Association for Mineral Exploration

Association for Mineral Exploration

Explore Our Economy Report

January 2022

iTOTEM ANALYTICS

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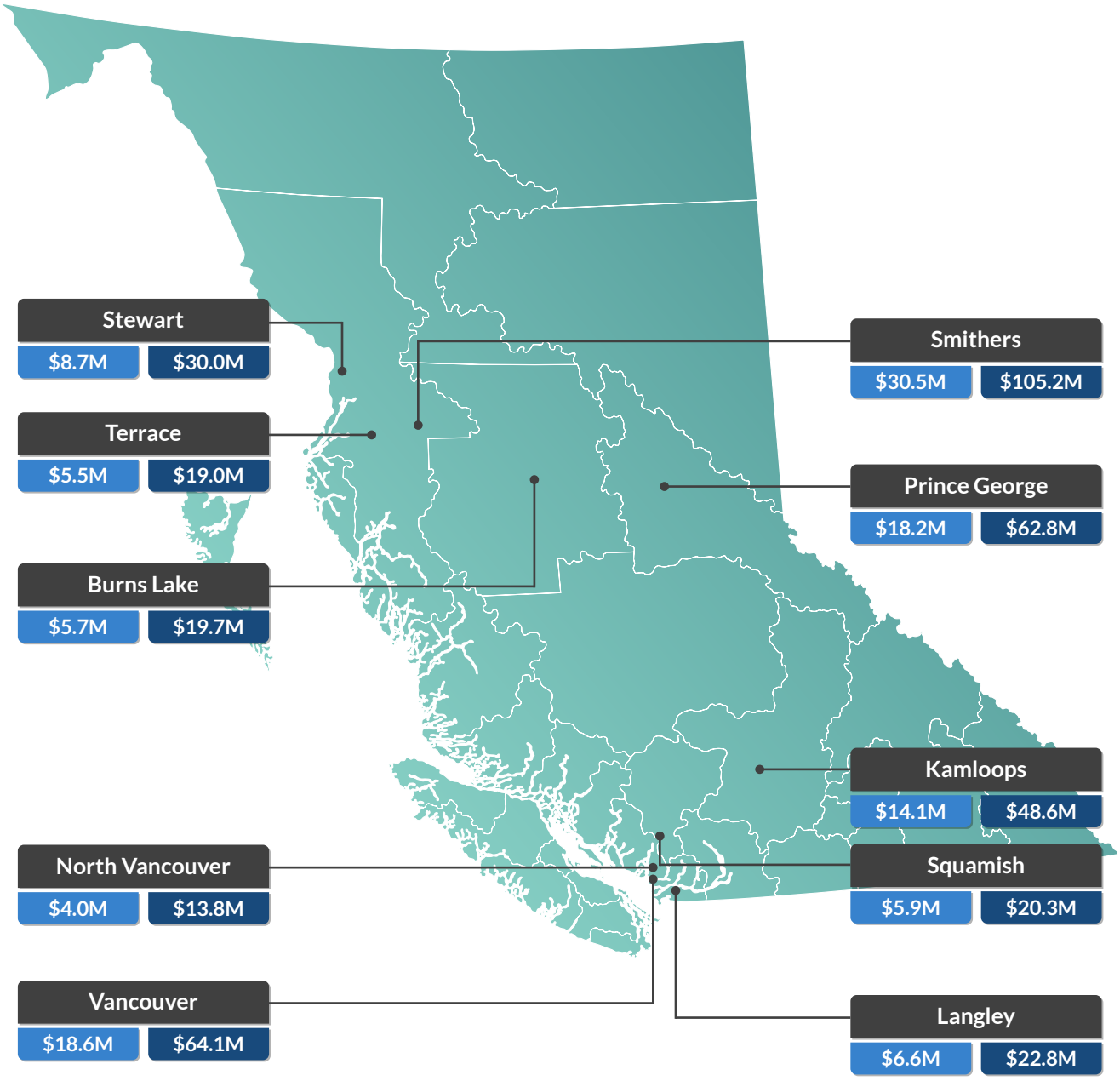
Explore Our Economy

More than **$510 Million** is contributed by the mineral exploration sector to BC's economy in one year. AME's **Explore Our Economy** initiative reports on the industry's contribution to reconciliation, to a low carbon future and to BC's economic recovery.



INTRODUCTION

Explore Our Economy

iTOTEM Analytics is pleased to submit to the Association for Mineral Exploration BC (AME) the inaugural **Explore Our Economy** (EOE) report.

The initiative was branded **Explore Our Economy** as an invitation to British Columbians to learn more about the businesses that support British Columbia's (BC) mineral exploration sector.

As our society heals from the losses and monumental changes in our communities, workforce, and economy as a result of the pandemic, AME saw an opportunity with **Explore Our Economy** to encourage a discussion about the unique role BC's mineral exploration sector and their vendors can play to support economic recovery across BC.

The mineral exploration industry is central

- To reconciliation;
- To discovering the minerals needed for low-carbon energy solutions, leading our transition to a net zero future; and,
- To thousands of businesses and people in all corners of the province recovering and rebuilding.

A thriving mineral exploration industry in our province supports **reconciliation, the low carbon future** and **economic recovery** in BC.

Reconciliation

History shows that prospectors and explorers played a foundational role in shaping and developing the province. While part of our past reflects a legacy of colonialism, our country seeks to build a better future together with Indigenous peoples. BC is the first jurisdiction in Canada to formally adopt the internationally recognized **United Nations Declaration on the Rights of Indigenous Peoples** (UNDRIP)[I] through legislation in 2019.[II] With the official adoption of UNDRIP by the federal government in 2021, the need to "forge stronger relationships with Indigenous peoples and advance reconciliation"[III] has never been clearer.

BC's mineral exploration industry aims to be a leader in reconciliation with Indigenous peoples through collaboration, shared planning, and procurement. EOE revealed that more than 20% of supply chain expenditures were spent with Indigenous-affiliated businesses, which is a participation rate four times greater than the Government of Canada's purchasing target for 2024.

BC Minerals are Needed for Our Low Carbon Future

Since the Intergovernmental Panel on Climate Change's (IPCC) **Special Report on Global Warming of 1.5 °C** (2018)[IV], many countries have enhanced and accelerated greenhouse gas (GHG) emission reduction targets to help limit the global temperature rise to 1.5°C above pre-industrial levels. Canada has adopted an ambitious new target, committing to GHG emissions reduction of 40-45% below 2005 levels by 2030 and to achieve net-zero emissions by 2050.[V] Meanwhile, the Government of BC has adopted GHG emissions reduction targets of 40% below 2007 levels by 2030 and 80% below 2007 levels by 2050.[VI]

The International Energy Agency (IEA) **World Energy Outlook special report on The Role of Critical Minerals in Clean Energy Transitions**[VII] reports that since 2010, the average amount of minerals needed for a new unit of power generation capacity has increased by 50% as the share of renewables in new investment has risen.

The minerals BC discovers and produces, backstopped by BC businesses, are essential to meeting these climate goals and the green transition. According to the IEA, at least 30 times as much nickel and other key minerals may be required by the electric vehicle (EV) industry to meet global climate targets by 2040. For instance, a typical EV requires six times the mineral inputs of a conventional vehicle.

BC is ideally positioned to meet the increased global demand for clean energy materials due to several distinct advantages:

1. World-class mineral resources;
2. Approximately 1,100 mineral exploration companies[VIII], creating a global centre of excellence; and,
3. A diverse, reliable, and regionally dispersed exploration and mining supply chain.

Economic Recovery

The Government of BC's **StrongerBC Economic Recovery Plan**[IX] provides the foundation to mobilize a low carbon economy and outlines the path forward in BC's economic recovery. One major pillar of the StrongerBC plan is supporting businesses to "reopen, adapt, hire, and grow—through the pandemic and beyond."[X]

BC mineral exploration companies are supported by a diverse supply chain, with vendors located across the province. Many of which are independently owned, **small businesses**[XI], launched by entrepreneurs who can lead economic recovery, innovation, and be crucial partners in tackling the challenges of creating a low-carbon future.

Aligning with the objectives of the StrongerBC Economic Recovery Plan, the results of EOE demonstrates that an investment in BC's mineral exploration sector is an investment in reconciliation, the low carbon future and the technology of tomorrow. Mineral exploration creates an anchor for supply chain activity, building strong resilient businesses in communities across BC for decades to come.

Project Objectives

The intent of the **Explore Our Economy** (EOE) study was to gain a better understanding of the diverse BC-based vendors who support the mineral exploration industry and the associated economic, social and environmental benefits arising from mineral exploration in BC.

The specific objectives of EOE were to:

Discover the provincial and regional economic impact of mineral exploration through supply chain expenditures;

Gain a better understanding of the variety of vendors supporting the mineral exploration sector, and their geographic distribution;

Promote the Indigenous vendors participating in BC's mineral exploration supply chain;

Report the different types of community investments made across the province by mineral exploration companies; and,

Test the effectiveness of a new methodology of supply chain data collection from a cross sectional representation of exploration sector stakeholders, including AME members and prospective members.

Scope of Research

Explore Our Economy analyzed the supply chain impact of the mineral exploration sector province-wide, by geographic regions and according to the Government of BC mining regions.

The following considerations defined the parameters of research for EOE and ensured the mineral exploration companies participating in the study represented:

- all regions and mineral exploration types;
- projects owned by junior and senior mineral exploration companies; and,
- projects at all stages, including:
  - Non-mechanized exploration
  - Early-stage mechanized exploration
  - Advanced mechanized exploration
  - Feasibility study

The scope also involved analysis of existing studies such as EY Canada's ***British Columbia Mineral and Coal Exploration Survey 2020***[XII] and the ***2020 BC Industry Estimates***[XIII] from Natural Resources Canada (NRCan).

Employment numbers were not within the scope of this research. However, analysis on employment on BC's 259 projects as collected through the EY survey is provided in Exhibit One for reference.

Project Participation

We recognize that BC's mineral exploration companies are requested and often required by law to contribute information to many data collectors.

Mineral exploration companies understand that information transparency and data sharing are necessary to create public awareness and inspire trust. However, while conducting this study iTOTEM Analytics also heard some companies express 'survey fatigue' from the volume of requests for information from multiple data collectors.

With the intention to demonstrate the linkage between the mineral exploration sector and BC advancing reconciliation, the low carbon future and economic recovery, AME decided to proceed with EOE, requesting that iTOTEM Analytics simplify the process of data collection and reporting.

We are deeply grateful for the participation of the mineral exploration companies who shared their perspective on industry trends and provided their confidential financial data on supply chain investments. ***The report was a genuine team effort by the staff of AME and the mineral exploration companies, advancing the collective goal of enhancing public education and celebrating contributions of local vendors who make up BC's mineral exploration supply chain.***

iTOTEM Analytics strived to maximize participation in EOE by collecting supply chain data from mineral exploration companies representing approximately 45% of the total annual estimated expenditures in BC in 2020.

More than 160 operators with mineral exploration projects spanning all mining regions in BC were involved via 350 engagements by iTOTEM Analytics including emails, phone calls, social media reminders and virtual meetings between September 15 and November 15, 2021.

At the close of the inaugural campaign, EOE engagements represented 29% of the estimated mineral exploration sector supply chain in 2020, equivalent to some **$148M in expenditures with BC-based businesses.** This data was then analyzed, including categorizing the types of goods, materials and services supplied to mineral exploration companies by approximately **445 vendors** located or affiliated with **110 Indigenous Nations and municipalities** across BC.

These vendors worked for companies on a cross-section of BC's critical mineral exploration projects including gold, copper, silver, nickel, coal, lead, zinc, molybdenum, tungsten, cobalt, palladium, platinum, and a variety of industrial minerals.

KEY FINDINGS

The key findings of EOE are grouped into the four following themes:

1. The economic benefits of mineral exploration across BC;
2. Geographic reach and vendor diversity
3. Indigenous participation; and,
4. Community investments.

1 The Economic Benefits of Mineral Exploration Across BC

Twenty-nine mineral exploration companies provided their 2020 supply chain expenditures.

EOE captured **$148M** worth of expenditures spent on goods, materials, and services from more than 445 vendors located or affiliated with **110 Indigenous Nations and BC municipalities.** This supply chain analysis covered an estimated 29% of the total BC mineral exploration expenditure for 2020.

To assist in creating more awareness about BC's mineral exploration sector and the associated economic spin-offs, each vendor was sorted according to the goods, materials or services provided to the mineral exploration company into one or more standardized categories.

Twelve categories were established from over 300 cost codes submitted by the mineral exploration companies. See Appendix A for a description of the categorization methodology.

Annual supply chain expenditures reported by mineral exploration companies ranged from **$61K to $66M.** The median annual expenditure reported by mineral exploration companies was **$1.2M.**

The variance in annual budget was largely driven by two factors:

- project stage; and,
- differing operational responses through the pandemic.

An average of 10 vendors were contracted for each exploration project in EOE, inclusive of all exploration phases.

Approximately 60% of respondents reported projects in **the early stage mechanized exploration** phase.

- Assuming a five-year horizon, the BC supply chain benefits of one such project could exceed an estimated value of **$11M**.
- Moreover, EOE revealed that 40% of these vendors were within 200 km of the project. These vendors represent service-based businesses including hotels, restaurants, trucking, companies, and earth works.
- A mineral exploration project anchors supply chain activity in a region for decades, supporting Indigenous and local service businesses which otherwise might be underutilized.

EOE surveyed mineral exploration companies to determine what factors would most positively impact mineral exploration investment in BC, recognizing how critical the sector is to economy.

- 70% of respondents said predictable and timely regulatory processes would remove investment barriers, expediting the discovery of the minerals necessary for a low carbon future.

2 Geographic Reach and Vendor Diversity

The geographic reach of the economic impact of mineral exploration supply chain was examined in EOE.

The municipality with the greatest amount of reported mineral exploration supply chain expenditures was Smithers, with consumables, equipment, logistics, and procurement for specialized contracting, such as drilling, representing approximately 95% of the expenditures.

Vancouver, ranked second by EOE supply chain spend, was a hub for specialized mineral exploration consulting and technical service companies in 2020, including engineering, geology, laboratory testing and Geographic Information System (GIS) service providers, making up approximately 90% of the spend in the municipality.

The municipalities with the highest exploration spend in 2020 in each of BC's mining regions were:

- **Northwest:** Smithers represented 52% of the regional spend
- **Northeast/North-Central:** Prince George represented 99% of the regional spend
- **Southwest:** Vancouver represented 45% of the regional spend
- **South Central:** Kamloops represented 61% of the regional spend
- **Southeast:** Cranbrook represented 50% of the regional spend.

The diversity and characteristics of the mineral exploration supply chain was also considered in EOE.

Drilling was the supply chain category with the greatest expenditure reported by EOE in 2020.

- **Drilling** companies made up 5% of the total vendors in the industry; but accounted for nearly 35% of the total expenditures in EOE.
- Of the operators that contracted drilling service, the average annual spend was $2.9M.

The second and third categories for most expenditure were **Logistics** and **Consultants** with a respective average annual cost of $1.1M and $864K per instance.

Only 21% of vendors reported in EOE were utilized by more than one mineral exploration company.

Certain service categories were more available locally to a project than others. For instance, 82% of all project sites in the survey were within 150 km of an accommodation supplier. At the same time, a smaller percentage of digital services providers were available within the same distance. For example, only approximately 38% the projects sites were within 150 km of a GIS service provider.

3 Indigenous Participation

The Indigenous procurement opportunities reported in EOE showed more than **35 Indigenous-affiliated businesses** associated with **19 Nations** were active with EOE companies.

- Aligned with the Government of BC's commitment through the adoption of UNDRIP to create opportunities for Indigenous peoples to be full partners in the economy, **21% of BC mineral exploration supply chain expenditures were spent with Indigenous-affiliated vendors.**
  - In comparison, Public Services and Procurement Canada (PSPC), Indigenous Services Canada (ISC) and the Treasury Board of Canada Secretariat (TBS), are striving for a minimum of 5% of the total value of public contracts to be held by Indigenous vendors by 2024.
- EOE also analyzed the types of Indigenous-affiliated vendors active in the mineral sector. Notably, Indigenous-affiliated vendors offered eight of the 12 goods, materials and service categories accessed by mineral exploration companies.
- As with the provincial distribution, the **Contractors** category, in particular **Drilling**, overperformed in terms of expenditure earned by Indigenous-affiliated businesses relative to the number of unique vendors.
- Overall, 14% of BC drilling companies were Indigenous-affiliated. These companies represented approximately 40% of the total drilling expenditure in the report.
- The Northwest mining region reported the highest count of Indigenous-affiliated vendors, while the Northeast/North-Central region reported the highest Indigenous-affiliated supply chain spend and the highest percentage of Indigenous-affiliated businesses in a mining region.

4 Climate Action and Community Contributions

The types of climate action and community investments made by mineral exploration companies was also examined in EOE.

- Alternative transport and fuel efficiency were the most widely reported areas of climate action by EOE participants. Other climate investments made by mineral exploration companies included electrification and process optimization, as well as implementing standardized greenhouse gas (GHG) emission tracking and reporting.
- EOE participants also reported investing approximately **$908K** in community contributions.
- Sponsorships, donations, and in-kind financial contributions made by mineral exploration companies supported more than **170 organizations** in over **40 Indigenous Nations** or municipalities across BC in 2020.
- More than 30 investments were directed to Indigenous communities or affiliated organizations, totaling approximately **$220K.**
- Health infrastructure, sport and community wellness-related organizations received the greatest amount of donations reported by EOE participants, topping $450K in 2020.

SECTION ONE

The Economic Benefits of Mineral Exploration Across BC

SECTION DESCRIPTION

This section addresses the supply chain economic impact of the BC mineral exploration sector by municipality across the province. Municipalities experiencing the greatest amount of mineral exploration supply chain expenditures are reported. The section also addresses proximity of vendors to projects. Recognizing the role mineral exploration could play in economic recovery, recommendations pertaining to regulatory improvement opportunities are also summarized.

KEY INSIGHTS

- EOE captured **$148M** or approximately 29% of detailed BC mineral exploration supply chain expenditure data for 2020.
- Based on the **$148M** annual spend, there were approximately **445** BC vendors spanning **110** Indigenous Nations and/or municipalities that benefitted from procurement made by mineral exploration companies.
- Smithers ranked number one for supply chain expenditures reported in EOE, followed by Vancouver and Prince George.
- Respondents reported, on average, having two active projects in BC with some companies reporting as many as eight projects. On average, 10 vendors were contracted for each mineral exploration project in the study.
- When surveyed 70% of respondents said predictable and timely regulatory processes would most positively impact mineral exploration investment in BC.

ECONOMIC IMPACT OF THE MINERAL EXPLORATION SUPPLY CHAIN

Explore Our Economy (EOE) captured $148M of detailed supply chain expenditure data with each economic benefit tagged to the address associated with the vendor providing the goods, materials, or services. For reference, **Natural Resources Canada's** (NRCan) 2020 BC's Mineral Exploration Supply Chain Exploration Plus Deposit **Appraisal Expenditures** was used as a proxy to estimate the supply chain impact of the mineral exploration sector province wide.

Table 1.1: BC's Mineral Exploration Supply Chain Footprint

BC's Mineral Exploration Supply Chain Footprint	Values
Exploration Plus Deposit Appraisal Expenditures	**$513.5M**
Categorized spend reported in EOE	**$148M**
Number of unique BC vendors accounted in EOE	~445
Number of municipalities with vendors reported in EOE	~90
Number of vendors Average number of vendors reported per company	10
Max. Annual Supply Chain Expenditure per company	~$66M
Min. Annual Supply Chain Expenditure per company	~$61K
Median Annual Supply Chain Expenditure per company	~$1.2M
Estimated Projected Total PST contributions[1]	~$35.9M

A Closer Look at the Procurement Benefits of Early Stage Mechanized Exploration

Companies participating in EOE represented all commodity types and exploration phases from planning to mine-life extension.

- Approximately 60% of respondents reported projects in **the early stage mechanized exploration** phase.
- Assuming a five-year horizon, the early stage mechanized exploration supply chain opportunity for Indigenous and local businesses could exceed an estimated $11M.
- The supply chain of the mechanized exploration phase, as reported by participants, revealed that **40%** of the vendors accessed by the mineral exploration companies were within 200KM of the project. These vendors represented service-based businesses including hotels, restaurants, trucking companies and earth works.

An investment in the mineral exploration sector anchors business opportunities for Indigenous and local vendors, and spurs economic recovery, in all regions of BC.

[1] Based on a naïve calculation, multiplying total spend by PST rate, 7%

Mineral exploration involves vendors from many municipalities across BC; however, there are several central hubs where there is a concentration of mineral exploration vendors. Table 1.2 displays the ten municipalities with the greatest supply chain expenditures reported in EOE .

Table 1.2: BC Municipalities Ranked by Mineral Exploration Expenditure – EOE, 2020

Expenditure Rank	Municipality	EOE Expenditure[2]	Estimated Total Expenditure[3]
1	Smithers	$30.5M	$105.2M
2	Vancouver	$18.6M	$64.1M
3	Prince George	$18.2M	$62.8M
4	Kamloops	$14.1M	$48.6M
5	Stewart	$8.7M	$30.0M
6	Langley	$6.6M	$22.8M
7	Squamish	$5.9M	$20.3M
8	Burns Lake	$5.7M	$19.7M
9	Terrace	$5.5M	$19.0M
10	North Vancouver	$4.0M	$13.8M

All values are approximate.

The Mining Association of BC's (MABC) **2019 'Mining Supply Chain Economic Impact Study,' One Province One Economy (OPOE)**[XIV] was cross-referenced to evaluate potential overlap of municipalities with highly active mining sector supply chains, compared with municipalities with highly active mineral exploration sector supply chains. Table 1.3 displays the ten municipalities with the greatest supply chain expenditure in OPOE.

Table 1.3: BC Municipalities Ranked by Mine Operator Expenditures - OPOE, 2019

Expenditure Rank	Municipality	Expenditure
1	Kamloops	$343M
2	Prince George	$252M
3	Vancouver	$247M
4	Sparwood	$238M
5	Burnaby	$202M
6	Elkford	$183M
7	North Vancouver	$156M
8	Chetwynd	$124M
9	Surrey	$111M
10	Kitimat	$86M

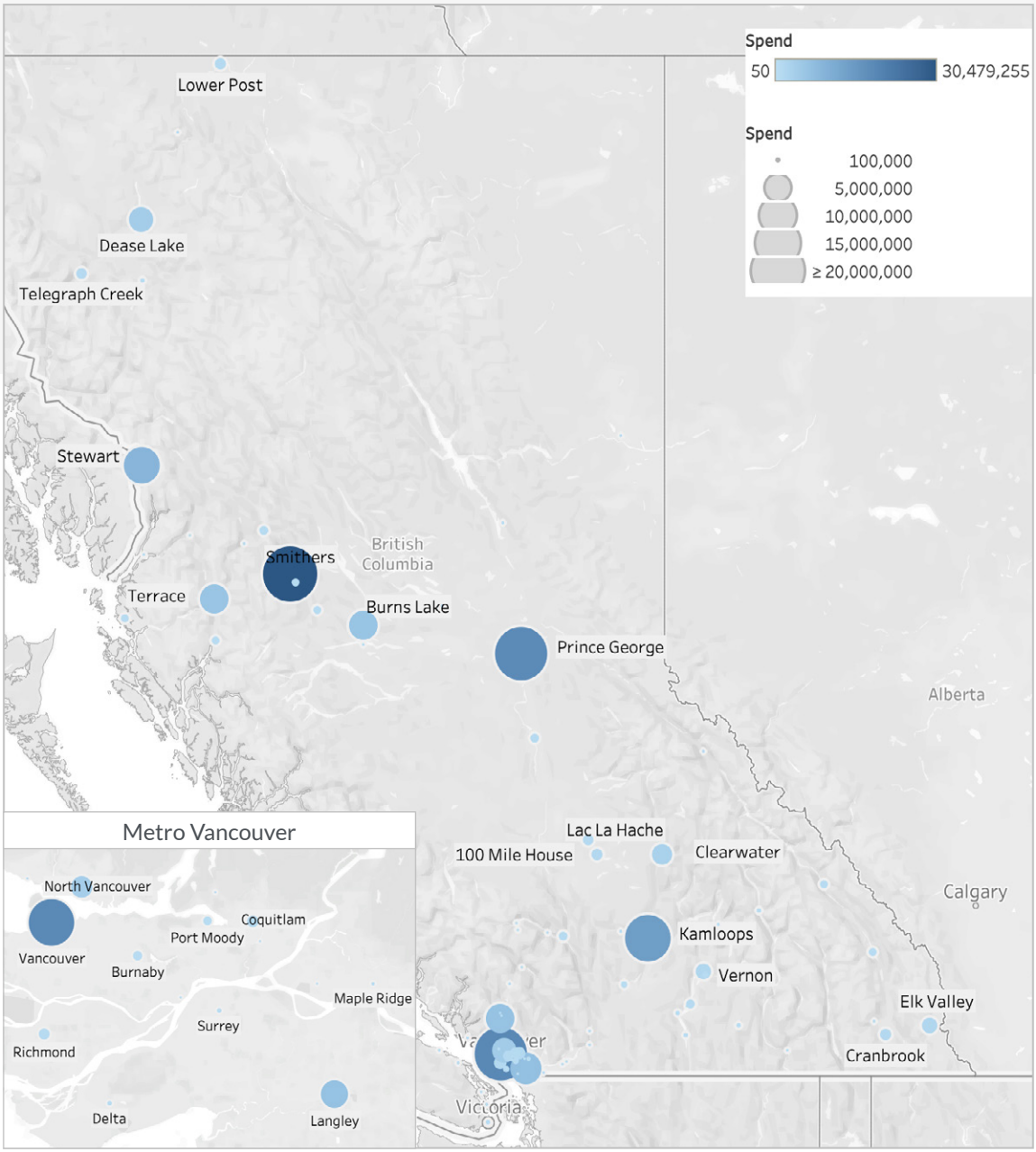
[2] Values include vendors and expenditure covering approximately 29% of the total expenditures by exploration projects in BC during 2020
[3] Assuming expenditure scales proportionally for the remaining estimated spend not captured in EOE.

Figure 1.1: Distribution of Relative Expenditure to Municipalities Across the Province.[4]

Roughly **36%** of unique vendors based in the Metro Vancouver Regional District reported an approximate $34 million of the mineral exploration supply chain expenditure. This equates to **23%**, or an estimated $118 million of projected expenditure.

Approximately **27%** of unique vendors are based in the key areas of Smithers, Kamloops, Prince George, and Terrace. These municipalities account for approximately **46%** of provincial mineral exploration supply chain spend.

The remaining **37%** of vendors are in other rural or remote regions of BC accounting for **31%** of the exploration related supply chain expenditures in 2020.



[4] The following municipalities are included in the Metro Vancouver area: Anmore, Burnaby, Coquitlam, Delta, Langley, Maple Ridge, New Westminster, North Vancouver, Pitt Meadows, Port Coquitlam, Port Moody, Richmond, Surrey, Vancouver, West Vancouver, and White Rock.

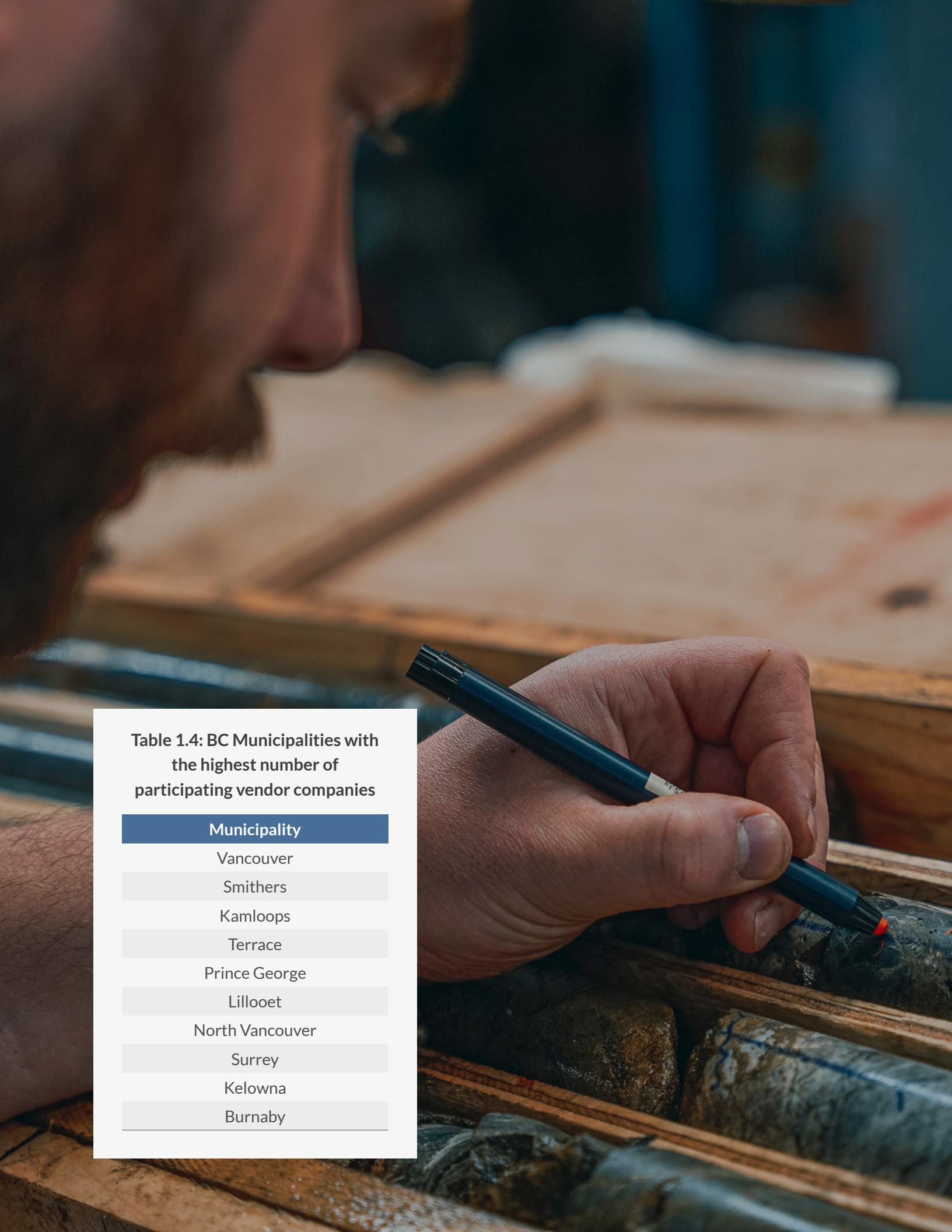


Table 1.4: BC Municipalities with the highest number of participating vendor companies

Municipality
Vancouver
Smithers
Kamloops
Terrace
Prince George
Lillooet
North Vancouver
Surrey
Kelowna
Burnaby

SECTION TWO

Geographic Reach and Vendor Type Diversification

SECTION DESCRIPTION

This section describes the vendors, their goods, products, and services, provided to the mineral exploration sector. The vendors are categorized into 12 different groups of businesses and mapped:

1. Provincially;
2. By geographic region; and,
3. By Government of BC mining regions

Also addressed in this section are climate innovations reported by EOE participants.

KEY INSIGHTS

- The municipality of Vancouver, ranked second by EOE supply chain spend, was a hub for specialized consulting and technical service companies in 2020. The consultants sub-category, including engineering, geology, lab testing and GIS, making up approximately **90%** of the spend alone with vendors located in the city.
- Smithers, ranked first by EOE supply chain spend, was a source for consumables, equipment, and logistics, as well as contractors. Together, these two categories represented approximately **95%** of expenditures in Smithers.
- The category mineral exploration companies spent the most on in 2020 was Drilling. Drilling companies made up 5% of the total vendors in the industry; but accounted for nearly 35% of the total expenditure. Of operators that contracted drilling services, the average annual spend was **$2.9M.**
- The second and third categories for most expenditure were **Logistics** and **Consultants** with a respective average annual cost of **$1.1M** and **$864K** per instance.

GEOGRAPHIC REACH AND VENDOR DIVERSIFICATION PROVINCE-WIDE

Categories of Vendors Across British Columbia

A key object of EOE was to develop a better understanding of the vendor categories supporting mineral exploration and the geographic dispersion of these vendors.

Based on the goods, materials or services provided to an exploration company, a vendor was sorted into one of the 12 categories. The expenditure was attributed to the category of service defined by the individual mineral exploration company that declared the expenditure. The map illustrates the approximate location and category of the 445 vendors reported in EOE.

Certain categories were found to be more available locally to a project than others. For instance, 82% of all project sites in the survey were within 150 km of an accommodation supplier, while only 38% of project sites were within 150 km of a GIS service provider.

The most expensive category reported in EOE was **Drilling**, with an average spend of **$2.9M** per instance. Drilling companies made up only 5% of the total vendors in the industry; however, they accounted for nearly 35% of the total expenditure. The second and third most costly categories were **Logistics** and **Consultants** with a respective average annual cost of $1.1M and $864K per instance. On average, the least costly category was **IT & Telecommunication Services** with an average cost of $85K per instance. A likely driver for the large disparity in cost by category is the amount of labour required to provide the service. A drilling contract necessitates significantly more labour than a satellite phone service and thus generates much more employment for the local community.

The composition of BC's mineral exploration sector supply chain is shown on page 22, both by relative number of unique vendors and by expenditure on the respective category.[5] It should be noted that labour costs of internal employees, those on payroll, were not captured as part of this study as they are not considered as vendors, however labour costs associated with external contractors were captured.

Note: the data does not show the economic contributions of internal labour and overhead of mineral exploration companies. There is opportunity for further analysis in this regard in the future.

[5] The categorization process is detailed in APPENDIX A

Figure 2.1: Categories of Vendors Across BC by Mining Region

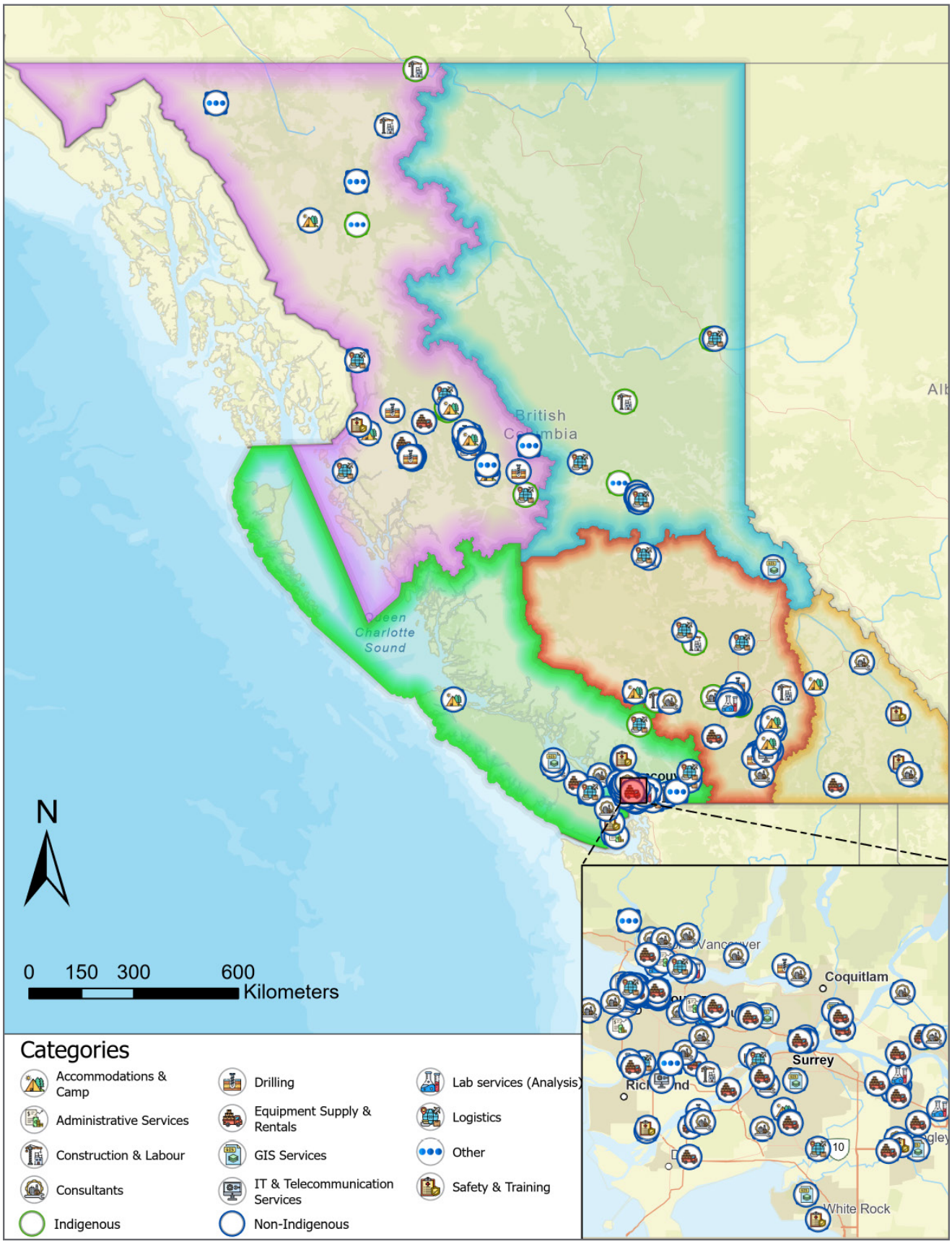
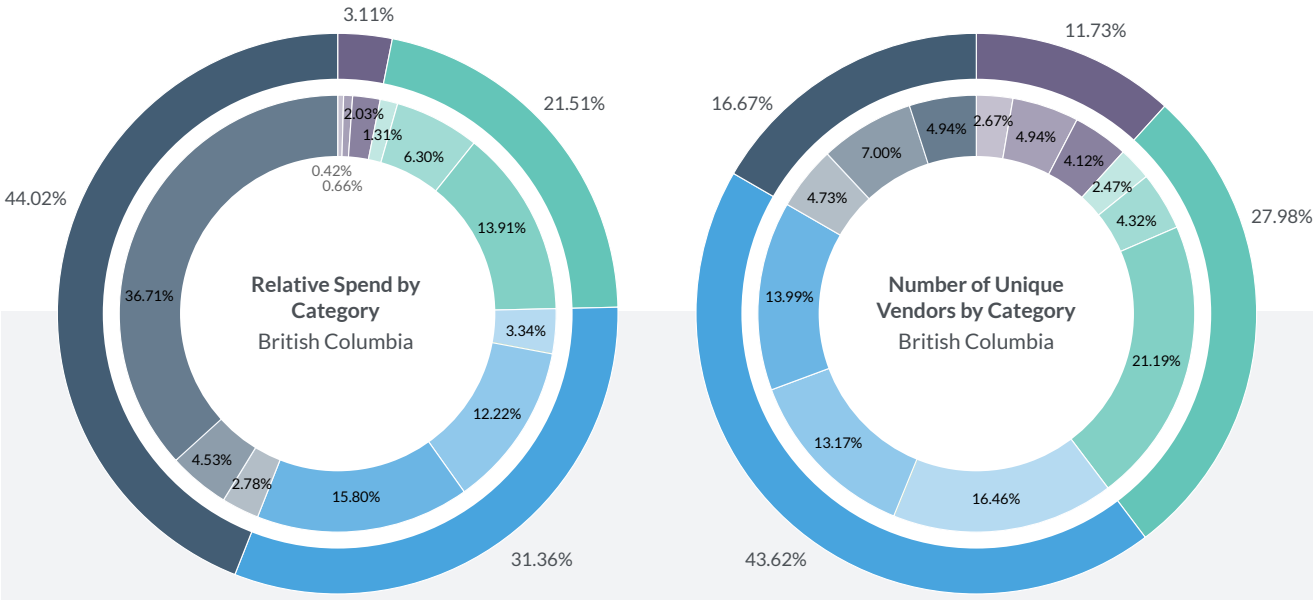


Figure 2.2: Mineral Exploration Supplier Types – British Columbia Vendor Distribution



Consulting and Technical Services – Spend 21.5%
Vendor Count 27.9%

- Consultants: Engineering, Environmental, Geological, Project Management, Regulatory Advisor
- Lab Services: Assaying, Chemical Analysis, Geochemistry, Petrographic Services
- GIS Services: GIS Mapping, LiDAR Survey, Radiometric/Magnetics Survey, Remote Sensing, Satellite Surveyors

Consumables, Equipment and Logistics: Spend 31.3%
Vendor Count 43.5%

- Logistics: Couriers, Freight, Fuel, Helicopter Charter, Storage, Transportation, Trucking
- Equipment Supply & Rentals: Auto Parts, Core Boxes, Drilling Instruments, Forklifts, Misc. Parts & Equipment, Truck Rental, Water Monitors
- Accommodations & Camp Supplies: Camp Electrical Work, Camp Setup, Cooks, Field/ Mobile Offices, Groceries & Food Supplies, Hotel/Motel

Contractors: Spend 44.1%
Vendor Count 16.8%

- Drilling: Drilling Contractors & Support
- Construction & Labour: Drill Pad Construction, Electrical Work, Field Building Construction
- Other: Media/News, Pest Control, Waste Management

Support Services – Spend 3.1%
Vendor Count 11.7%

- Safety & Training: Cultural Monitors, First Aid Courses, Helicopter Audit, Misc. Health & Fitness, Mountain and Avalanche Safety, Remote Medic
- IT & Telecommunication Services: Communication Equipment, Remote Internet, Satellite Phone, Software
- Administrative Services: Accounting, Financial Services, Insurance, Lawyers

Categories of Expenditures by Regional Distinction

Kamloops, Prince George, Smithers and Vancouver are the four municipalities with the largest total expenditures reported in EOE. The proportion of expenditure in each category is illustrated below.[6]

Table 2.1: Top Four Municipalities Distribution of Expenditure

	Kamloops	Prince George	Smithers	Vancouver
Consulting & Technical Services	15.51%	0.51%	0.85%	89.74%
Technical Consultants	1.91%	0.51%	0.85%	81.85%
GIS Services	-	-	-	0.34%
Lab services (Analysis)	13.60%	-	-	7.55%
Consumables, Equipment and Logistics	7.05%	8.52%	58.12%	4.64%
Accommodations & Camp supplies	0.34%	0.71%	30.08%	0.12%
Equipment Supply & Rentals	0.08%	0.75%	3.19%	1.51%
Logistics	6.63%	7.06%	24.85%	3.01%
Contractors	75.93%	90.89%	36.97%	0.78%
Construction & Labour	2.54%	0.53%	2.41%	0.09%
Drilling	73.09%	89.54%	34.53%	0.30%
Other	0.30%	0.82%	0.03%	0.39%
Support Services	1.51%	0.08%	4.06%	4.84%
Administrative Services	1.51%	-	-	1.95%
IT & Telecommunication Services	0.00%	0.00%	-	2.89%
Safety & Training	-	0.08%	4.06%	-

Mineral Exploration Supports Indigenous and Local Content

Approximately, 21% of vendors captured in the **EOE** were utilized by multiple exploration companies. This statistic is likely driven by the high levels of local vendor procurement, combined with the necessity for some specialized services and the wide dispersion of projects across the province.

On average, 10 vendors were contracted for each mineral exploration project reported in EOE. With some companies reporting up to eight project sites, and the average being two sites per company, a mineral exploration project creates an on ramp for local businesses.

[6] No expenditures for a given category is denoted by "-".

Percentage of Spend and Unique Vendors by BC Mining Region

Regional Distribution of the Mineral Exploration Supply Chain by BC Mining Region.

Figure 2.3 displays the boundaries of the BC Mining Regions. The data boxes are color coded to match the boundaries of each. Presented are the top two categories of material/good/service, based on the number of unique vendors. The estimated supply chain spend is also summarized for each region.

> *See Appendix B for more detailed information on mineral exploration supply chain spend and vendor type by BC mining region.*

Northwest

29% of total vendors Projected $211.5M spend	% of Region's Vendor Count by Category
Accommodations & Camp supplies	26.1%
Logistics	16.7%

Northeast/ North-Central

6% of total vendors Projected $66M spend	% of Region's Vendor Count by Category
Logistics	25.8%
Equipment Supply & Rentals	25.8%

South Central

19% of total vendors Projected $81.5M spend	% of Region's Vendor Count by Category
Logistics	17.0%
Accommodations & Camp supplies	16.0%

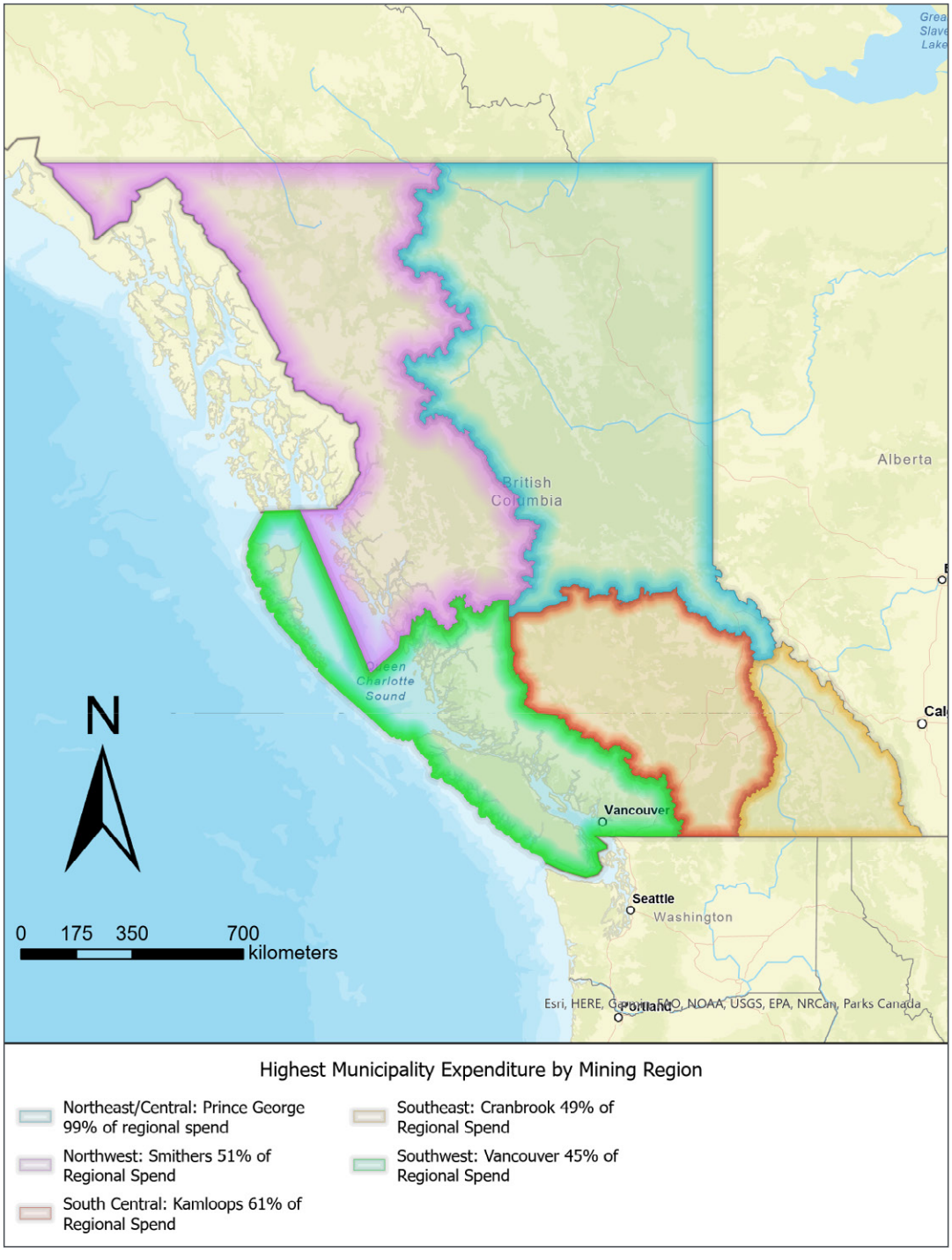
Southwest

44% of total vendors Projected $147.5M spend	% of Region's Vendor Count by Category
Consultants	33.3%
Equipment Supply & Rentals	16.4%

Southeast

2% of total vendors Projected $7M spend	% of Region's Vendor Count by Category
Consultants	42.9%
Safety & Training	28.6%

Figure 2.3:
Map of BC Mining Regions



SECTION THREE

Indigenous Participation

SECTION DESCRIPTION

Indigenous-affiliated procurement in the mineral exploration industry creates economic opportunity for Indigenous Nations, organizations and entrepreneurs and advances the Government of BC's Declaration on the Rights of Indigenous Peoples Act **Draft Action Plan** (2021).[XV] This section addresses Indigenous-affiliated business participation in the mineral exploration supply chain in BC.

KEY INSIGHTS

- Roughly 21% of expenditures of BC mineral exploration supply and service vendors were spent with Indigenous-affiliated companies, totaling approximately **$30.5M** in EOE, translating to an estimated **$105M** in total impact in 2020.
- Indigenous-affiliated vendors offered goods, materials, or services in eight of the 12 vendor categories reported in EOE.
- The Northwest mining region reported the highest count of Indigenous-affiliated vendors, while the Northeast/North-Central region reported the highest Indigenous-affiliated supply chain spend and the highest percentage of Indigenous-affiliated businesses in a mining region.

Indigenous-Affiliated Supply Chain Impact Province-Wide

The BC mineral exploration industry is uniquely positioned to collaborate with Indigenous Nations, organizations and affiliated vendors.

As a result of the geographically dispersed nature of mineral exploration, many Indigenous Nations with territories across rural and remote BC are active business partners.

In addition to leading project oversight, Indigenous Nations are actively participating in the sector's supply chain. This aligns with the Government of BC's commitment through the adoption of UNDRIP to create more opportunities for meaningful partnerships and collaboration with Indigenous peoples.

Based on the approximately 445 vendors reported in EOE, there were more than 35 Indigenous-affiliated businesses associated with more than 19 Nations.

The map on the right displays the Indigenous-affiliated vendors reported in the survey.[XVI]

Approximately 21% of the mineral exploration supply chain expenditure reported in EOE was spent with Indigenous-affiliated vendors. This was equivalent to an estimated $105M in total spend in 2020.

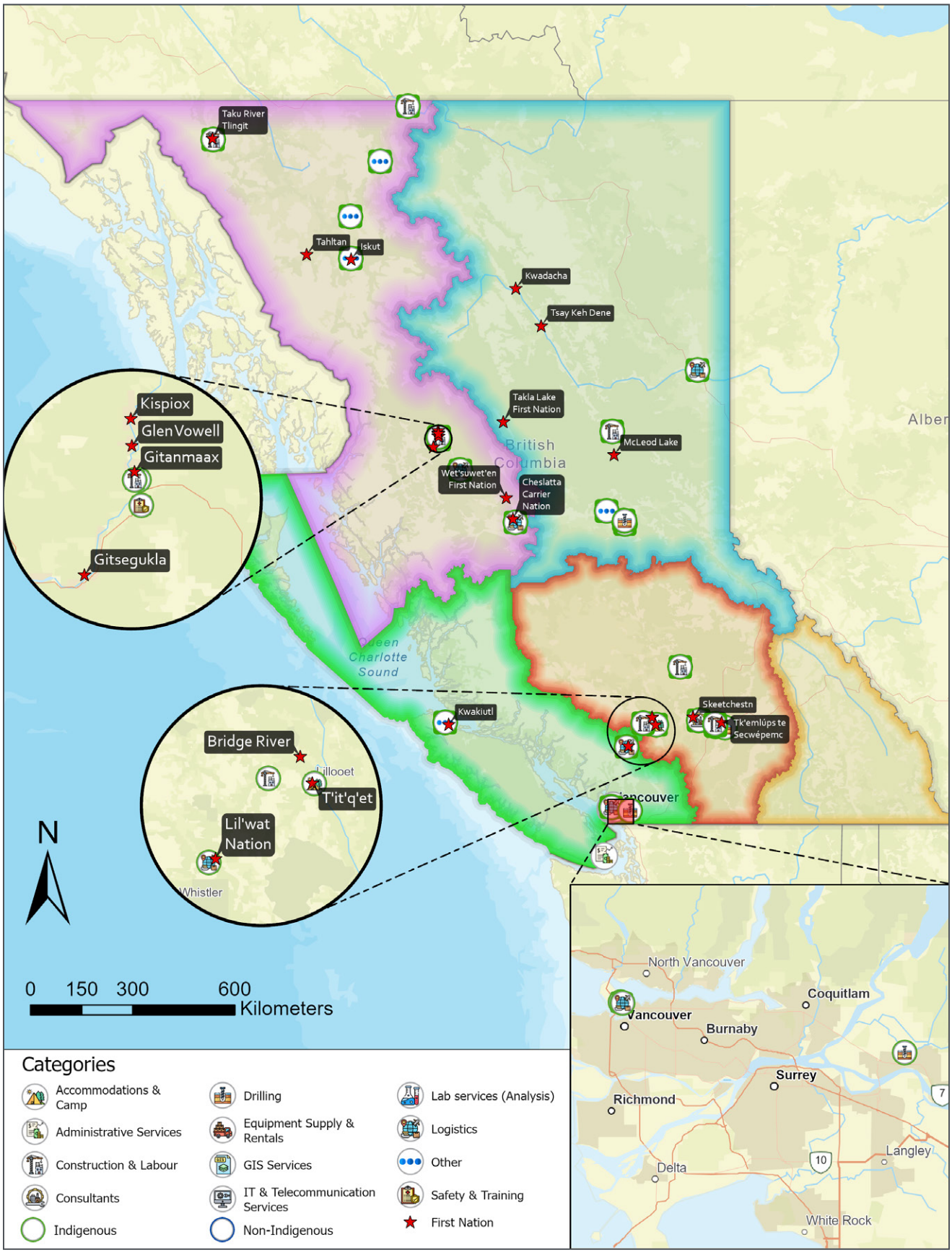
The Northwest mining region reported the highest count of Indigenous-affiliated vendors, while the Northeast/North-Central region reported the highest Indigenous-affiliated supply chain spend and the highest percentage of Indigenous-affiliated businesses in a mining region.

Table 3.1: Indigenous Nations with Affiliated Businesses Reported in EOE[7]

Bridge River	Kwadacha	Taku River Tlingit
Cheslatta Carrier Nation	Kwakiutl	T'it'q'et
Gitanmaax	Lil'wat Nation	Tk'emlúps te Secwépemc
Gitsegukla	McLeod Lake	Tsay Keh Dene
Glen Vowell	Skeetchestn	Wet'suwet'en First Nation
Iskut	Tahltan	
Kispiox	Takla Nation	

[7] Offical name and spelling wrriten according to https://fnp-ppn.aadnc-aandc.gc.ca

Figure 3.1: Indigenous Affiliated by Vendor Category

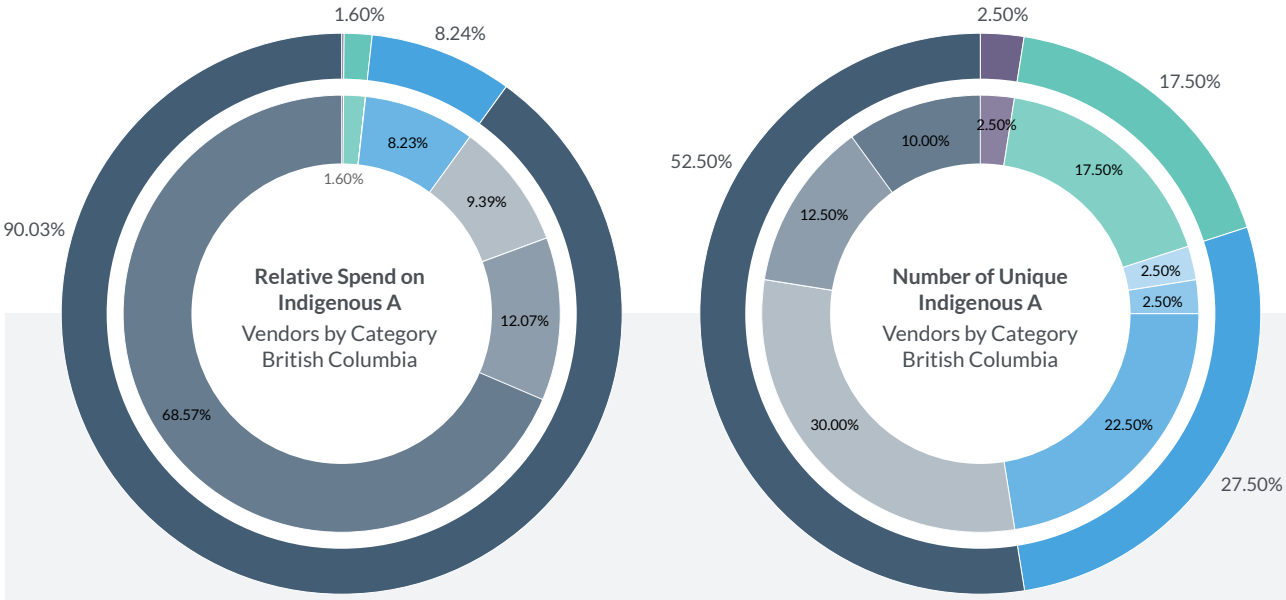


Categories of Indigenous-Affiliated Vendors Across British Columbia

Indigenous-affiliated vendors play major roles in the exploration industry, supporting projects by providing a wide variety of products and services. The pie charts below outline the composition of Indigenous-affiliated vendors and the associated expenditures.

As with the provincial distribution the **Contractors** category, in particular **Drilling**, overperformed when it came to the amount of expenditures made, relative to the number of unique vendors. Overall, 10% of Indigenous-affiliated suppliers are drilling vendors. These companies received approximately 69% of the Indigenous-affiliated expenditure in the study.

Figure 3.2: Mineral Exploration Supplier Types – Indigenous Affiliated Vendor Distribution



Consulting and Technical Services – Spend 1.6%
Vendor Count 17.5%

- Consultants: Engineering, Environmental, Geological, Project Management, Regulatory Advisor
- Lab Services: Assaying, Chemical Analysis, Geochemistry, Petrographic Services
- GIS Services: GIS Mapping, LiDAR Survey, Radiometric/ Magnetics Survey, Remote Sensing, Satellite Surveyors

Consumables, Equipment and Logistics: Spend 8.2%
Vendor Count 27.5%

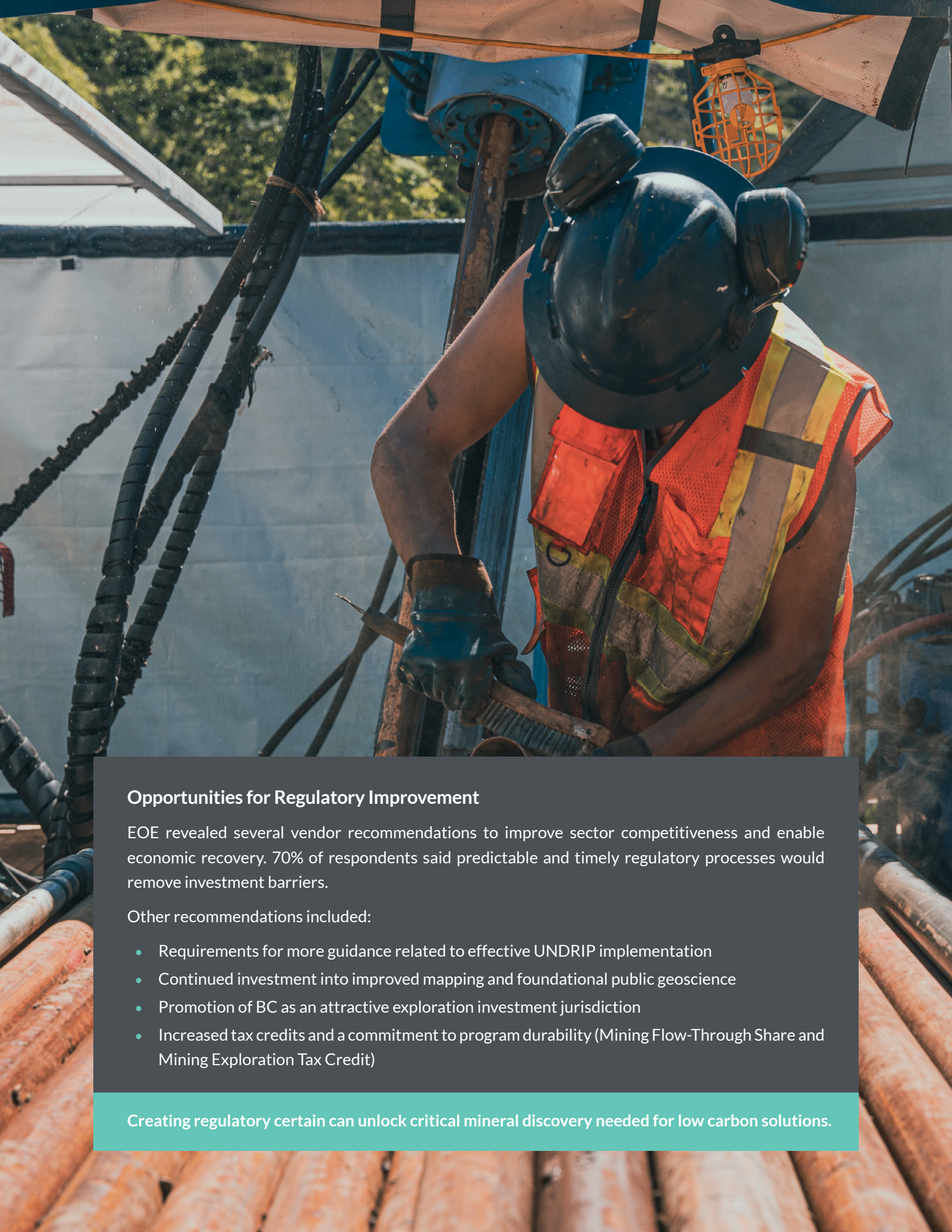
- Logistics: Couriers, Freight, Fuel, Helicopter Charter, Storage, Transportation, Trucking
- Equipment Supply & Rentals: Auto Parts, Core Boxes, Drilling Instruments, Forklifts, Misc. Parts & Equipment, Truck Rental, Water Monitors
- Accommodations & Camp Supplies: Camp Electrical Work, Camp Setup, Cooks, Field/Mobile Offices, Groceries & Food Supplies, Hotel/Motel

Contractors: Spend 90%
Vendor Count 52.5%

- Drilling: Drilling Contractors & Support
- Construction & Labour: Drill Pad Construction, Electrical Work, Field Building Construction
- Other: Media/News, Pest Control, Waste Management

Support Services – Spend 0.1%
Vendor Count 2.5%

- Safety & Training: Cultural Monitors, First Aid Courses, Helicopter Audit, Misc. Health & Fitness, Mountain and Avalanche Safety, Remote Medic
- IT & Telecommunication Services: Communication Equipment, Remote Internet, Satellite Phone, Software
- Administrative Services: Accounting, Financial Services, Insurance, Lawyers



Opportunities for Regulatory Improvement

EOE revealed several vendor recommendations to improve sector competitiveness and enable economic recovery. 70% of respondents said predictable and timely regulatory processes would remove investment barriers.

Other recommendations included:

- Requirements for more guidance related to effective UNDRIP implementation
- Continued investment into improved mapping and foundational public geoscience
- Promotion of BC as an attractive exploration investment jurisdiction
- Increased tax credits and a commitment to program durability (Mining Flow-Through Share and Mining Exploration Tax Credit)

Creating regulatory certain can unlock critical mineral discovery needed for low carbon solutions.

SECTION FOUR

Climate & Community Investment

SECTION DESCRIPTION

Mineral exploration benefits extend beyond procurement and resource discoveries. The industry also advances climate action and makes investments benefitting the services, infrastructure and programs offered by host communities and partner organizations. This section reports the climate innovations that EOE participants primarily invested in as well as community contributions made Province-wide.

KEY INSIGHTS

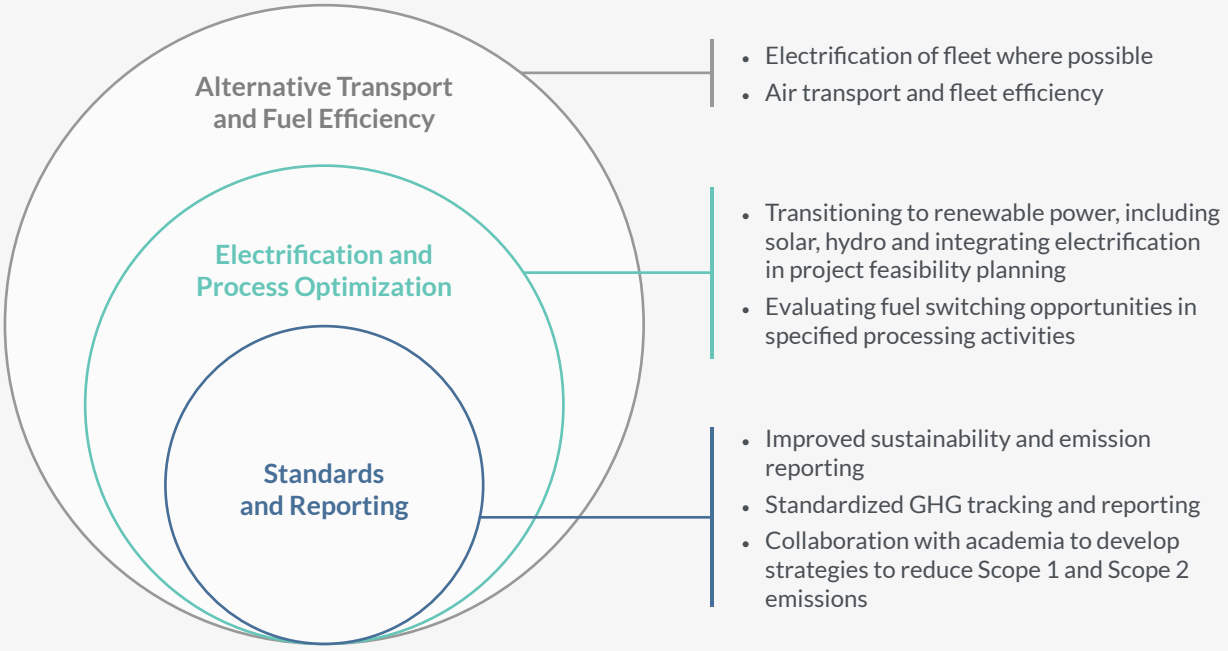
- Alternative transport and fuel efficiency were the most widely reported areas of climate action by EOE participants. Other climate investments made by mineral exploration companies included electrification and process optimization, as well as implementing standardized greenhouse gas (GHG) emission tracking and reporting.
- Approximately **$908K** was made in community investments benefitting **170** organizations in more than **40** Indigenous communities and municipalities.
- More than 30 community investments were directed to Indigenous Nations or affiliated organizations, totaling approximately **$200K.**

Investing in Our Climate Innovation

The mineral exploration industry is critical for the clean energy transition required to meet both the federal and provincial GHG reduction targets. The Government of Canada aims to reduce GHG emissions to 40-45% below 2005 levels by 2030, and to achieve net-zero emissions by 2050. Meanwhile, the Government of BC's GHG emissions reduction targets are 40% below 2007 levels by 2030 and 80% below 2007 levels by 2050.

Combined with the minerals BC exploration companies discover supporting the nickel, copper, gold, and other key minerals required to meet the increased global demand for clean energy, EOE shows that mineral exploration companies are taking practical actions necessary to reduce GHG emissions. Three areas of climate investment were reported by mineral exploration companies. The diagram below illustrates the frequency of innovation from most common to least commonly reported.

Figure 4.1: Climate Action Investments by Mineral Exploration sector



Investing in Our Communities

Mineral exploration companies also reported making considerable community investments throughout the province. This includes fiscal supports to improve community infrastructure, environmental conservation, and emergency preparedness, as well as social services. This aligns with the StrongerBC plan which aims to contribute to the recovery of stronger resilient communities across our province.

Table 4.1 below shows the areas of community investment reported by mineral exploration companies who contributed to EOE.

Table 4.1: Community Investment by Spend, 2020

Community Investment Category	Amount Invested Round to nearest $,000
Health Infrastructure, Sport and Community Wellness	$450K
Indigenous Communities and Organizations	$219K
Environmental Conservation, Wildlife Societies and Emergency Preparedness	$97K
Business Associations, Service Clubs and Non-Profit Agency Support	$73K
Art, Music, Theatre and Entertainment	$36K
Other	$33K

CONCLUSION

EOE shows that BC's mineral exploration sector can enable economic, climate and societal transformation at a local level. With continued action by the Government of BC to enhance mineral exploration sector competitiveness and regulatory effectiveness, which was championed by 70% of EOE participants, the industry can advance our collective ambition and commitment to Indigenous reconciliation, to a low carbon future and to economic recovery in BC.

As British Columbians adapt to a new world post-pandemic, EOE is a recognition by AME and the mineral exploration industry that rebuilding starts locally.

Economic recovery will be enabled by the innovation of entrepreneurs; by the work ethic of employees; and only with a shared resolve to serve the well-being of the climate and BC communities.

We know from EOE that a mineral exploration site can anchor a wide variety of businesses across a range of goods, materials, and service categories for decades – businesses which might otherwise be underutilized. Also demonstrated by examining the supply chain of mineral exploration companies is the vast geographic reach of the industry.

Dollars spent by BC's mineral exploration community extend to every corner of the province, including Metro Vancouver.

BC's diverse and regionally dispersed mineral exploration supply chain, combined with world-class mineral resources and the more than 1,100 mineral exploration companies located here, can backstop a growing modern mining industry in our province.

iTOTEM Analytics is genuinely appreciative of the collaborative spirit demonstrated by AME, its members and prospective members in sharing their supply chain information and stories, as part of the Explore Our Economy initiative. We know that the world's most challenging problems can only be solved, and new opportunities can only be seized, by transforming data, so it is relatable, shareworthy, and trusted.

APPENDIX A: Vendor Categorization Methodology

The service and supply categories were developed with reference to the data collected and guidance provided by the Association for Mineral Exploration. Participating mineral exploration companies submitted their supply chain data along with their accounting notes for their utilization of each supplier. Each supplier entry was cleaned, verified, and sorted into the categories below.

In the case of vendors who were used by separate mineral exploration companies for multiple purposes, the vendor was tagged in both/all categories. For counts, referring to the number of vendors offering each service in a particular region, these vendors were counted once for each category. The expenditure is attributed to the category of service defined by the individual exploration company that declared the expenditure.

Table A1: Standardizing Categories

Type of materials, products, and services	Categories of Service			
	Consulting and Technical Services	Consumables, Equipment and Logistics	Contractors	Support Services
Consultants: Engineering, Environmental, Geological, Project Management, Regulatory Advisor	X			
GIS Services: GIS Mapping, LiDAR Survey, Radiometric/ Magnetics Survey, Remote Sensing, Satellite Surveyors	X			
Lab Services: Assaying, Chemical Analysis, Geochemistry, Petrographic Services	X			
Accommodations & Camp Supplies: Camp Electrical Work, Camp Setup, Cooks, Field/Mobile Offices, Groceries & Food Supplies, Hotel/Motel		X		
Equipment Supply & Rentals: Auto Parts, Core Boxes, Drilling Instruments, Forklifts, Misc. Parts & Equipment, Truck Rental, Water Monitors		X		
Logistics: Couriers, Freight, Fuel, Helicopter Charter, Storage, Transportation, Trucking		X		
Construction & Labour: Drill Pad Construction, Electrical Work, Field Building Construction			X	
Drilling: Drilling Contractors & Support			X	
Other: Media/News, Pest Control, Waste Management			X	
Administrative Services: Accounting, Financial Services, Insurance, Lawyers				X
IT & Telecommunication Services: Communication Equipment, Remote Internet, Satellite Phone, Software				X
Monitors, Safety & Training: Cultural Monitors, First Aid Courses, Helicopter Audit, Misc. Health & Fitness, Mountain and Avalanche Safety, Remote Medic				X

APPENDIX B: Vendor Category Composition

Table A2: Community Investment by Spend, 2020

Northwest 29% of total vendors and projected $211.5M spend	**% of Region's Vendors**
Accommodations & Camp supplies	26.1%
Logistics	16.7%
Equipment Supply & Rentals	15.2%
Consultants	9.4%
Construction & Labour	9.4%
Drilling	8.0%
Other	6.5%
Safety & Training	5.8%
IT & Telecommunication Services	2.9%
Northeast/Central 6% of total vendors and projected $66M spend	
Logistics	25.8%
Equipment Supply & Rentals	25.8%
Construction & Labour	12.9%
Consultants	9.7%
GIS Services	6.5%
Accommodations & Camp supplies	6.5%
Safety & Training	3.2%
Other	3.2%
IT & Telecommunication Services	3.2%
Drilling	3.2%
South Central 19% of total vendors and projected $81.5M spend	
Logistics	17.0%
Accommodations & Camp supplies	16.0%
Equipment Supply & Rentals	14.9%
Consultants	13.8%
Construction & Labour	13.8%
Drilling	7.5%
Lab services (Analysis)	6.4%
Other	5.3%
IT & Telecommunication Services	3.2%
GIS Services	1.1%
Administrative Services	1.1%

Southwest 44% of total vendors and projected $147.5M spend	**% of Region's Vendors**
Consultants	33.3%
Equipment Supply & Rentals	16.4%
Logistics	9.4%
Lab services (Analysis)	7.0%
IT & Telecommunication Services	7.0%
Administrative Services	5.6%
Accommodations & Camp supplies	4.7%
Safety & Training	4.2%
GIS Services	4.2%
Other	3.8%
Drilling	2.4%
Southeast 2% of total vendors and projected $7M spend	
Consultants	42.9%
Safety & Training	28.6%
Accommodations & Camp supplies	14.3%
Equipment Supply & Rentals	14.3%

APPENDIX C: Study Methodology

The following section describes the methodology used in the development of the AME 'Explore our Economy study.

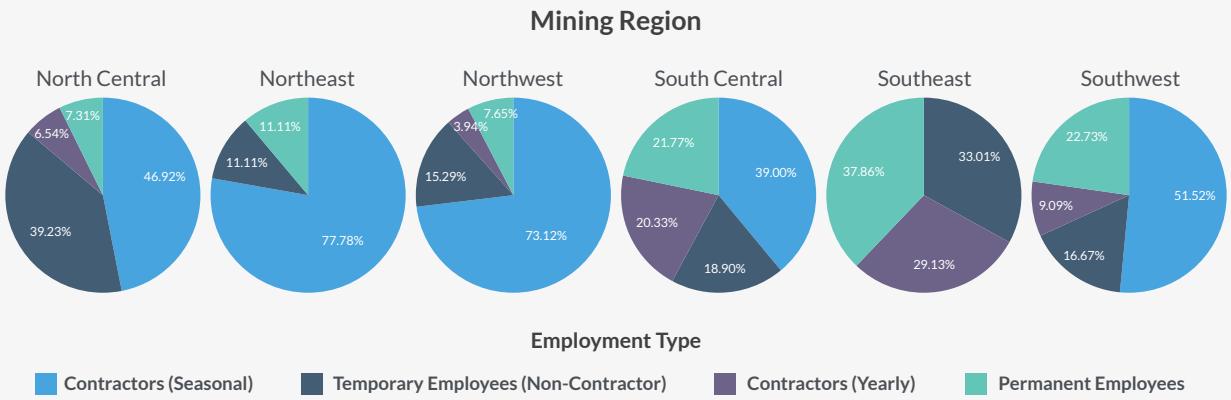
Assumptions & Parameters	
Scope	• Three primary sources of data were used, both of which pertain to exploration operations in 2020 – Data collected through the **Explore our Economy** data collection campaign. Containing detailed supply chain data for 29 exploration companies and covering approximately 445 unique BC service and supply companies – Data collected through the 2020 '**British Columbia Mineral and Coal Exploration Survey**' conducted by EY. Containing operations data for 259 mineral exploration companies and 273 exploration projects in BC – Reference statistics obtained from Natural Resources Canada's (NRCan) online summary tables. Specifically, **Table 27 – Exploration Plus Deposit Appraisal Expenditures, by Province and Territory, 2017- 2021 Annual and 2021 Revised Spending Intentions** (revised September 2021)
Unique Supplier Counts and Location	• Unless specified otherwise, the geographical region is British Columbia only. Any spend with vendors outside of BC is excluded. • If a supplier has multiple offices engaged by the exploration industry: – The expenditure for each location is attributed to its respective region and municipality – Each location is included in the maps displayed – For BC total vendor counts, each vendor is only counted once – For regional counts each location is counted once – For service/supply category distributions, each vendor is counted once in each service category they provide • A supplier can be tagged in more than one municipality, but this does not change the total number of unique vendors in the Province of BC • The unique supplier count means the supplier is counted once. In situations where two or more exploration companies use the same supplier the spelling is standardized, and duplications excluded. • A supplier's head office can be outside of BC, but if the expenditure is made with a BC-based office, the supplier is counted as BC-based.
Quality Assurance Data Changes and Exclusions	• Eligible costs are expenditures on community investment, Indigenous or local procurement (goods, materials, and services). Examples of exclusions are Canada Revenue Agency, BC Ministry of Finance, employee expenses, pensions. • A QA process was run to remove duplications, standardize spelling, and apply exclusions. • All included 'Indigenous Affiliated Vendors were verified to be so • Standardization includes spelling of vendors, municipalities, categories, Indigenous communities, and community investments • If community investments were tagged as vendors, the community investment was removed from the supply chain count and included in the community investment spend. • Regarding inclusion of "Names of People" as supplier – Individual names confirmed to be independent contractors/vendors were included in the supplier count. Individual names that were determined to be employees or unknown were excluded as vendors.
Geographic References:	• Vendors were tagged to communities based on location data provided by each mineral exploration company regarding their contractors • All geographic locations and spatial analysis are approximate. Vendor locations were approximated using either postal codes or, where available, full mailing address • Project locations were plotted with approximate latitude and longitude values • BC's mining regions were defined based on spatial data acquired from British Columbia's Open Data Catalogue https://catalogue.data.gov.bc.ca/dataset/mining-regions • Municipalities, communities, and individual operators were mapped to mining regions using GIS software in combination with the spatial data defined above • Indigenous spend is defined as any Indigenous-affiliated business or organization with a business agreement and/or stewardship partnership.

Indigenous Definitions	• Indigenous-affiliated Business: – Vendors who are members of, or who are affiliated with, or controlled by, a Local Indigenous Community (in each case as defined by the duly authorized leaders or representatives of the relevant Local Indigenous Community; OR – Any corporation, partnership, firm, joint venture or other entity which has, prior to the Issue Date, by or through one or more contracts, agreements, arrangements or understandings between it and a Local Indigenous Community or one or more Affiliated Indigenous Individuals procure for, conferred on or otherwise made available to that Local Indigenous Community or those Affiliated Indigenous Individuals' business, economic, employment or training opportunities or benefits (in each case as certified or confirmed in writing by the duly authorized leaders or representatives of the relevant Local Indigenous Community). • **Indigenous Business:** A company, partnership or joint venture which conducts or carries on a business that employs one or more Indigenous individuals and: – In the case of a company, is a company in which a substantial amount of the equity (including any common or voting shares) of that company, as determined by the Company in its sole discretion, is directly owned or controlled by one or more Indigenous individuals or Indigenous vendors; OR – In the case of a partnership or joint venture (whether unincorporated or incorporated), is a partnership or joint venture in which a substantial amount of the ownership, partnership, or participatory interests (including any voting rights) of that partnership or joint venture, as determined by the Company in its sole discretion, is directly owned or controlled by one or more Indigenous individuals or Indigenous vendors. • Spatial Data: https://catalogue.data.gov.bc.ca/dataset/first-nation-community-locations/resource/337bb7ea-ec4f-48af-a703-c2bac3e890fc
Categorization	Appendix A for details on Categorization process
Rounding	• If supplier count values were rounded to the nearest 10. – For illustration: – 3 -> 0 – 9 -> 10 – 12 -> 10 – 24 -> 20 • Dollar values were rounded to the nearest hundred thousand, *unless specified otherwise*
Margin of Error	• The Explore our Economy report is intended as an investigation of a cross-section of the exploration industry within BC The analysis does not report the absolute number of vendors supporting the mining sector in the province • All estimated total impact values use values obtained from NRCan data from Table 27 – *"Exploration Plus Deposit Appraisal Expenditures, by Province and Territory, 2017- 2021 Annual and 2021 Revised Spending Intentions"* as an estimate for the size of the exploration industry • Maps - distance error, ± 5~10 meters and geographic projections
Limitations	• iTOTEM Analytics relied on the accuracy of the information provided by participating companies regarding their 2020 supply chain and community investment expenditures in British Columbia.

Exhibit One: Employment by Mining Region

According to EY Canada's **British Columbia Mineral and Coal Exploration Survey 2020** report, there were over 3,200 jobs directly created by the mineral exploration industry.

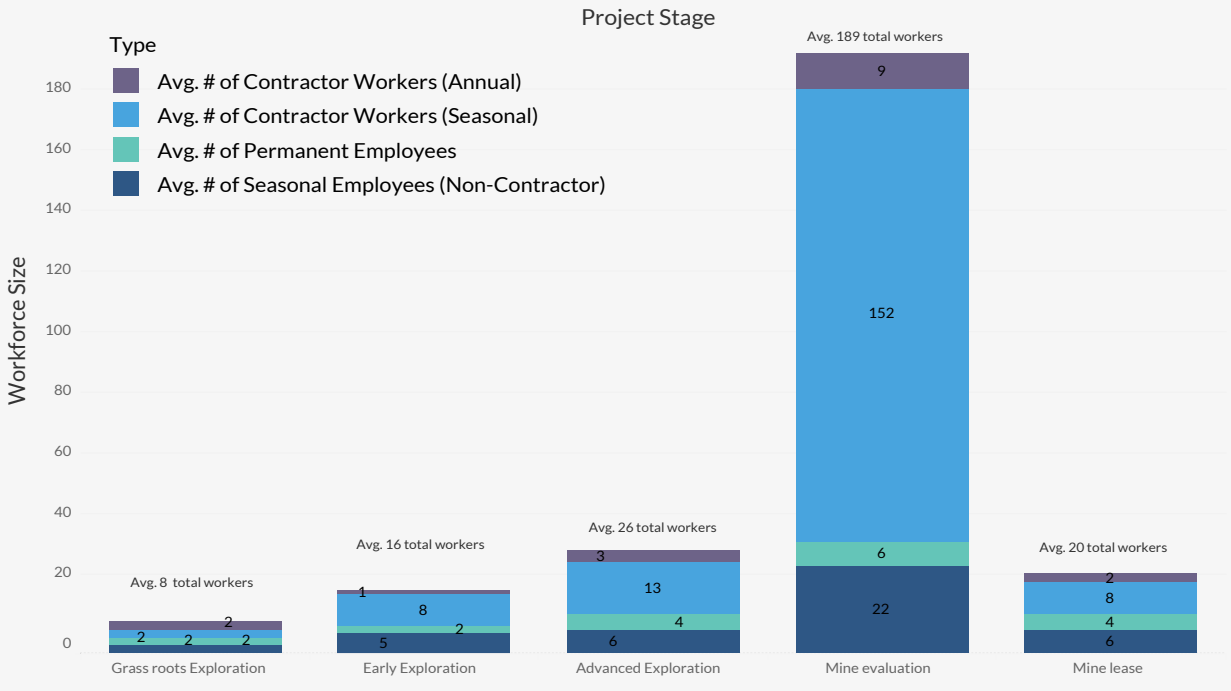
Figure E1: Distribution of Workforce Within Each Mining Region



The following showcases the mineral exploration sector's direct employment across all 5 regions of the province. The breakdown of the employment type within each mining region is outlined in the series of pie charts above.

The type of work conducted by a given project changes from project stage to stage. The labour required fluctuates greatly depending on the stage of a given exploration project. The bar graph below displays the average workforce and breakdown by each stage of the exploration process.

Figure E2: Average Workforce by Project Stage



Endnotes

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XIII National Resources Canada (2020) Table 27 – Exploration Plus Deposit Appraisal Expenditures, by Province and Territory, 2017- 2021 Annual and 2021 Revised Spending Intentions (revised September 2021).

XIV iTOTEM Analytics. "Mining Supply Chain Economic Impact Study (MSCEIS)." Mining Association of British Columbia, September 30, 2019. http://mining.bc.ca/sites/default/files/2019%20Mining%20Supply%20Chain%20Economic%20Impact%20Study.pdf.

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Prepared by iTOTEM Analytics for the Association of Mineral Exploration.

Association for Mineral Exploration

AME is the lead association for the mineral exploration and development industry based in British Columbia. Established in 1912, AME represents, advocates, protects and promotes the interests of thousands of members who are engaged in mineral exploration and development in B.C. and throughout the world.

iTOTEM Analytics

iTOTEM Analytics, a full-service indigenous-affiliated data analytics company located in Vancouver, is dedicated to quantifying and amplifying the positive impact of business, not-for-profits and government organizations. We simplify complex data collection and analysis to reveal critical insights allowing our clients to make better decisions. iTOTEM Analytics rationalizes and coordinates the arduous process of data integration.


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