



# Sudbury Operations Update 2021-2022





# Acknowledgement

We acknowledge that Vale’s Sudbury Operations operate within the traditional territory of Atikameksheng Anishnawbek First Nation, Wahnapiatae First Nation, Sagamok Anishnawbek First Nation and Whitefish River First Nation. Our operations are also within the traditional territory the Métis Nation of Ontario — Region 5.

## Purpose

**Vale exists to improve life and transform the future. Together.**

We believe mining is essential to the world’s development. We only serve society when we generate prosperity for all and take care of the planet.

**This is our purpose.**

## Values — What do we believe in?

### Life matters most.

We believe that life is more important than material results and goods, and we incorporate this vision in our business decisions.

### Act with integrity.

We build relationships of trust and we promote open and transparent communication, acting with respect and integrity.

### Value the people who build our company.

We trust people, and together we build a work environment admired by all. We seek lifelong learning and personal growth.

### Make it happen.

We are engaged, responsible and disciplined about generating results and overcoming challenges. We act in the pursuit of excellence, being sustainable and reliable.

### Respect our planet and communities.

We are committed to economic, social, and environmental development in our business decisions.

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On the cover:

Copper Cliff Mine South headframe.  
Photo credit: Marie Fjordell

# A message from Alfredo Santana

Vale’s North Atlantic Operations are in the midst of an exciting transformation that encompasses everything from the way we operate to the configuration of our asset portfolio to the culture that underpins our business. It is driving us towards realizing our goal to be a great company recognized for our safety performance, operational excellence, and leadership in sustainable mining.

As part of our transformation, we are revitalizing our asset portfolio. This includes advancing the Voisey’s Bay Mine Expansion Project, which will transition the operation from open pit to underground mining, extending mine life to at least 2035. We are also investing \$150 million to extend our mining activities in Thompson, Manitoba, by 10 years, and we have invested approximately \$950 million in our Copper Cliff South Mine Project in Sudbury, which began operations in August.

As we accelerate our transformation, one thing that will not change is our obsession with safety. At Vale, Life Matters Most, and we continue to introduce new safety initiatives to mitigate risk and ensure we live up to this core value. This includes our recently launched Leadership in the Field, which, as its name suggests, ensures our leaders spend more time supporting and mentoring frontline employees in their work areas.

Our transformation reflects the fact that the world itself is changing — and that we need to change with it. Global adoption of electric vehicles (EVs) and renewable energy is rising, and demand for our metals is rising in tandem. But it is not enough to mine critical minerals like nickel, copper, and cobalt, we must mine them in innovative ways, ensuring we meet our emission targets and help our customers meet their targets. That is why we are transitioning to low-carbon alternatives to power our operations wherever possible.

Leveraging new technologies is not only critical to our ability to adapt to a low-carbon world, it is vital to our

future. As our mines go deeper and we operate in increasingly remote areas, it is incumbent upon us to maintain and increase efficiency and productivity while ensuring we always mine safely and responsibly.

Our transformation also encompasses who we are and who we aspire to be as a business. This includes establishing a work environment that is diverse, inclusive, and respectful of all. Over the past year, we have advanced workstreams focused on language, facilities, recruitment, training, and education of our employees to build a more diverse and inclusive culture.

In all my years in mining, I have never seen a deeper commitment to diversity, equity, and inclusion. We are making significant progress but there is still much to do. Building a diverse and inclusive culture is similar to building a strong safety and health culture: it requires constant diligence, continuous learning, regular communication, and leadership by example.

Transformation is vital to the future of our business and I believe that future is extremely bright. Our business is underpinned by outstanding assets, people, and community relationships. We are transforming Base Metals as the world itself transforms in pursuit of a low-carbon future in which our metals will play a central role. While we are in the early stages of our transformation, we are all on the same page at Vale, striving to achieve our purpose to improve life and transform the future, together.

**Alfredo Santana**  
Chief Operating Officer, North Atlantic Operations and Asian Refineries



## Vale’s 2030 Global Sustainability Commitments:

**33%**  
Reduce greenhouse gas emissions by 33%

**100%**  
self-generation of clean energy

**10%**  
Reduce new water collection by 10%

**x2**  
Double female participation in our workforce



# A message from Gord Gilpin

As I reflect on the past two years of the Ontario Operations, I'm reminded of what an exciting time it has been. I am also reminded of the incredible team of people we have here in Sudbury. We have approximately 3,700 employees working for the Sudbury Operations and each and every one of them are all driven and guided by our purpose and values, especially that life matters most.



There is nothing more important to us than ensuring our employees go home safely after each and every shift. It is equally important to us that we operate safely within our local community. To do that, we use Vale's Production System, a management model designed to manage risk and improve operating efficiency.

With our purpose, values and production system in place, our team is strongly positioned to deliver the critical minerals in high demand for Canada's green economy. At our Sudbury Operations we produce critical minerals such as nickel, copper and precious group metals electric cars, mobile phones and that are used in many other high tech applications.

To meet the growing demand for these critical minerals, we have a number of short and long-term mining projects underway. We are also investing in our surface operations for sustainable growth. At the same time, we're using technology to find new ways to mine more efficiently and more sustainably.

It is also important to us that we are sensitive to the impact our operations may have on our local community and to acknowledge that we are operating within the traditional territory of several Indigenous communities.

We are continuing to develop and improve our relationship with Indigenous communities and committed to supporting their plans for community development. We're also working on collaborative actions for our Truth & Reconciliation Journey. At Vale, we've implemented a residential school memorial garden at our North Atlantic Operations Centre and a paid day off for all employees in Canada on the National Day for Truth & Reconciliation.

It's important to us that we also give back to the broader community, especially in support of vulnerable populations. Earlier this year we donated \$100,000 to Réseau Action Network in support of a supervised drug consumption site and over the past year we've made significant donations to United Way North East Ontario (\$250,000), YMCA North East Ontario (\$100,000) and the Sudbury Food Bank (\$100,000 — in partnership with Wheaton Precious Metals). All of it is an important opportunity to contribute to the community where we operate.

Sincerely,

**Gord Gilpin**  
Head of Ontario Operations

Over the last 12 years, Vale has contributed:

**\$5.9B**  
in capital investments, and  
**\$22.5B**

in operating expenditures to support its operations in Ontario.



**\$28.4B**  
In total investment

**\$36.1B**  
GDP direct and indirect contribution to Ontario

Vale directly employed  
**4,420**  
people across Ontario



**\$2.3B**  
in government revenue



Special evening dedicated to recognizing the 54 mine rescuers who, in September 2021, valiantly returned 39 individuals from underground to surface at Totten Mine.

## Health & Safety

At Vale, we are obsessed with health and safety. There is nothing more important to us than ensuring no lives lost and no lives changed for every employee, after every shift. That's why we work so diligently as a team to ensure the highest possible safety standards across our operations.

We have emerged from a challenging couple of pandemic years, which saw unprecedented levels of absenteeism in the workplace which we worked hard to address through pandemic protocols, access to pandemic supplies and enhanced health supports for employees. This year we returned to a steady state of operating. Though we continue to experience above average levels of absenteeism across our sites, the evolution of Public Health guidelines related to COVID-19 have lessened the impact and duration of these absences within our operations.

Mental health has also been a key focus of our support for employees during the pandemic. Employees have access to our Employee Family Assistance Program 24 hours per day, 7 days a week. We also introduced a new medical services app offering complimentary and unlimited access to virtual care 24 hours a day, 7 days a week to our employees and their families. This service helped employees access support anywhere in Canada for many health challenges, including

mental health specialist referrals, lab work, prescriptions, medical advice, etc. We are also working to address the stigma associated with mental health through national sponsorship of community awareness programs like Defeat Depression with the Mood Disorders Society of Canada. Many of our employees participated in Defeat Depression walks near our operations.

In terms of safety, we continue to be incredibly proud of the men and women that make up our Mine Rescue Team. They truly came to the rescue last year when they helped 39 Totten Mine employees climb out of the mine after an incident in the shaft rendered the conveyance inoperable. This spring we recognized their heroic efforts and the support from the Ontario Mine Rescue in a special recognition ceremony.



This year we also introduced Self-Contained Self-Rescuing devices at all of our underground mines and they are available for employees to wear in the workplace. These are wearable escape breathing devices that can be worn in an emergency to escape from carbon monoxide and other harmful gases emitted in an underground fire or explosion. These, along with other fire prevention and rescue controls will enhance safety for our employees in the workplace.

Our employees' unwavering focus on safety has delivered significant results over the past year.







Vale Day at YMCA

## VPS — Vale’s Management Model

At Vale, we have 100,000 employees working in approximately 30 countries. Although we work in such diverse businesses and cultures, we have one focus as a company: To ensure safe operations that place people at the core. For this we have implemented the Vale Production System (VPS) as our management model.

VPS is the path that will lead us to becoming a safer and more reliable company. The model outlines practices that all employees are adopting daily. The practices are based on three dimensions: leadership, technical and management.

It is a model that is constantly evolving and continuously improves and consolidates its approach, methods, techniques and tools used in accordance with lessons learned. And, it extends to our social performance model.



How we engage with communities, Indigenous Peoples and other key stakeholders are all a part of this VPS model. We have greater rigor within the Sudbury Operations regarding this social performance today than we had just five years ago. We now take a more systemized approach in evaluating the risks and impacts our operations may have on communities and the plans and controls we can put in place to mitigate them.

Examples include human rights, community conflict, safety risk and impact assessments. We now annually evaluate our performance against our social performance model and requirements. Externally, we participate in the Mining Association of Canada’s Towards Sustainable Mining Program, International Council on Mining & Metals and Global Reporting Initiative and we’re also working towards ISO 14001 certification.



N’swakamok National Indigenous Peoples Day Pow Wow

This year the Mining Association of Canada introduced a new Indigenous and Community Relationships protocol, which raised the bar for performance in this area over previous years. As such, we have some work to do in Sudbury. While we achieved a top score of AAA in three categories under this protocol, we achieved a more average score of A in the areas of community impact and benefit management and community of interest response mechanism. Scores for Vale’s performance on all of the Towards Sustainability performance indicators are available here: <https://mining.ca/companies/vale/>.

## Community

The community is a part of Vale’s Sudbury Operations. In fact, the community has been growing up and expanding around our operations for more than 100 years. As such, our relationships with community stakeholders and Indigenous People near our operations are critically important to us and help to guide the way that we operate.



Community Liaison Committee

We develop these relationships through ongoing community engagement via participation and financial support for community events and partnerships. We have a newly formed Community Liaison Committee, comprised of key stakeholders from across the City of Greater Sudbury. In the Spring we plan to resume our annual Open House. Both of these forums provide an excellent opportunity to share information about our operations, projects and ongoing initiatives.

We have a grievance mechanism called the Vale Community Concerns Line, which residents can call at 705-222-VALE (8253) 24 hours a day, seven days a week and receive a call back from a subject matter expert within one business day.

In the past two years we have received the largest number of calls to the Community Concerns Line when seismic events occur. Having heard these concerns from residents, we have implemented a seismic event communications protocol, designed to expedite community communications regarding significant seismic events that are felt in the community.

It’s important to us that we give back to the community that hosts our operations. During the pandemic we donated approximately 90,000 N95 masks to first responders, long-term health care homes and local hospitals.

We made increased donations to long-standing community partners, the United Way North East Ontario (\$250,000), YMCA Northeast Ontario (\$100,000) and the Sudbury Food Bank (\$100,000 — in partnership with Wheaton Precious Metals). For the first time, this year we donated \$100,000 to Réseau Access Network for a supervised drug consumption site in downtown Sudbury to help prevent fatalities associated with drug consumption.



Réseau Action Network Safe Consumption Site ribbon cutting event



United Way Kick-off

Vale’s relationship with local Indigenous communities is critically important to us. In fact, our global social ambition is to support Indigenous communities near our operations in their plans to pursue the rights set out in the United Nations Declaration on the Indigenous Peoples Rights.

We’re supporting these plans through a variety of agreements with Indigenous communities in the Sudbury Basin. Some of these are currently being reviewed and need to be updated and revised to better meet the needs of Indigenous community partners.

In addition to agreements, we have developed an action plan to develop our Truth & Reconciliation Journey, together with employees and local Indigenous communities. Some of these actions include:

- Honouring the National Day for Truth & Reconciliation on September 30th with a paid day off and education opportunities for all employees in Canada to reflect on our shared colonial past and impacts to Indigenous People
- A new online Indigenous cultural awareness training module for all Canadian employees
- A new Residential School Memorial Garden at Vale’s North Atlantic Operations Centre in Copper Cliff
- Sponsorship of the National Indigenous Peoples Day celebration hosted by N’Swakamok Native Friendship Centre in Bell Park and education for Vale employees about Indigenous culture
- Introduction of our Community Procurement Program, a pilot program designed to drive Indigenous community participation and inclusion through our local supply chain
- Participation in local Indigenous community cultural events such as pow wows and fall harvests



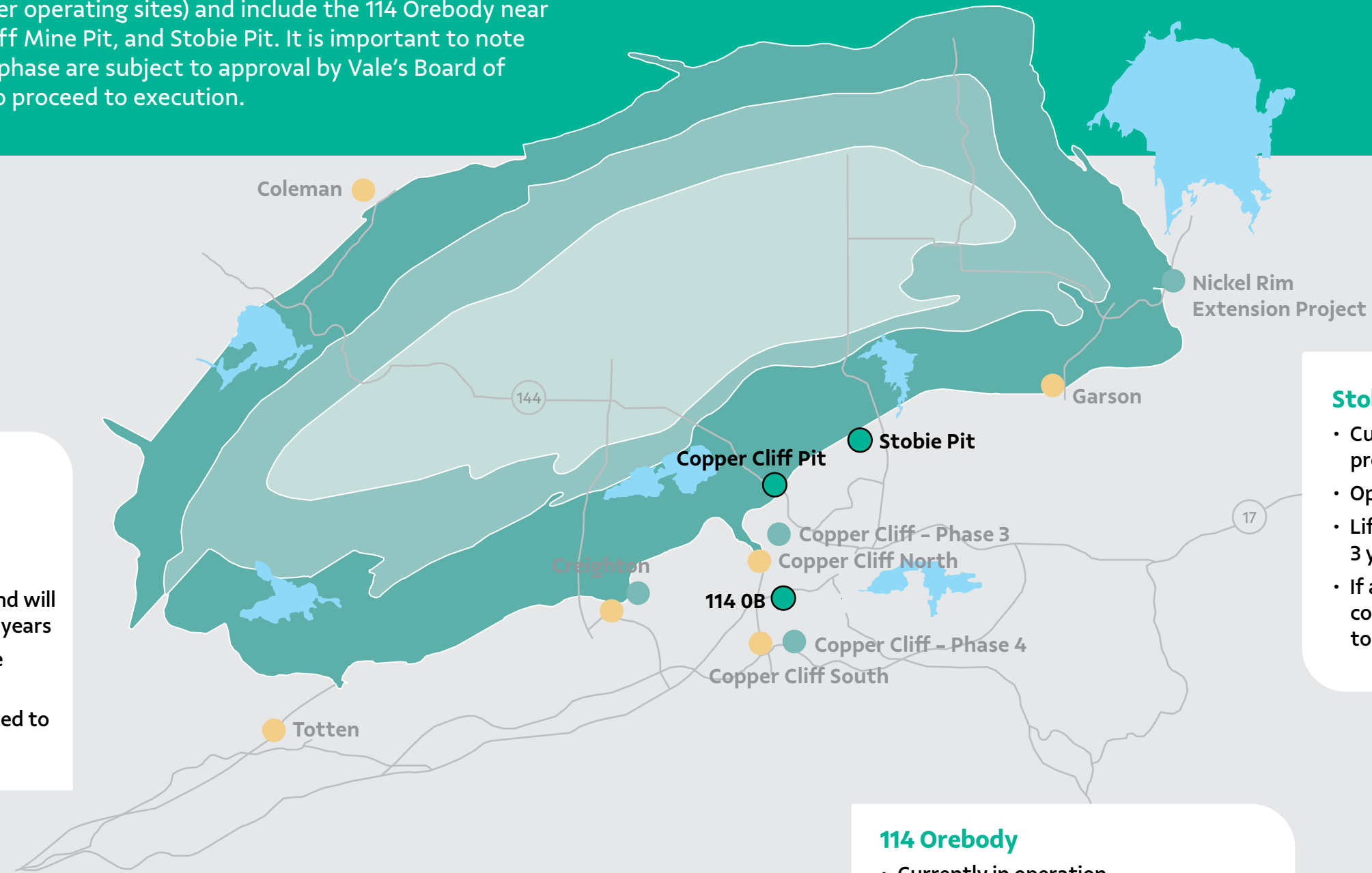
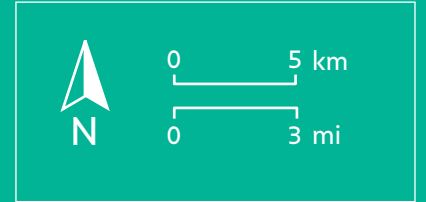
Planting and building of Residential School Memorial Garden



# Near Surface Short-Term Mining Projects

Vale is currently studying a number of small, near surface and short-term mining projects to develop a pipeline of projects to deliver on our production plan and support our market commitments.

These are all brownfield sites (former operating sites) and include the 114 Orebody near Copper Cliff Mine North, Copper Cliff Mine Pit, and Stobie Pit. It is important to note that all projects in feasibility study phase are subject to approval by Vale's Board of Directors and are not guaranteed to proceed to execution.



**Copper Cliff Pit**

- Currently conducting pre-feasibility study
- Open pit operation
- Pit dewatering has begun and will continue over the next two years
- Life of mine estimated to be approximately 8 years
- If approved, project estimated to commence in 2025

**Stobie Pit**

- Currently conducting a pre-feasibility study
- Open pit operation
- Life of mine estimated at 3 years with potential for expansion
- If approved, project estimated to commence in 2025, with potential to accelerate to 2024

**114 Orebody**

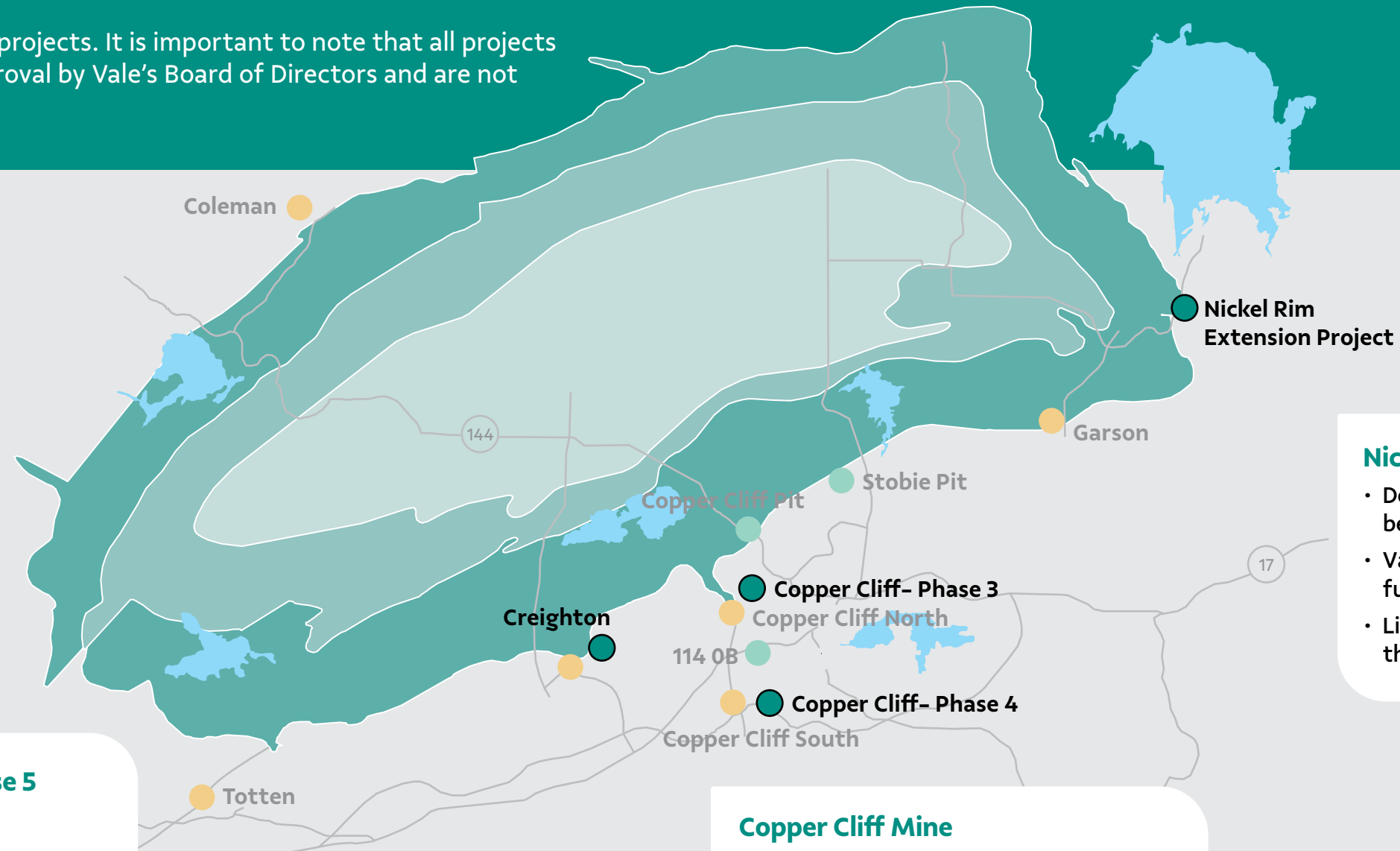
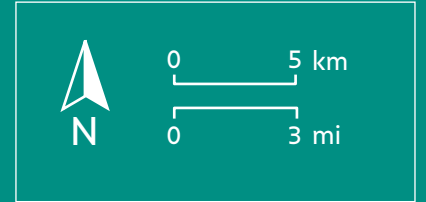
- Currently in operation
- Life of mine currently estimated at 3 years with potential for expansion
- Ramp access near Copper Cliff Mine North headframe
- Also functions as a training facility

- Active Mines
- Large Mining Projects
- Small Deposits

# Long-Term Mine Site Extension Projects

While we need the short-term, smaller projects to keep our operations working at full capacity over the next 7 years, we are also planning three larger long-term mining projects in parallel. These projects include: Nickel Rim South Extension, Copper Cliff Mine Phase 4 and Creighton Phase 5.

These projects are all brownfield extension projects. It is important to note that all projects in feasibility study phase are subject to approval by Vale's Board of Directors and are not guaranteed to proceed to execution.



**Creighton Mine – Phase 5**

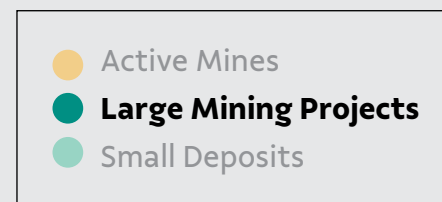
- Currently in feasibility study phase
- Early works construction anticipated to start in March 2023
- Extends the life of Creighton Mine to 2038

**Copper Cliff Mine**

- Completed Phase 1 of Copper Cliff Mine South Project this year
- Phase 2 on hold and under evaluation
- Phase 3 & 4 currently in study phase
- Life of mine is approximately 20 years
- If approved, Phase 3 would commence production in 2029; Phase 4 in 2031

**Nickel Rim South Extension**

- Designed to be a joint venture between Vale and Glencore
- Vale and Glencore are jointly funding a feasibility study
- Life of mine is anticipated through to 2052







## Surface Plants Projects

While we've been intensely focused on studying the feasibility of multiple mining projects, we've also been studying ways to improve our surface operations. This includes massive investment in studies for our Smelter Complex as well as environmental improvements for the Copper Cliff Nickel Refinery. Capital investments and study work has also been occurring on our hydro-electric facilities and within our Central Tailings Area.

These projects are all occurring on brownfield sites. It is important to note that all projects in feasibility study phase are subject to approval by Vale's Board of Directors and are not guaranteed to proceed to execution.



A tailings project area.

### Tailings

- Approximately \$1 billion in tailings improvement projects planned over the next 10 years
- 5 of 11 dams have been completely refurbished since 2007. The remaining 6 dams will be rehabilitated over the next 6 years
- Primary activities include buttressing, erosion control and dredging



New surface utilities building is designed to modernize utilities infrastructure for the Smelter.

### Copper Stack & Superstack Demolition

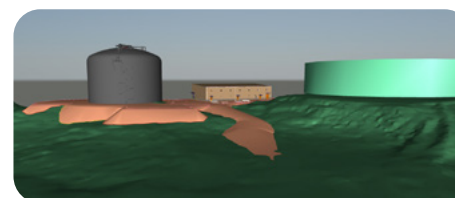
- With the construction of two 450' new stacks following the completion of the \$1 billion Clean AER project, the Copper stack and the Superstack are no longer required and have been decommissioned from service.
- Copper stack demolition will commence in the Summer of 2023.
- Superstack concrete shell demolition preparatory work will commence in 2024, with demolition starting in 2025.

### Slag East

- Designed to collect and treat ground water from Vale's Smelter slag pile.
- Currently in feasibility study phase with expected completion in Q3 2023.
- If approved, project execution will occur in phases from Q4 2023 – 2028.

### 16 million gallon tank

- Vale has a large 16 million gallon water tank in Copper Cliff that stores potable water from Vale's Vermilion Water Treatment facility.



- The project will build a new 5 million gallon tank to allow for inspection and repairs of the 16 million gallon tank. It will also include a new booster pump station to meet the water pressure demands for smelter operations.
- Civil construction will begin in May 2023 and tank erection will be completed by Q4 2024.

### CAWMS (Central Area Water Management System) Upgrades

- This study will provide options to improve collection and treatment performance of the CAWMS to reduce potential off-site migration of surface run-off, considering current and future environmental and operational projects.
- The results of the feasibility study will determine the preferred option and associated schedule for implementation.

### Hydro-electric facilities

- Last year replacement of the spillway and side dams at our Wabagishik Generating Station were completed to replace aging infrastructure.
- Construction of new spillway also began at the Nairn Generating Station and will be completed Q3 2025.
- A feasibility study is also underway to evaluate a variety of options for refurbishment of the Nairn Generating Station.



Rendering of scubber project facilities.

### Nickel Refinery SO<sub>2</sub> Scrubber

- This is an environmental improvement project that will construct a facility that will clean (scrub) the off gas from the Nickel Refinery prior to atmospheric discharge
- Ensures Vale remains compliant with new SO<sub>2</sub> emission regulations
- Project is in final phases of feasibility study
- Investment is estimated at approximately \$200 million
- Construction start is anticipated in Q2 2023



# Innovation

## Green Energy Vehicles

Vale is trialing a fleet of approximately 40 battery-electric vehicles in Sudbury. Over 70% of operators surveyed reported feeling better after a shift when operating an EV as compared to a diesel equivalent. Learnings & experience are informing our project teams designing our mines of the future. Deeper mines are requiring modern fleet technologies to ensure economic viability. Operational feedback indicates positive impact on working conditions.

## Biomining and Bioremediation

Vale is committing \$875,000 over a 5 year period to MIRARCO to support innovative research in biomining and bioremediation. Dr. Nadia Mykytczuk is the lead researcher who will look to developing a series of biotechnologies aimed at recovering metals from mine waste such as tailings and waste rock. The technology could help to add to production and significantly reduce financial liabilities associated with the management of waste materials.

## Integrated Remote Operating Centre (iROC)

Vale's Integrated Remote Operating Centre (iROC) uses digital connectivity to monitor, assist and respond to underground operations at our Creighton and Coleman Mines, with plans to connect the rest of our mines in Canada in the future. Located on surface at our North Atlantic Operations Centre in Copper Cliff, iROC functions like an 'air traffic controller' for our mining operations.

This technology provides greater safety in the workplace by increasing supervisor time in the field, offering 24/7 emergency response support and seismic event monitoring. It also improves efficiency by exposing production bottlenecks and shift delays and improving our maintenance planning process.



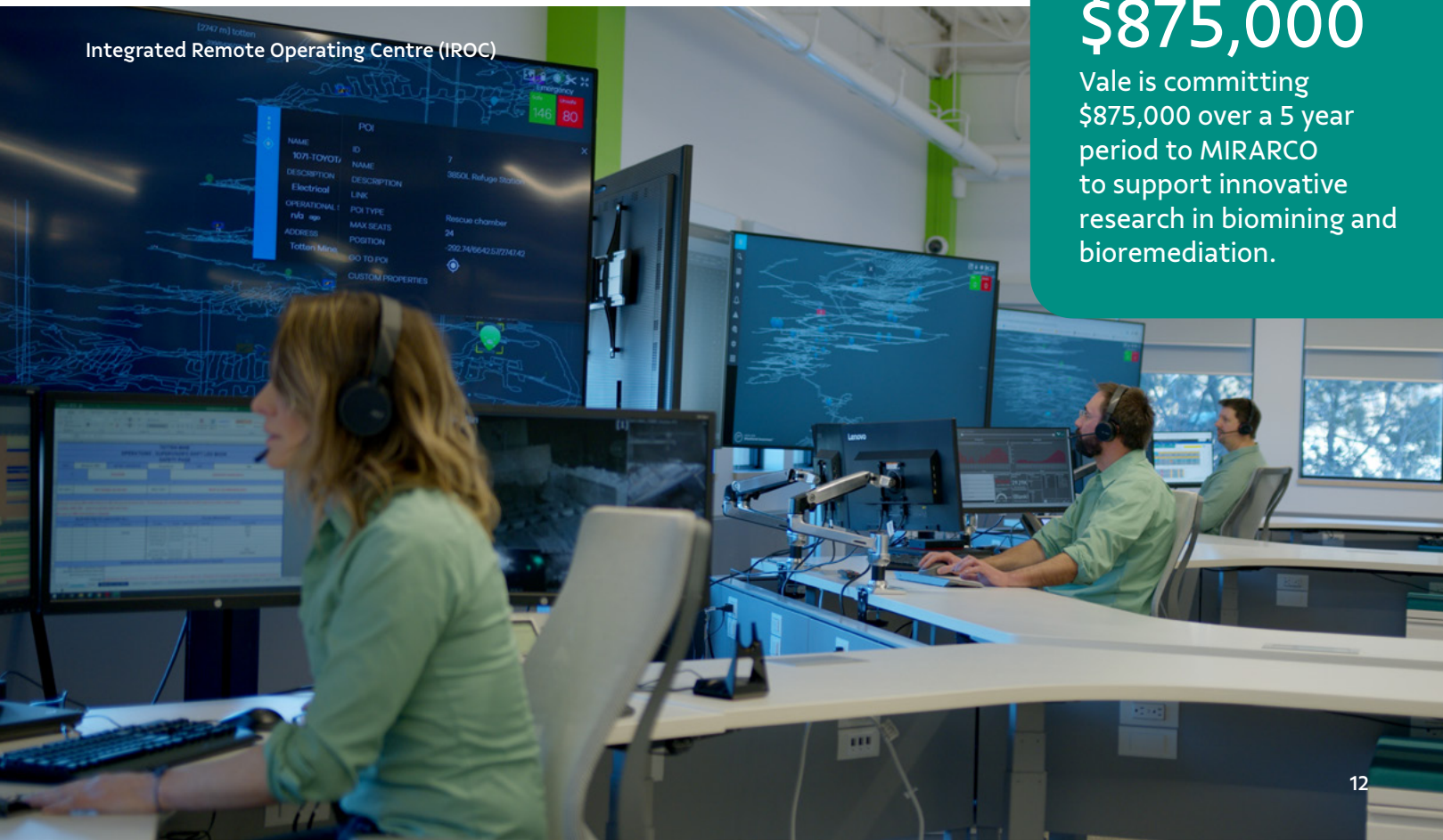
**70%+**

Over 70% of operators surveyed reported feeling better after a shift when operating an EV as compared to a diesel equivalent.



**\$875,000**

Vale is committing \$875,000 over a 5 year period to MIRARCO to support innovative research in biomining and bioremediation.



Tree planting for Sudbury's Biodiversity Action Plan.

# Environment

We're excited to share that Vale's Ontario Operations (including our Sudbury Operations and our refinery in Port Colborne) are being certified under ISO 14001:2015 standard. This is an internationally accepted standard for environmental management systems that will help us to improve our environmental performance and demonstrate our commitment to minimizing environmental impacts from our operations.

ISO 14001 will help us to better identify, report and manage environmental risks. At the same time, it will provide Vale with a competitive advantage on the Dow Jones Sustainability Index and it will soon become a requirement of the London Metal Exchange. Certification of Vale's Ontario Operations is planned for mid-2023.



Beekeeping to enhance biodiversity.



Tree seedlings in Vale's greenhouse in Copper Cliff.



## Contact Us:

If you have questions or concerns about Vale's Sudbury Operations, please contact our Community Concerns Line at: 705-222-VALE (8253) or you can email us at [Ontario.operations@vale.com](mailto:Ontario.operations@vale.com). For greater anonymity, you may also contact **Vale's Whistleblower channel**.

We want to hear from you! Scan this QR code to provide feedback about our operations and how you would like to receive information from us.

