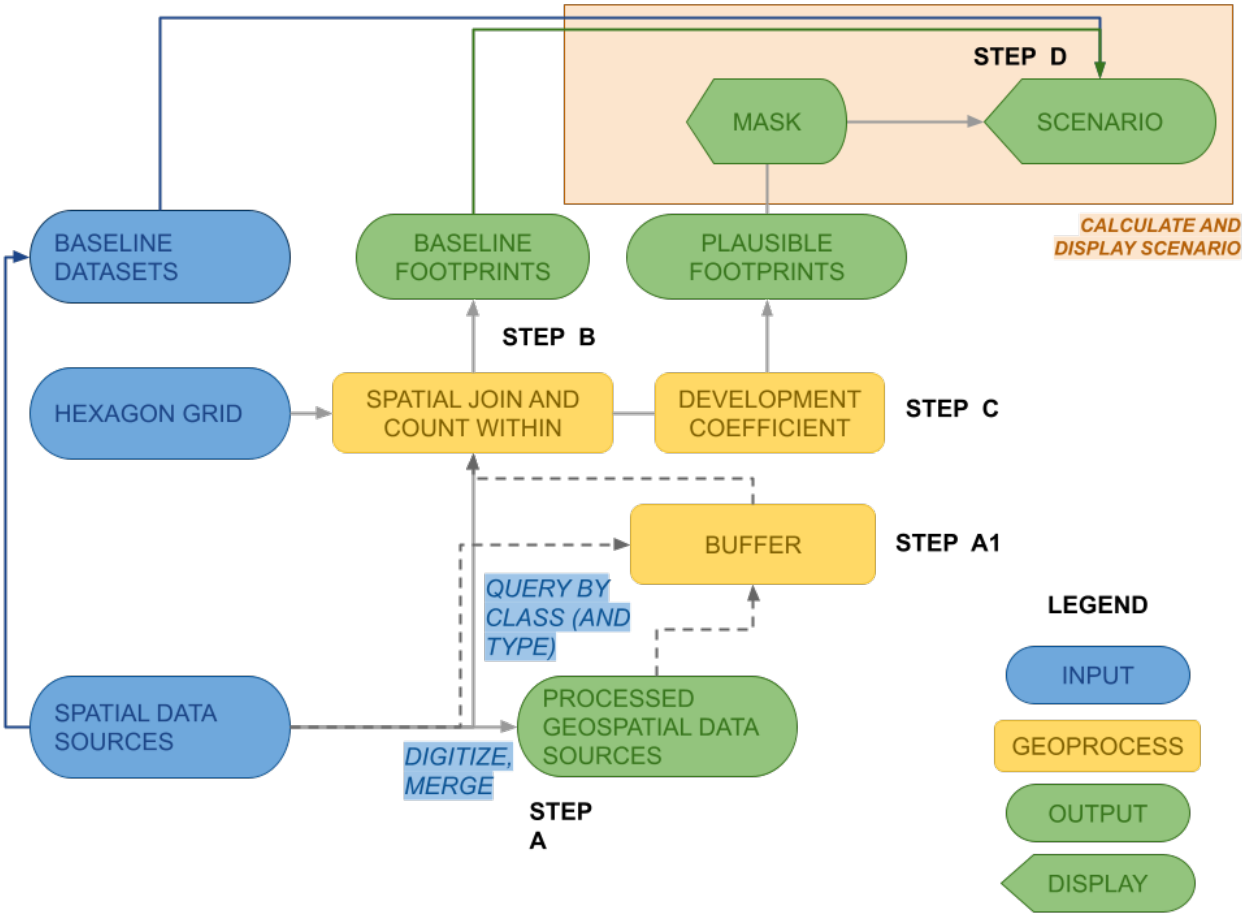





Community Aspirations
community cohesion / family skills training
health care
recreational facilities
elders facilities
wellbeing
healing / healthy communities
community infrastructure
clean water
heating
equality with all Canadians (health, education, etc.)
more land / additions to reserves
land based seasonal activities (youth)
cultural resiliency
language preservation
own source revenue
capacity
ability to participate
participation in economic development

Appendix B: Scenario Model

The following summarizes a workflow developed using Python (version 3).



Step A: From compiled open geospatial data files (e.g., shapefiles) and other types of documents with spatial information (e.g., PDF reports), Firelight created two configuration files (i.e., spreadsheets) that document data sources for “Baseline Map Features” (Appendix E) and “Plausible Map Features” (Appendix F).

Step A1: If a buffer is specified, then apply a buffer to the point, line or polygon feature.

Step B: Apply a spatial join (intersect), where a created Hexagon Grid is an input and the selected and queried geospatial data sources (from Step A) are overlayed and counted within each grid cell.

Step C: For the Plausible Map Features that are inputted and counted into a Hexagon Grid, a coefficient can be *optionally* applied for representing induced development.

Step D: Last, overlay and visually display on a map the selected baselines (and other base map layers) and plausible activities (i.e., scenario) within a desktop GIS software.

Appendix C: Scenario Map Input Datasets

Table C1 summaries available inputs that the Scenario Model depends on.

Table C1: Input datasets available for the Scenario Model.

FILE	INPUTS	PARAMETERS	DESCRIPTION
Baselined Map Features	Refer to Appendix D		Each row represents a geospatial data file that is an input to the Scenario Model for producing Baseline Footprint(s).
Plausible Map Features	Refer to Appendix E		Each row represents a geospatial data file that is an input to the Scenario Model for producing the Plausible Footprint(s).
Hexagon Grid	Regional Assessment Area	Resolution: 10-km^2 Extent: Ontario Cell: Hexagon Projection: EPSG 3347 (Statistics Canada Lambert) Operations: ArcGIS Pro 3.6.0	Hexagon Grid for the Scenario Model.

Appendix D: Baseline Map Features

The following are the baseline map features that led to the development of the Baseline Map Figure 7.

Table D1: Features included in the Baseline Map.

FEATURE TYPE	NAME	BUFFER (METRES)	SOURCE
All Roads	Ontario Road Network	500	Ontario Ministry of Natural Resources
Winter Roads	Ontario Road Network	250	
Railways	Ontario Railway Network	500	
Airports	Official airports	1000	
Nautical Facilities	CanVec Nautical Facility	1000	Natural Resources Canada
Transmission Lines	Utility Line	100	Ontario Ministry of Natural Resources
Pipelines	Utility Line	100	
Communication Lines	Utility Line	100	
Mineral Exploration Areas	Exploration Activity Atlas of Canada 900A	100	Natural Resources Canada
Mining Tenures	Mining Land Tenures	250	Ontario Ministry of Energy and Mines
Active Aggregate Sites	Aggregate Sites	250	Ontario Ministry of Natural Resources
Inactive Aggregate Sites	Aggregate Sites	0	
Partial Surrender Aggregate Sites	Aggregate Sites	0	
Unrehabilitated Aggregate Sites	Aggregate Sites	0	
Aggregate Extraction Area	Aggregate Sites	250	
Aggregate Sites	Aggregate Sites	250	Ontario Ministry of Transportation
Forestry Activity	Chemically Tended Harvest Blocks, 2002-2021	500	Mushkegowuk Council
Forest Processing Facilities	Forest Processing Facility	500	Ontario Ministry of Natural Resources
Dams	Ontario Dam Inventory	500	
Petroleum Wells	Petroleum Well	250	
Renewable Energy Sites	Renewable Energy Projects	500	Ontario Ministry of Energy and Mines
Protected and Conserved Areas	Canadian Protected and Conserved Areas Database	1000	Environment and Climate Change Canada
Wild Rice Stands	Wild Rice Stands (1997)	0	Ontario Ministry of Natural Resources
Waste Management Sites	Waste Management Site	100	

Runways	CanVec Transportation Features – Runway	1000	Natural Resources Canada

Table D2: Input configuration (.csv) column description.

COLUMN NAME	DATA TYPE	DESCRIPTION
UID	Integer	The unique identifier for each mappable feature.
CLASS	String	The type of classification the mappable feature falls within, can be anything but recommend consistent list used (e.g., “Industrial” or “Cultural”).
FEATURE_TYPE	String	Generic classification of the mappable feature.
NAME	String	Name of the dataset used as the input.
SOURCE	String	Source of the relevant geospatial data and/or referenced materials.
FILE_PATH	String	The file path to the spatial data source that will be an input for the Scenario Model.
SELECT_LYR	String	The specific layer to select if a geodatabase is read into the Scenario Model.
FILTER_COL	String	The specific name of the field/attribute to query (e.g., “road_type”) by the Scenario Model.
FILTER_VAL	String	The specific value of the specified field/attribute to query (e.g., “winter”) by the Scenario Model.
BUFFER	Float	To create a larger area based on specified ***metre*** distance from a point (e.g., port), line (e.g., road, pipeline), or polygon (e.g., land use plan zone) feature. This would be more to indicate an anticipated growth in area across time. For example, wanting to show more coverage.
S1_T1, S1_T2, …, S4_T3, S4_T4	Float	A number over 1 for assuming a greater magnitude/weight of use/activity. A number over 0 and under 1 for assuming a lesser magnitude of use/activity. Specify -1 for assuming no use/activity. These columns are not currently being used for the baseline map, but may be applied.

Appendix E: Plausible Map Features

The following summarizes the datasets compiled to assume plausible map features. These plausible map features can be used as inputs into the Scenario Model.

Table E1: Features included in the plausible development footprints.

FEATURE TYPE	PROJECT	BUFFER (METRES)	DATA SOURCE	SCENARIO ASSUMPTIONS
Road	Webequie Supply Road (All versions)	500	Impact Assessment Agency of Canada	All
Road	Webequie Supply Road Potential Aggregate Access	500	Atkins-Réalis	All T1-T3
Road	Webequie Supply Road Potential Camp Access	500	Atkins-Réalis	All T1-T3
Road	Northern Road Link	500	Impact Assessment Agency of Canada / AECOM Canada ULC	All T2-T4
Road	Marten Falls Community Access Road	500	Impact Assessment Agency of Canada	All
Road	TGR Railway-Road	500	Northern Policy Institute	S2-T3, T4 S4-T2, T3, T4
Road	Anaconda and Painter Lake Road	500	AtkinsRéalis	All T2-T4
Road	James Bay All-Season Road	500	Aecom Canada ULC	S2-T2-T4 S3-T2-T4 S4-T2-T4
Road	Ogoki-Armstrong Primary Roads	500		All T1-T3
Rail	KWG North-South Railway	500	Northern Policy Institute	S1-T3, T4 S2-T3, T4 S3-T3, T4 S4-T2, T3, T4
Rail	TGR Railway-Road	500		S2-T3, T4 S4-T2, T3, T4

Communication	Rapid Lynx Broadband Project	500	AtkinsRéalis	All T2-T4
Shipping/ Boating	James Bay Seaport	1000	Northern Policy Institute	S2-T3, T4 S3-T3, T4 S4-T2, T3, T4
Transmission	Wataynikaneyap Transmission Project	100	Watay Power	All T2-T4
Transmission	Waasigan TL Project	100	AECOM Canada ULC	All
Communication	See Appendix G	500	Ontario Ministry of Energy and Mines	All T2, T3, T4
Operational Mineral Claims	See Appendix G	250		S2-T1, T2, T3 S3-T1, T2, T3 S4
Mining Plans/Permits	See Appendix G	250		S2-T1, T2, T3 S3-T1, T2, T3 S4
Mining Land Tenures	See Appendix G	250		S1-T1 S2 S3-T1 S4
Aggregates Operations	See Appendix G	250		S1-T1, T2 S2-T1, T2, T3 S3-T1, T2, T3 S4
Hydroelectric Development	See Appendix G	500		All
Renewable Energy Projects	See Appendix G	1000		All T2, T3, T4
Work Camps	Potential Camp Site (Northern Road Link)	500	AECOM Canada ULC	All
Protected and Conserved Areas	Western James Bay and Southwestern Hudson Bay National Marine Conservation Area – Phase I	0	Mushkegowuk Council	S3
Protected and Conserved Areas	Western James Bay and Southwestern Hudson Bay National Marine Conservation Area – Phase I and II	0	Mushkegowuk Council	S1

Protected and Conserved Areas	See Appendix G	0	Ontario Ministry of Energy and Mines	S1 S3
Forestry	All Forest Harvest 2022-2032 (All)	50	Mushkegowuk Council	S2-T4 S4
Forestry	All Forest Harvest 2022-2032 (excluding caribou ranges)	50		S3
Forestry	All Forest Harvest 2022-2032 (within 1km of existing roads)	50		S2-T1, T2, T3
Research	See Appendix G	0	Ontario Ministry of Energy and Mines	S1 S3
Mineral Development	Albany Graphite	10000	Zentek	S4-T3 (Active), T4 (Low)
Mineral Development	Big Daddy	10000	Canadian Chrome Company	S4-T2 (Active), T3 (Active), T4 (Low)
Mineral Development	Black Creek	10000	VMS Ventures	S4-T3 (Active), T4 (Low)
Mineral Development	Black Label	10000	Wyloo Metals	S4-T2 (Active), T3 (Low), T4 (Low)
Mineral Development	Blackbird One	10000	Wyloo Metals	S3-T3 (Active), T4 (Low) S4-T2 (Active), T3 (Low), T4 (Low)
Mineral Development	Blackbird Two	10000	Wyloo Metals	S3-T3 (Active), T4 (Low) S4-T2 (Active), T3 (Low), T4 (Low)
Mineral Development	Butler	10000	Wyloo Metals	S4-T3 (Active), T4 (Low)
Mineral Development	Black Thor	10000	Cliffs	S3-T3 (Active), T4 (Low) S4-T2 (Active), T3 (Low), T4 (Low)
Mineral Development	Eagle's Nest	10000	Wyloo Metals	S2-T3 (Active), T4 (Low) S3-T2 (Active), T3 (Low), T4 (Low) S4-T1 (Active), T2 (Active), T3 (Low), T4 (Low)
Mineral Development	McFauld's Lake	10000	Canadian Chrome Company	S4-T3 (Active), T4 (Low)
Mineral Development	Thunderbird	10000	Wyloo Metals	S4-T3 (Active), T4 (Low)
Mineral Development	Triple J	10000	Wyloo Metals	S4-T3 (Active), T4 (Low)

Mineral Development	Wabassi	10000	Northern Shield Resources Inc.	S4-T3 (Active), T4 (Low)

Table E2: Plausible features input configuration .csv column description.

COLUMN NAME	DATA TYPE	DESCRIPTION
UID	Integer	The unique identifier for each map feature.
CLASS	String	The type of classification the map feature falls within. Can be anything but use of a consistent list is recommended (e.g., “Industrial” or “Cultural”).
FEATURE_TYPE	String	Type of map feature (e.g., “Road”, “Transmission Line”, “Seaport”).
PROJ_NAME	String	Name of the project or project component.
DIGITIZED	Boolean	“Yes” or “No” if the input data source was digitized by Firelight. This is only relevant for the map features for the Scenario Maps.
SOURCE	String	Source of the geospatial data or referenced materials.
FILE_PATH	String	The file path to the geospatial data source that will be an input for the Scenario Model.
SELECT_LYR	String	The specific layer to select if a geodatabase is read into the Scenario Model.
FILTER_COL	String	The specific name of the field/attribute to query (e.g., “road_type”) by the Scenario Model.
FILTER_VAL	String	The specific value of the specified field/attribute to query (e.g., “winter”) by the Scenario Model.
BUFFER	Float	To create a larger area based on specified ***metre*** distance from a point (e.g., port), line (e.g., road, pipeline), or polygon (e.g., land use plan zone) feature. This can be used to indicate an anticipated growth in area across time or other parameters with uncertain geographical coverage.
S1_T1, S1_T2, …, S4_T3, S4_T4	Float	A number over 1 for assuming a greater magnitude of use/activity. A number over 0 and under 1 for assuming a lesser magnitude/weight of use/activity. Specify -1 for assuming no development use/activity (i.e., protected area).

Appendix F: Coded Alienation Map Features

As part of the plausible map features (described in Appendix E), this section describes how the *Alienation* dataset (993 records) from the Ontario Ministry of Energy and Mines was qualitatively coded to assume areas of plausible development or no development.

Table F1: Summary of the alienation features classified for the Scenario Maps.

FEATURE TYPE	CODE	DESCRIPTION
Renewable Energy	RE	Any reference to wind, solar, etc. (not hydroelectrical).
Indigenous Land Claim	IC	Any reference to aboriginal land, boundary, territory land/title claims with First Nations.
Aggregate Permit	AG	Any reference to aggregate.
Hydro Electrical	HE	Any reference to hydroelectrical/hydropower development.
Shipping/Boating	SB	Any reference to anchorage, boating, or shipping activity.
Telecommunication	TC	Any reference to communication, telecommunication development, etc.
Conservation Area	CA	Any reference to land for conservation or protection from development.
Research	RS	Any reference to areas alienated for research and monitoring. For example, weather station, forestry studies.
Transportation	TR	Anything related to transportation.
Forestry	FR	Any reference to forestry activity.
Plan	*	Add * at the end if the feature is related to a plan, proposal, future development assessment, etc.
Surface and Mining Rights	SMR	Any reference to alienation of an area where there are surface and/or mining rights held by an entity.
Land Status Under Review	LSR	Any reference to alienation of an area that is under evaluation by a ministry or governing body.
Withdrawal of Land from Prospecting and Mining	WL	Any reference to alienation through the withdrawing of land from prospecting and mining (i.e., those done under S. 29 and S. 36 of the Mining Act).
Property Development	PD	Any reference to areas set aside for municipal development, including development of residential property and / or recreational areas.
Rehabilitation	REHAB	Any reference to areas being alienated for the purposes of rehabilitation of a site AFTER development.
Crown Reserves / Lands	CR	Any reference to alienation for the purpose of developing Crown Reserves / Lands that do NOT provide additional detail about the activity taking place there.
Public Use	PU	Areas that are set aside for public use.

Waste Disposal	WD	Areas alienated for the purposes of waste management (e.g., landfill development) and waste disposal.
Agricultural Lands	AL	Any references to agricultural lands.
Defense	CD	Any references to areas being set aside for defense and/or policing purposes.