DEVELOPING A DYNAMIC WORKFORCE FOR NATURE-BASED CLIMATE SOLUTIONS AND GREEN INFRASTRUCTURE PROJECTS IN ALBERTA AND BRITISH COLUMBIA

A SECTOR PROFILE

JANUARY 2024

eco canada

This report was produced as part of a project funded by the Future Skills Centre (FSC), with financial support from the Government of Canada's Future Skills Program.

FSC is a forward-thinking centre for research and collaboration dedicated to preparing Canadians for employment success. We believe Canadians should feel confident about the skills they have to succeed in a changing workforce. As a pan-Canadian community, we are collaborating to rigorously identify, test, measure, and share innovative approaches to assessing and developing the skills Canadians need to thrive in the days and years ahead. The Future Skills Centre was founded by a consortium whose members are Toronto Metropolitan University, Blueprint ADE, and The Conference Board of Canada

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ECO Canada has supported Canada's environmental workforce by establishing professional development resources, training programs, and educational partnerships, conducting in-depth labour market research, and providing the largest industry-specific job board.

ECO Canada's programs and services are developed through strong national partnerships, consultative strategic planning, and ongoing labour market research. Its labour market research provides valuable insights into environmental career trends, which can be used by governments, educators, youth, and industry partners to make decisions and formulate strategies. To learn more, please visit **www.eco.ca**

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The opinions and interpretations in this publication are those of the author and do not necessarily reflect those of the Future Skills Centre or the Government of Canada.

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DISCLAIMER

For comments or questions, contact: **Research@eco.ca**

NATURE-BASED CLIMATE SOLUTIONS SECTOR PROFILE

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EXECUTIVE SUMMARY

Within Canada's expansive natural landscapes lies the potential to mitigate and adapt to climate change, address biodiversity loss, and support communities against environmental shifts. Alberta's resource-rich terrain and British Columbia's varied ecosystems converge in a unified goal: pursuing a balanced approach to economic growth and sustainable development.

Nature-based climate solutions and green infrastructure projects safeguard these provinces' natural and built environments. These endeavours focus on addressing and adapting to climate change, drawing upon a diverse, cross-sectoral workforce collaborating across disciplines to advance national and provincial objectives of responsible economic growth and environmental stewardship.

NATURE-BASED CLIMATE SOLUTIONS

- encompass an array of strategies that use natural processes and ecological approaches to mitigate climate change impacts while promoting biodiversity and ecosystem health and enhancing resilience.

GREEN INFRASTRUCTURE

- refers to an interconnected network of natural or nature-based elements like parks, wetlands, green spaces, and other ecological systems that collectively deliver multiple benefits, such as improving air and water quality, mitigating floods, enhancing biodiversity, and providing recreational spaces.
- an overarching concept of using nature-based climate solutions to address various environmental, social, and economic challenges.

GREEN INFRASTRUCTURE PROJECTS

- are focused initiatives that enhance natural features in specific areas.
- involve actions to develop, restore, or integrate green elements into landscapes like coastal areas, reclaimed lands, restored terrains, and protected habitats.
- projects aim to achieve coastal restoration, reclaim industrial land, restore degraded areas, and protect vital habitats by reviving waterways, fostering native plants, and conserving essential ecosystems.
- takes a holistic approach, however, projects are targeted efforts to improve natural systems in distinct contexts or locations.

This report explores the pivotal roles and specialized expertise required to propel nature-based climate solutions and green infrastructure projects forward. It concentrates on uncovering critical occupations and specific skill sets necessary across various industries involved in these initiatives. We examine these occupations in four sectors and seven subsectors.

SECTORS		SUBSECTORS
COASTAL RESTORATION	Addressing	Climate Adaptation Flood Prevention and Habitat Restoration
FORESTRY	Strategies for	Wildfire Mitigation and Management
MINING AND OIL AND GAS	Tackling	Land Remediation Land Reclamation
WATERSHED RESTORATION	Emphasizing	Erosion and Sediment Control Flood and Drought Mitigation

By analyzing occupations and skill sets within these sectors and subsectors, we are asking:

What specialized skills and roles are needed for green infrastructure projects?

This report highlights labour dynamics, needs, and challenges surrounding nature-based climate solutions and green infrastructure projects. By understanding these aspects of labour, stakeholders can strategically navigate and harness the expertise needed to drive forward nature-based climate solutions and green infrastructure projects in Alberta and British Columbia.

FIVE KEY REPORT FINDINGS

We distinguish **three broad occupational groups** crucial for nature-based climate solutions and green infrastructure projects. Our research sheds light on **leveraging existing expertise from various industries** to contribute to nature-based climate solutions and green infrastructure projects.

OCCUPATIONAL LANDSCAPE

Tradespeople and Labourers key roles involve practical construction, maintenance, and remediation and reclamation task contributing foundational skills vital for green infrastructure projects.

Technicians, Technologists, Engineers, and Scientists possess technical expertise in designing, planning, and innovating environmental solutions, developing strategies for climate-resilient infrastructure, soil erosion studies, forest conservation techniques, leveraging civil engineering, environmental science, and forestry expertise.

Managers and Supervisors are critical in overseeing the implementation of nature-based climate solutions, coordinating between teams for regulatory adherence, budget compliance, and timelines, and crucial roles in decision-making, strategizing, and collaborating for the success of green infrastructure projects.

Shifting labour dynamics in Alberta and British Columbia, shaped by changing demographics, immigration, and retirements, underscore diverse job demands. At the same time, persistent gender disparities in all occupational groups for nature-based climate solutions and green infrastructure projects emphasize the need for strategic workforce planning to address imbalances.

LABOUR TRENDS

Diverse job prospects in Alberta and British Columbia reflect changing demographic shifts, immigration trends, and anticipated retirements, creating varying demands across occupational groups.

Gender gaps persist in key positions for nature-based climate solutions and green infrastructure projects in British Columbia and Alberta. Progress in technical roles contrasts with challenges in achieving gender diversity in managerial positions. Addressing imbalances in trades and labour roles is a critical need within these industries.

Our analysis **highlights the evolving composition of the workforce** and its potential impact on various sectors within these provinces.

This study indicates a need for a **strategic approach to workforce planning** to meet the growing demand for roles involving nature-based climate solutions.

A **spectrum of skills and knowledge**—project management, regulatory expertise, safety protocols, biology, hydrology, civil engineering, forestry, and heavy equipment operation—are equally crucial for project success. The need for **specialized skills sets** is also surging in sectors pivotal for nature-based climate solutions and green infrastructure projects.

SPECIALIZED SKILL SETS

The demand for specialized skills is rising across various sectors critical for nature-based climate solutions and green infrastructure projects.

Developing these specialized skills through **targeted training program**s is crucial for these industries to navigate toward sustainability while addressing environmental challenges.

Proactive talent development initiatives will be pivotal in preparing the workforce for the evolving needs of these sectors.

COASTAL RESTORATION

Expertise in habitat restoration, marine ecology, and coastal engineering is essential to protect ecosystems against rising sea levels and storms.

FORESTRY

Expertise in sustainable forest management and timber harvesting techniques to balance conservation and production.

MINING, OIL AND GAS

Skills in environmental impact assessment, reclamation, and sustainable mining practices as it transitions to eco-friendly methods and carbon capture technologies.

WATERSHED RESTORATION

Requires hydrology, soil conservation, and sustainable land use planning skills to manage changing water patterns and scarcity concerns.

Many of the occupations and skills identified are in demand in multiple sectors, which creates challenges for organizations seeking to recruit and retain the workforce needed. They necessitate an **integrated workforce development** approach in this dynamic and evolving field.

EDUCATION AND TRAINING PATHWAYS

Highlighting **shifting educational trends** in Alberta and British Columbia, the report underscores the importance of hands-on skills.

It outlines pathways for occupational groups within nature-based climate solutions, emphasizing the need to **combine formal education with practical experiences** such as apprenticeships.

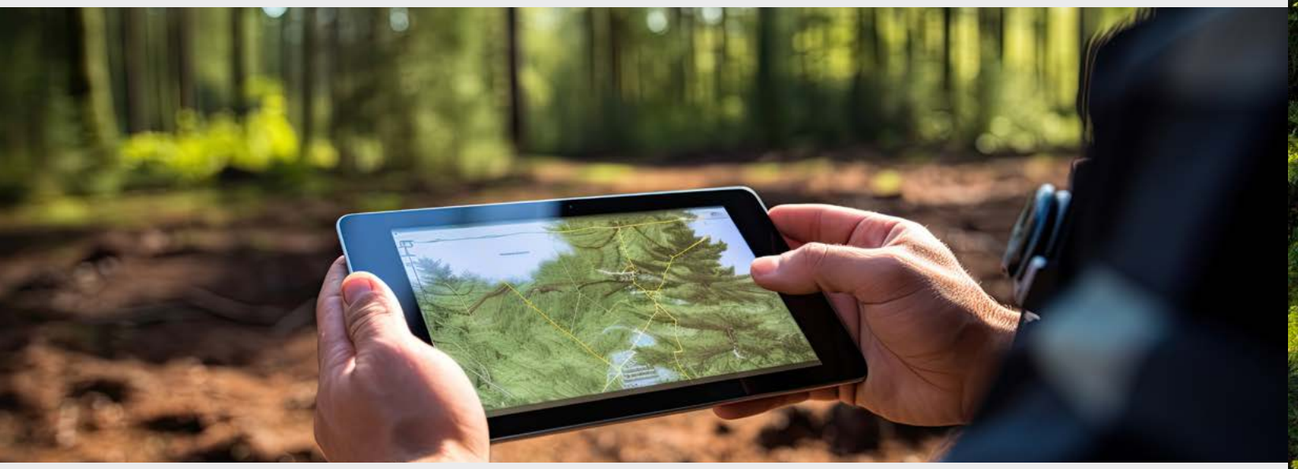
This approach recognizes the **diversity within the sector** and the significance of a **balanced educational approach** for success in climate-focused professions.

WORKFORCE DEVELOPMENT

Insights into workforce transformation potential are outlined, stressing the importance of reskilling, adaptability, and strategic skill development programs.

The report advocates for proactive measures to develop a skilled workforce capable of meeting the evolving needs of nature-based climate solutions and green infrastructure projects.

It underlines the potential for transformation through well-planned skill development strategies aligned with the dynamic nature of these industries.



Our research underscores the importance of tapping into expertise across diverse industries—from environmental remediation and consulting services to specialized construction firms, mine site reclamation, and biological consulting. However, these sectors face a common challenge: intense competition for skilled individuals, hindering the recruitment efforts for nature-based solutions and green infrastructure projects.

Key skills required for nature-based climate solutions and green infrastructure projects encompass a broad spectrum, including adeptness in project management, adherence to safety protocols, regulatory proficiency, and a multifaceted knowledge base covering biology, hydrology, civil engineering, forestry, and heavy equipment operation.

The versatility of many of these skills allows adaptable workers to transition swiftly in and out of the nature-based climate solutions domain. While this indicates an existing pool of skilled labour, it also intensifies the competition among organizations seeking to engage these individuals for nature-based climate solutions initiatives. Our findings stress the pressing need for strategic talent acquisition and retention efforts within the environmental sector to effectively harness the wealth of skills necessary for successful nature-based climate solutions and green infrastructure projects.

INTRODUCTION – A WORKFORCE FOR SUSTAINABLE SOLUTIONS IN ALBERTA AND BRITISH COLUMBIA

As the second-largest country in the world, Canada is fortunate to have an immense tapestry of natural landscapes, ranging from boreal, montane, subalpine forest regions and freshwater riverine systems to mountain ranges, interior prairies, and coastal shorelines, and ocean watersheds. In this diversity of natural ecosystems is an untapped potential to sequester carbon, enhance biodiversity, improve ecosystem services, and prepare communities against the consequences of a changing climate.

Alberta, renowned for its resource-rich environment, and British Columbia, celebrated for its diverse ecosystems, share a common ambition—to reconcile economic prosperity with environmental protection. From the Alberta oil sands to the coastal rainforests of British Columbia, the workforce engaged in nature-based climate solutions and green infrastructure projects will be pivotal for sustainable development.

Canada, known for its abundant natural resources and commitment to achieving net-zero emissions, is pivotal in spearheading nature-based climate solutions. With its vast potential, the country is poised to lead in implementing nature-based climate solutions initiatives. By embracing these strategies, Canada can curtail its greenhouse gas emissions by as much as 78 megaton of carbon dioxide equivalent annually by 2030 through nature-based climate solutions alone (Drever et al., 2021). This reduction would account for roughly 11% of its yearly carbon emissions (Drever et al., 2021). The Government of Canada's investment in these solutions is considerable, showcasing a dedicated commitment. As part of the 2030 Emissions Reduction Plan, Canada has already injected $4 billion in funding for nature-based climate solutions within its borders (Environment and Climate Change Canada, 2022, p. 68).

Additionally, in 2021 a further $1 billion has been earmarked to support initiatives in nature-based climate solutions to developing nations over five years (Environment and Climate Change Canada, 2021). This substantial investment underscores Canada's proactive stance toward fostering sustainable domestic and global climate actions. Specifically, with their diverse landscapes and environmental significance, Alberta and British Columbia stand to benefit significantly from these strategic investments, aligning with their efforts toward environmental conservation and climate mitigation.

In this report, we define nature-based climate solutions as an array of strategies that use natural processes and ecological approaches to mitigate climate change impacts while promoting biodiversity and ecosystem health and enhancing resilience and refer to green infrastructure as a network of natural or nature-based features and systems that provide ecological, economic, and social benefits across various sectors.

This report explores the diverse range of professions contributing to these tools to mitigate climate change, address biodiversity loss, and support human communities and livelihoods, encompassing scientists, engineers, tradespeople, technicians, technologists, managers, and more. By shedding light on the organizations and people involved in nature-based climate solutions and green infrastructure projects, we aim to highlight the collaborative effort required to navigate the complex intersection of sustainable development and climate change mitigation.

This report focuses on labour force requirements for four main sectors and seven subsectors of nature-based climate solutions and green infrastructure projects in Alberta and British Columbia:

SECTORS	SUBSECTORS
Coastal Restoration	Climate Adaptation Flood Prevention and Habitat Restoration
Forestry	Wildfire Mitigation and Management
Mining and Oil and Gas	Land Remediation Land Reclamation
Watershed Restoration	Erosion and Sediment Control Flood and Drought Mitigation

By analyzing occupations and skill sets within these sectors and subsectors, we are asking:

What specialized skills and roles are needed for these projects?

INDUSTRY INSIGHTS:
KEY OCCUPATIONS AND ACTIVITIES DRIVING SUSTAINABLE SOLUTIONS

Exploring nature-based climate solutions and green infrastructure projects unveils numerous job opportunities aimed at tackling urgent environmental issues. These roles are spread across different fields, each playing a crucial role in addressing problems like climate change, declining biodiversity, risks from natural disasters, and the deterioration of habitats. Ultimately, these endeavours support sustainable growth and contribute to building a green economy.

This section overviews nature-based climate solutions and green infrastructure projects across four main sectors and seven subsectors. We explain the methods, how they work, their effects, and the overall impact and benefits they offer. We use the North American Industry Classification System (NAICS) to identify the primary industries involved in each sector and subsector. We also highlight the top three job categories using the National Occupational Classification (NOC) codes and list the required key skills. We spotlight recent green infrastructure projects in Alberta and British Columbia to give you a real-world example.

Refer to Appendix A for the research approach and methodology. See Appendix B for a list of federal and provincial-funded programs for nature-based climate solutions and green infrastructure projects.

Appendix C summarizes key occupations by subsector. These findings highlight a consistent pattern of occupational overlap, showcasing shared requirements for skill sets, knowledge, expertise, and experience across these sectors and subsectors.

COASTAL RESTORATION – CLIMATE ADAPTATION: PROTECTION AND MANAGEMENT

Climate adaptation strategies for coastal restoration using nature-based climate solutions and green infrastructure involve measures to address the challenges of flooding, rising sea levels, and biodiversity loss. These approaches involve restoring estuaries, creating green spaces, establishing coastal buffers, and implementing sustainable drainage systems. By leveraging nature's resilience, these methods help manage and mitigate flooding, counter rising sea levels by fortifying coastal areas, and preserve biodiversity by restoring and protecting natural habitats. Ultimately, these strategies aim to enhance community resilience, safeguard ecosystems, and foster a more sustainable response to the impacts of climate change.

PROJECT SPOTLIGHT: *GREEN SHORES INCENTIVES PROJECT*

Through nature-based climate solutions, the Green Shores Incentives Project aimed to reduce the risks and costs associated with shoreline development while increasing resilience to the effects of climate change. It operated within the Green Shores Program, collaborating with the Comox Valley Regional District and the Town of Qualicum Beach on Vancouver Island's East Coast from 2019 to 2022. The project had a threefold focus: educating and training communities, advancing policies supporting nature-driven climate solutions for coastlines, and providing complimentary services such as shoreline assessments, guidance for project design, and certification for coastal restoration initiatives.

KEY INDUSTRY GROUPS SUPPLYING CLIMATE ADAPTATION-PROTECTION AND MANAGEMENT WORKFORCE

Professionals in Management, Scientific, and Technical Consulting Services industry offer support for coastal restoration. They handle flood mitigation, erosion control, and building coastal defence infrastructure, including assessing climate vulnerability, risk management, and monitoring coastal ecosystems.

Similarly, the Other Heavy and Civil Engineering Construction industry is pivotal in climate adaptation. It constructs, maintains, and restores coastal green infrastructure. This industry uses mechanical systems and technology expertise to implement effective measures in coastal areas.

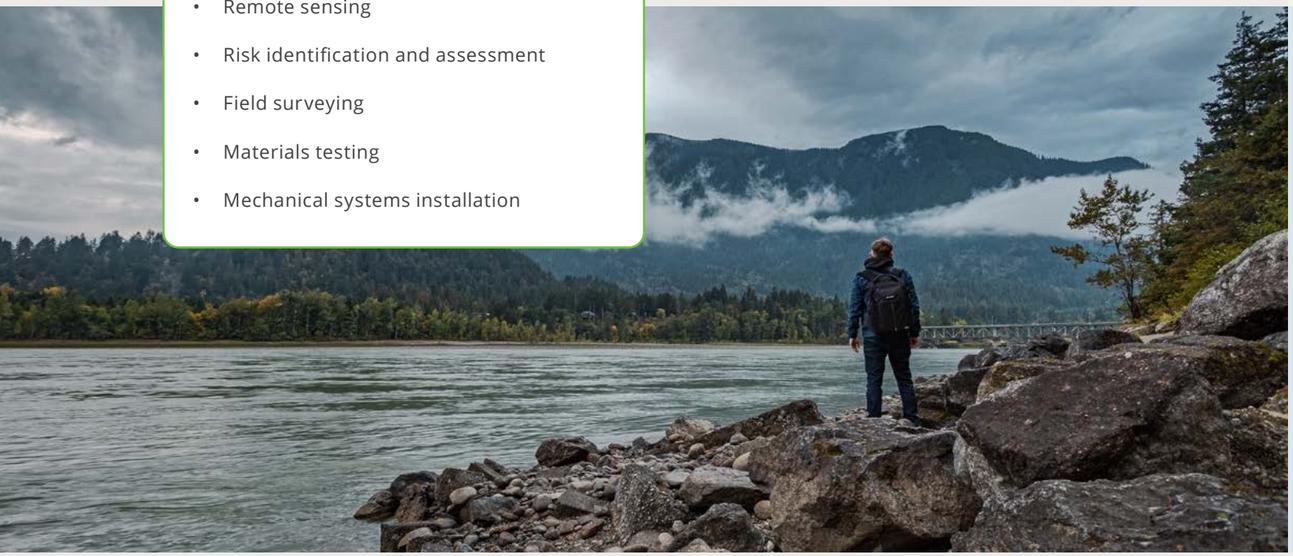
TOP OCCUPATIONS (NOC) BY KEY INDUSTRY GROUP (NAICS)

BRITISH COLUMBIA

MANAGEMENT, SCIENTIFIC, AND TECHNICAL CONSULTING SERVICES (5416)	• Senior managers – construction, transportation, production, and utilities (00015) • Biologists and related scientists (21110) • Civil engineers (21300) and mechanical engineers (21301)
OTHER HEAVY AND CIVIL ENGINEERING CONSTRUCTION (2379)	• Heavy equipment operators (except crane) (73400) • Contractors and supervisors, heavy equipment operator crews (72021) • Civil engineers (21300) and mechanical engineers (21301)

KEY SKILLS

- Restoration of contaminated sites
- Remote sensing
- Risk identification and assessment
- Field surveying
- Materials testing
- Mechanical systems installation



COASTAL RESTORATION – FLOOD PREVENTION AND HABITAT RESTORATION

Flood prevention and habitat restoration in coastal areas through nature-based climate solutions and green infrastructure involve employing natural techniques to manage water and revive ecosystems. Methods like restoring wetlands and natural buffers like estuaries and salt marshes and establishing vegetation along coastlines help mitigate flooding by absorbing water and reducing its force. These approaches simultaneously restore habitats, enhance biodiversity, and provide natural defences against erosion, safeguarding coastal communities and ecosystems from the impacts of flooding and promoting a healthier coastal environment.

PROJECT SPOTLIGHT: *FRASER RIVER CONNECTIVITY PROJECT*

Between 2017 and 2022, the Raincoast Conservation Foundation and Ducks Unlimited partnered on a project funded by Fisheries and Oceans Canada's Coastal Restoration Fund. The project aimed to restore estuary connectivity in the Fraser River, British Columbia. To achieve this, they implemented flow control infrastructure such as training walls, causeways, and jetties that repaired and restored damaged estuary connectivity caused by human activities. The project focused on enhancing natural processes in the Fraser River estuary. By restoring the connectivity, the project offers several ecosystem benefits, including higher juvenile salmon survival rates, restoration of the delicate balance of marsh habitats in the region, and enhanced food availability within the downstream habitat of the Southern Resident Killer Whales.

KEY INDUSTRY GROUPS SUPPLYING FLOOD PREVENTION AND HABITAT RESTORATION WORKFORCE

Professionals in the **Management, Scientific, and Technical Consulting Services** industry offer vital assistance for coastal restoration. They address flood prevention, erosion control, and the creation of coastal defence structures. This work includes evaluating climate vulnerability, risk management, and overseeing the health of coastal ecosystems.

Similarly, the **Other Heavy and Civil Engineering Construction** industry is pivotal in climate adaptation. This sector actively builds, upkeeps, and restores coastal green infrastructure. It utilizes mechanical systems and technological know-how to implement effective measures in coastal areas.

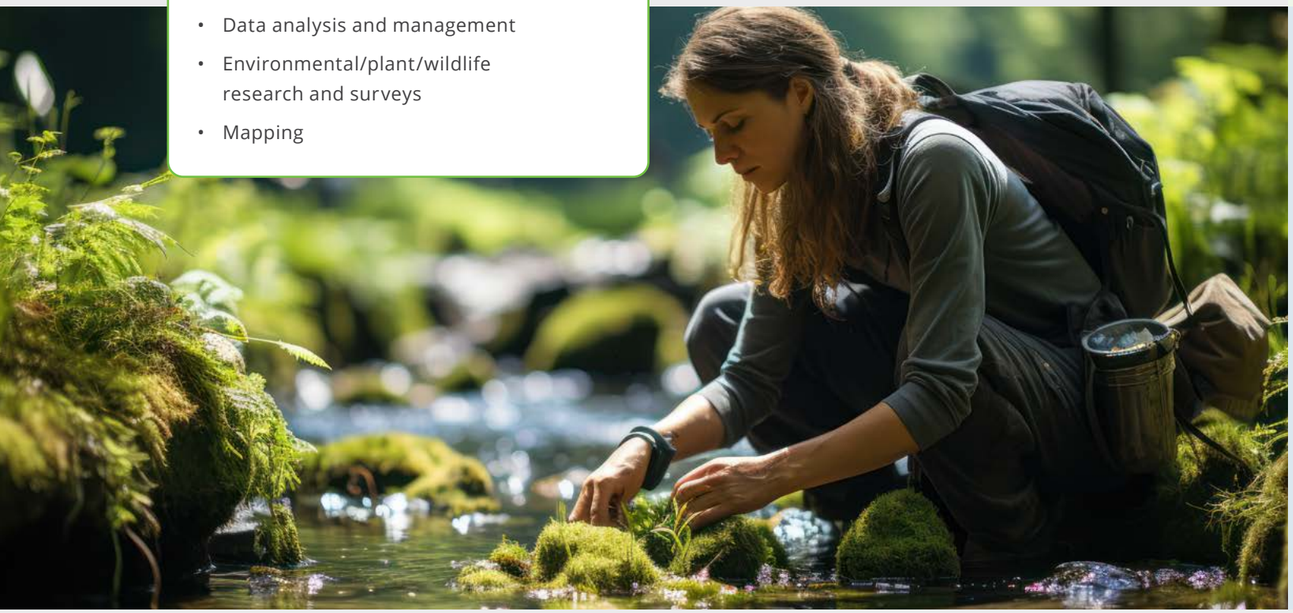
TOP OCCUPATIONS (NOC) BY KEY INDUSTRY GROUP (NAICS)

BRITISH COLUMBIA

MANAGEMENT, SCIENTIFIC, AND TECHNICAL CONSULTING SERVICES (5416)	• Senior managers – construction, transportation, production, and utilities (00015) • Biologists and related scientists (21110) • Civil engineers (21300) and mechanical engineers (21301)
SUPPORT ACTIVITIES FOR FORESTRY (1153)	• Heavy equipment operators (except crane) (73400) • Contractors and supervisors, heavy equipment operator crews (72021) • Civil engineers (21300) and mechanical engineers (21301)

KEY SKILLS

- Environmental monitoring and compliance
- Remote sensing
- Data analysis and management
- Environmental/plant/wildlife research and surveys
- Mapping



FORESTRY – WILDFIRE MITIGATION AND MANAGEMENT

Wildfire mitigation and management within the forestry sector via nature-based climate solutions involve strategies to reduce the risk and impact of wildfires. These solutions integrate natural approaches such as controlled burns, selective thinning of vegetation, creating fire breaks, and promoting healthier forest ecosystems. These methods aim to decrease the intensity and spread of wildfires, enhance forest resilience, protect biodiversity, and safeguard communities and infrastructure located in wildfire-prone areas.

PROJECT SPOTLIGHT: *NAZKO WILDFIRE RISK REDUCTION PROJECT*

The Forest Enhancement Society of British Columbia (FESBC) funds various projects to reduce wildfire risks, protect communities, enhance wildlife habitats, improve low-value forests, regenerate damaged forests, and utilize wood fibre. Since 2021, FESBC and Nazko Logging Ltd. have collaborated on a project that mitigates wildfire risks. The project's primary objective is to identify and treat forest stands and fuel buildups within a 5-kilometre radius of Nazko First Nation and Lhoosk'uz Dené Nation, reducing wildfire risk to nearby communities and interface areas. Nazko Logging Ltd.'s mitigation activities include removing and using dead pine trees as part of the fuel management treatments.

KEY INDUSTRY GROUPS SUPPLYING WILDFIRE MITIGATION AND MANAGEMENT WORKFORCE

Roles within the **Management, Scientific, and Technical** Consulting Services industry play a crucial role in guaranteeing the sustainability and success of measures to promote resilient forestry practices. These measures involve planting fire-resistant tree species, conducting controlled burns, and creating buffer zones to improve community defence against wildfires.

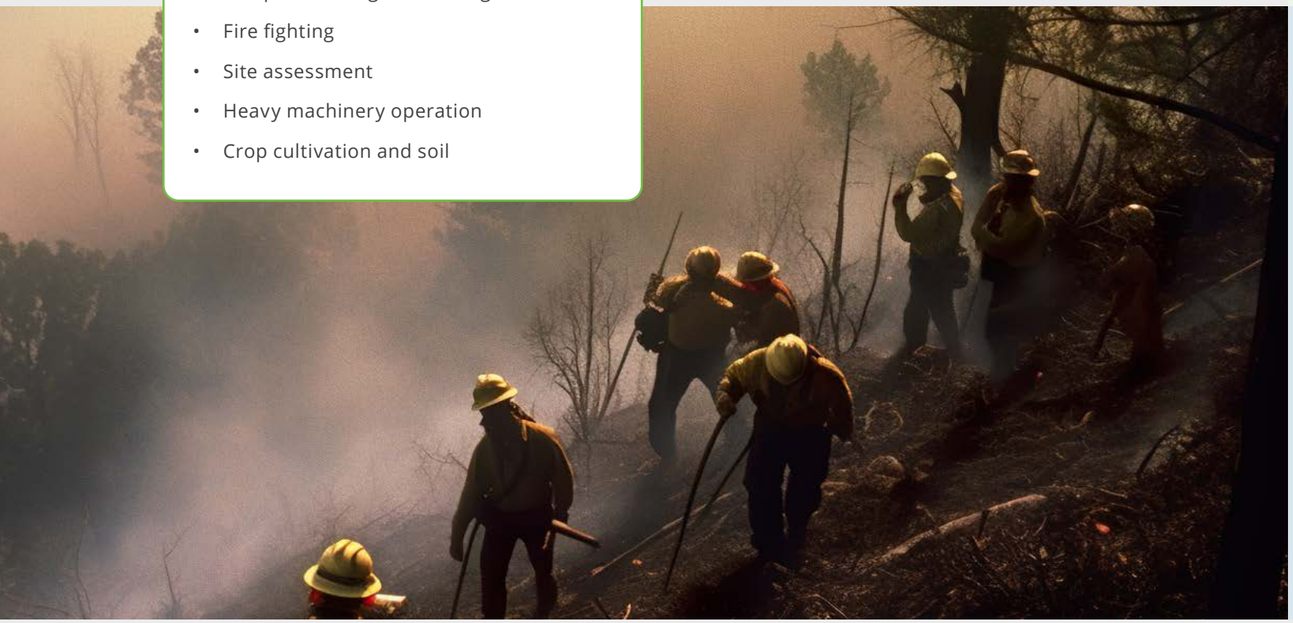
Professionals in the **Support Activities for Forestry** industry contribute to the prevention and management of wildfires through activities such as forest restoration, operating fire lookout stations, forest firefighting, forest thinning, and the creation of forest fire preparation and management plans.

TOP OCCUPATIONS (NOC) BY KEY INDUSTRY GROUP (NAICS)

	ALBERTA	BRITISH COLUMBIA
MANAGEMENT, SCIENTIFIC, AND TECHNICAL CONSULTING SERVICES (5416)	• Forestry professionals (21111) • Engineering managers (20010) • Technical occupations in geomatics and meteorology (22214)	• Engineering managers (20010) • Forestry professionals (21111) • Forestry technologists and technicians (22112)
SUPPORT ACTIVITIES FOR FORESTRY (1153)	• Chain saw and skidder operators (84110) • Logging and forestry labourers (85120) • Forestry technologists and technicians (22112)	• Forestry technologists and technicians (22112) • Logging and forestry labourers (85120) • Forestry professionals (21111)

KEY SKILLS

- Risk identification and assessment
- Sample handling and sorting
- Fire fighting
- Site assessment
- Heavy machinery operation
- Crop cultivation and soil



MINING, OIL AND GAS – LAND REMEDIATION

Land remediation of mining, oil, and gas activity waste involves cleaning and restoring contaminated or impacted land. This remediation aims to mitigate environmental damage caused by waste materials, such as heavy metals, chemicals, or pollutants left behind by mining, oil, or gas extraction. Techniques like soil excavation, treatment, or containment reduce or remove contaminants, restoring the land to a safer and more environmentally sound condition.

PROJECT SPOTLIGHT: *REMOVAL OF MINERAL FOOTPRINT AND RESTORATION OF FRESHWATER PEATLANDS*

The Environmental Damages Fund (EDF) manages funding received from fines, court orders, and voluntary payments. The fund supports priority projects on restoration, environmental quality improvement, research, development, education, and awareness. The main goal is to provide financial assistance to projects that help restore damage to the natural environment and support wildlife conservation. The Centre for Boreal Research at the Northern Alberta Institute of Technology received funding from EDF to research and mitigate the mineral footprint caused by in-situ oil and gas operations in northern Alberta.

KEY INDUSTRY GROUPS SUPPLYING LAND REMEDIATION WORKFORCE

Professionals in the Management, Scientific, and Technical Consulting Services industry are responsible for creating and implementing waste management plans that are sustainable and environmentally friendly.

Within Support Activities for Mining and Oil and Gas Extraction industry, workers collaborate with technical experts to ensure that waste management practices align with regulations and best practices, facilitating the integration of green infrastructure projects.

Skilled workers in the Remediation and Other Waste Management Services industry directly handle waste cleanup and disposal, using nature-based approaches like reforestation and wetland restoration to improve the environment while effectively managing waste.

TOP OCCUPATIONS (NOC) BY KEY INDUSTRY GROUP (NAICS)

	ALBERTA	BRITISH COLUMBIA
MANAGEMENT, SCIENTIFIC, AND TECHNICAL CONSULTING SERVICES (5416)	• Senior managers –construction, transportation, production, and utilities (00015) • Geoscientists and oceanographers (21102) • Supervisors, mining, and quarrying (82020) and oil & gas (82021)	• Senior managers – construction, transportation, production, and utilities (00015) • Geoscientists and oceanographers (21102) • Technical occupations in geomatics and meteorology (22214)
SUPPORT ACTIVITIES FOR MINING, OIL AND GAS EXTRACTION (2131)	• Supervisors, mining, and quarrying (82020) and oil & gas (82021) • Oil and gas drilling, servicing, and related labourers (85111) • Oil and gas well drilling and related workers (84101)	• Senior managers – construction, transportation, production, and utilities (00015) • Geoscientists and oceanographers (21102) • Oil and gas drilling, servicing, and related labourers (85111)
REMEDIATION AND OTHER WASTE MANAGEMENT SERVICES (5629)	• Construction trades helpers and labourers (75110) • Senior managers – construction, transportation, production, and utilities (00015) • Contractors and supervisors, heavy equipment operator crews (72021)	• Construction trades helpers and labourers (75110) • Contractors and supervisors, other construction trades, installers, repairers, and servicers (72014) • Contractors and supervisors, heavy equipment operator crews (72021)

KEY SKILLS

- Supply chain management
- Machinery operation and repair
- Equipment assembly
- Operation monitoring and control

MINING, OIL AND GAS – LAND RECLAMATION

Restoring areas affected by mining or oil and gas activities involves land reclamation—a process to return the land to a functional and often natural state. This restoration effort includes reshaping the land, reintroducing native vegetation, managing water resources, and addressing any soil or environmental issues caused by previous activities. The goal is to rehabilitate the land, making it suitable for various uses like agriculture, wildlife habitat, or recreational purposes while mitigating the impact of past industrial activities.

PROJECT SPOTLIGHT: *BIOSALIX, MINE RECLAMATION*

The BIOSALIX project, funded by the Natural Resources Canada Clean Growth Program and Alberta Innovates, leads the charge in expanding clean energy. It achieves this by repurposing prairie coal mines into wood biomass production sites, ensuring economic stability for mining communities transitioning toward a clean technology-based economy. Located at the Westmoreland Coal Company's Paintearth Mine in Alberta, this project addresses two critical challenges: the swift closure of coal mines and the management of organic waste. This initiative uses municipal biosolids and organic waste to enhance soil quality and cultivate rapidly growing willow wood biomass on the reclaimed land. The harvested wood biomass serves multiple purposes, including clean energy production, land reclamation, and the creation of bioproducts.

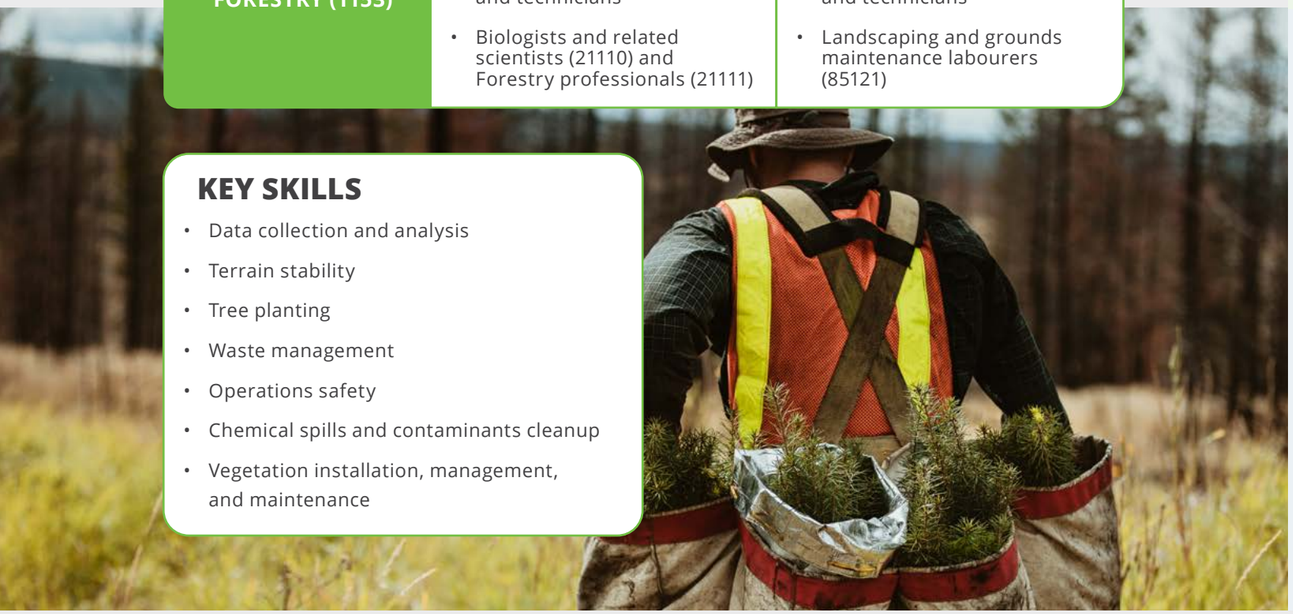
KEY INDUSTRY GROUPS SUPPLYING LAND RECLAMATION WORKFORCE

Experts in the Management, Scientific, and Technical Consulting Services industry develop comprehensive reclamation plans incorporating nature-based solutions to restore ecosystems and promote biodiversity while maintaining sustainable practices.

Meanwhile, within the Support Activities for Mining and Oil and Gas Extraction industry, various occupations are responsible for implementing and monitoring these plans, contributing to land and ecosystem restoration. Additionally, forestry professionals within the Support Activities for Forestry industry are essential for the reforestation of land, and their expertise is crucial in monitoring the reclamation process to ensure the successful growth of forests.

TOP OCCUPATIONS (NOC) BY KEY INDUSTRY GROUP (NAICS)

	ALBERTA	BRITISH COLUMBIA
MANAGEMENT, SCIENTIFIC, AND TECHNICAL CONSULTING SERVICES (5416)	• Biologists and related scientists (21110) and Forestry professionals (21111) • Senior managers – construction, transportation, production, and utilities (00015) • Engineering managers (20010)	• Legislative and senior managers (0001) • Biologists and related scientists (21110) and Forestry professionals (21111) • Engineering managers (20010)
SUPPORT ACTIVITIES FOR MINING AND OIL AND GAS EXTRACTION (2131)	• Supervisors, mining, and quarrying (82020) • Mine labourers (85110) and Oil and gas drilling, servicing, and related labourers (85111) • Oil and gas well drillers, servicers, testers, and related workers (83101)	• Oil and gas well drillers, servicers, testers, and related workers (83101) • Supervisors, mining, and quarrying (82020) • Mine labourers (85110) and Oil and gas drilling, servicing, and related labourers (85111)
SUPPORT ACTIVITIES FOR FORESTRY (1153)	• Logging, forestry, landscaping and other related labourers (8512) • Biological (22110) and Forestry (22112) technologists and technicians • Biologists and related scientists (21110) and Forestry professionals (21111)	• Biologists and related scientists (21110) and Forestry professionals (21111) • Biological (22110) and Forestry (22112) technologists and technicians • Landscaping and grounds maintenance labourers (85121)



KEY SKILLS

- Data collection and analysis
- Terrain stability
- Tree planting
- Waste management
- Operations safety
- Chemical spills and contaminants cleanup
- Vegetation installation, management, and maintenance

WATERSHED RESTORATION – EROSION AND SEDIMENT CONTROL

Soil erosion and sediment control are crucial to watershed restoration through nature-based climate solutions and green infrastructure. It involves implementing techniques to prevent soil loss and sediment movement within watersheds. Methods such as planting vegetation, creating buffer zones, using erosion-control blankets, and constructing retention ponds help stabilize soil, reduce erosion, and prevent sediment from entering water bodies. These measures promote healthier watersheds, maintain water quality, and support the restoration of natural habitats.

PROJECT SPOTLIGHT: *PROJECTS IN THE WETLAND REPLACEMENT PROGRAM*

This program aims to replace wetlands in all municipalities and watersheds across Alberta. Priority is given to watersheds that have lost the most wetlands since 2015 and areas with a history of high loss rates. The program commits to this goal by collaborating with municipalities and non-profit organizations interested in wetland replacement through restoration or construction, including Ducks Unlimited and the Alberta Conservation Association. These partners work with landowners to achieve mutual wetland replacement and conservation goals. County of Grande Prairie is working on restoration and construction to improve water quality of Saskatoon Lake and wildlife habitat within Trumpeter Swan Buffer area. Involves restoring and modifying existing dugouts, as well as creating ribbon wetlands along eroded drainage ditches.

KEY INDUSTRY GROUPS SUPPLYING EROSION AND SEDIMENT CONTROL WORKFORCE

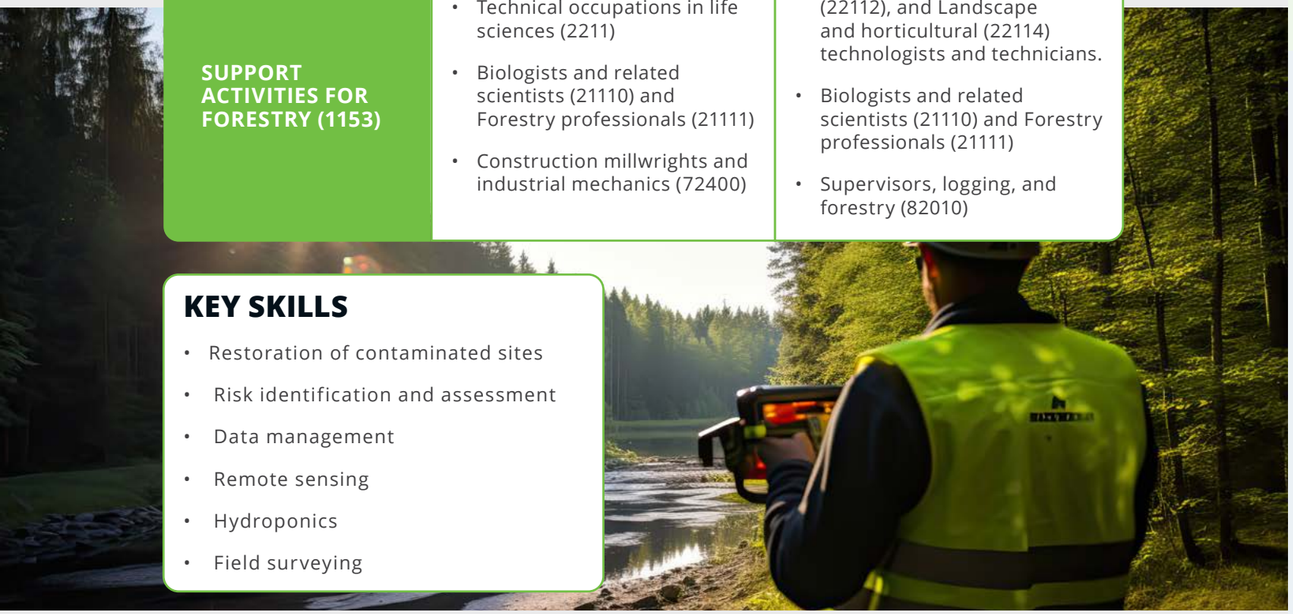
The Management, Scientific, and Technical Consulting Services industry specializes in biological systems and environmental consulting, especially in geology, hydrology, and risk assessment. Their expertise guides informed decisions for appropriate nature-based environmental interventions, integrating them with existing practices.

The Other Heavy and Civil Engineering Construction industry handles diverse infrastructure types, including construction, reconstruction, rehabilitation, and repairs. This includes infrastructures such as sediment traps, curtains, dykes, dams, and storm sewers.

Meanwhile, the Support Activities for Forestry industry have a vital role in erosion and sediment control. It achieves this by placing and maintaining vegetation to stabilize areas with high erosion in aquatic environments (Robotham et al., 2023). Such endeavours require well-informed decisions about integrating vegetation into erosion and sediment control projects, which involve designing, establishing, maintaining, monitoring, and managing this living infrastructure.

TOP OCCUPATIONS (NOC) BY KEY INDUSTRY GROUP (NAICS)

	ALBERTA	BRITISH COLUMBIA
MANAGEMENT, SCIENTIFIC, AND TECHNICAL CONSULTING SERVICES (5416)	• Biological (22110), Forestry (22112), and Landscape and horticultural (22114) technologists and technicians. • Biologists and related scientists (21110) and Forestry professionals (21111) • Construction millwrights and industrial mechanics (72400)	• Senior managers – construction, transportation, production, and utilities (00015) • Biologists and related scientists (21110) and Forestry professionals (21111) • Civil engineers (21300) and mechanical engineers (21301)
OTHER HEAVY AND CIVIL ENGINEERING CONSTRUCTION (2379)	• Contractors and supervisors, heavy equipment operator crews (72021)Civil engineers (21300) and mechanical engineers (21301) • Senior managers –construction, transportation, production, and utilities (00015)	• Contractors and supervisors, heavy equipment operator crews (72021) • Civil engineers (21300) and mechanical engineers (21301) • Civil engineering technologists and technicians (22300)
SUPPORT ACTIVITIES FOR FORESTRY (1153)	• Technical occupations in life sciences (2211) • Biologists and related scientists (21110) and Forestry professionals (21111) • Construction millwrights and industrial mechanics (72400)	• Biological (22110), Forestry (22112), and Landscape and horticultural (22114) technologists and technicians. • Biologists and related scientists (21110) and Forestry professionals (21111) • Supervisors, logging, and forestry (82010)



KEY SKILLS

- Restoration of contaminated sites
- Risk identification and assessment
- Data management
- Remote sensing
- Hydroponics
- Field surveying

WATERSHED RESTORATION – FLOOD AND DROUGHT MITIGATION

Flood and drought mitigation in watershed restoration via nature-based climate solutions involves restoring floodplains and managing extreme weather impacts. Strategies include reinstating natural floodplain functions, such as reconnecting rivers to their floodplains, creating storage areas, and fostering vegetation that absorbs excess water. Similarly, implementing green infrastructure, like rain gardens or permeable surfaces, helps manage water during droughts by capturing and storing rainwater. These strategies aim to reduce flood risks, enhance water retention, and mitigate the adverse effects of extreme weather events, promoting a more resilient and balanced watershed ecosystem.

PROJECT SPOTLIGHT: *PEMBINA RIVER WATERSHED SHORELINES PROJECT*

In 2014, Alberta Environment and Parks launched the Watershed Resiliency and Restoration Program to strengthen the natural capacity of watersheds by mitigating the effects of flooding and drought. One project supported by this program is the Pembina River Watershed Shorelines Project, which contributes to overall flood and drought resilience in the Athabasca River Watershed. This project aims to enhance the resilience of the Pembina River watershed through a combination of activities, including riparian habitat assessment, educational efforts, restoration initiatives, and conservation projects. The project involves using geographic information systems to conduct large-scale assessments that measure the intactness of riparian areas to evaluate both natural and human-induced pressures on these areas, to improve riparian habitat management.

KEY INDUSTRY GROUPS SUPPLYING FLOOD AND DROUGHT MITIGATION WORKFORCE

Professionals in the Management, Scientific, and Technical Consulting Services industry perform diverse roles. They collect and analyze watershed data to comprehend the impact of weather patterns and climate changes on the region. Additionally, they monitor water quality, species diversity, and hydrology. Their expertise extends to navigating local regulations and policies relevant to specific nature-based climate solutions and green infrastructure projects.

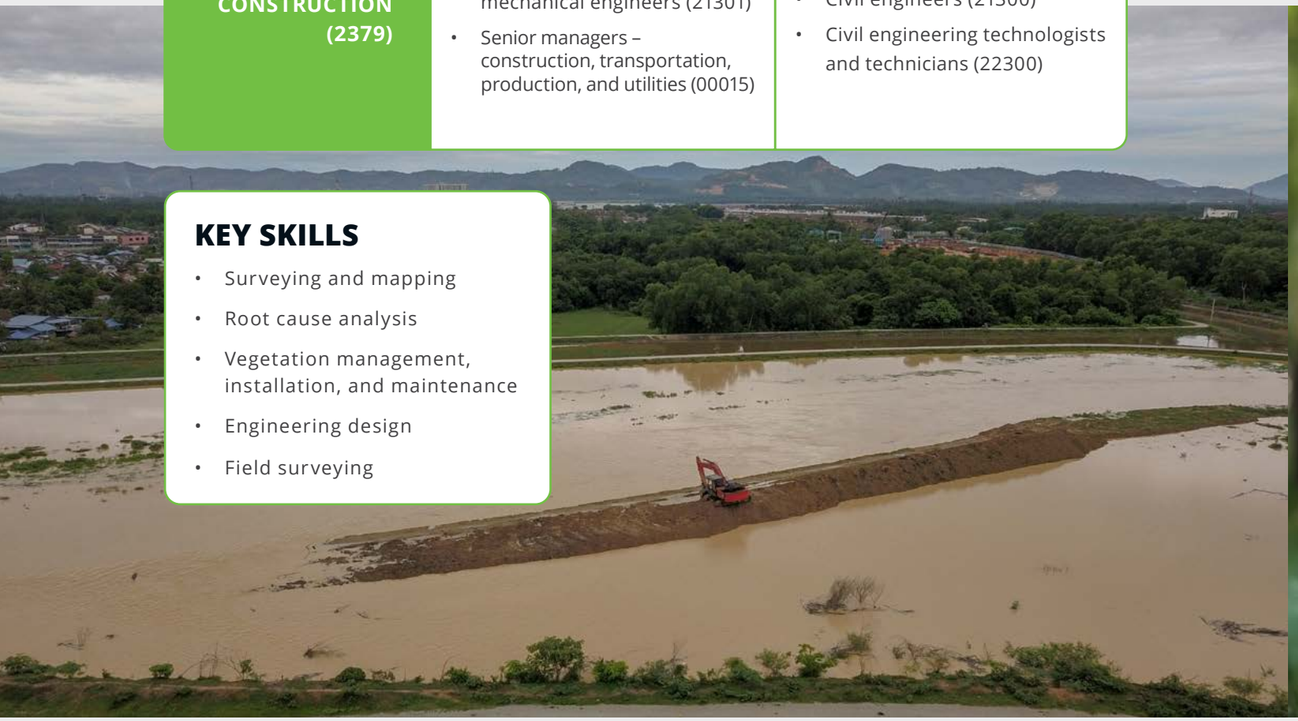
In the Other Heavy and Civil Engineering Construction industry, flood and drought mitigation measures are integral to various aspects of construction. These include new construction, reconstruction, rehabilitation, and repairs of different types of green infrastructure. Activities encompass water drainage management, implementing passive and active flood control practices, and constructing flood storage systems. Professionals in this sector also contribute to tasks like building vegetative buffer strips, planting vegetation, directional drilling, stream diversion, and clearing. Their involvement showcases their multifaceted role in flood and drought mitigation efforts.

TOP THREE OCCUPATIONS (NOC) BY KEY INDUSTRY GROUP (NAICS)

	ALBERTA	BRITISH COLUMBIA
MANAGEMENT, SCIENTIFIC, AND TECHNICAL CONSULTING SERVICES (5416)	• Biologists and related scientists (21110) • Senior managers – construction, transportation, production, and utilities (00015) • Civil engineers (21300) and mechanical engineers (21301)	• Senior managers – construction, transportation, production, and utilities (00015) • Biologists and related scientists (21110) • Civil engineers (21300) and mechanical engineers (21301)
OTHER HEAVY AND CIVIL ENGINEERING CONSTRUCTION (2379)	• Contractors and supervisors, heavy equipment operator crews (72021) • Civil engineers (21300) and mechanical engineers (21301) • Senior managers – construction, transportation, production, and utilities (00015)	• Contractors and supervisors, heavy equipment operator crews (72021) • Civil engineers (21300) • Civil engineering technologists and technicians (22300)

KEY SKILLS

- Surveying and mapping
- Root cause analysis
- Vegetation management, installation, and maintenance
- Engineering design
- Field surveying



EMPLOYMENT TRENDS:
EXPLORING KEY INDUSTRIES DRIVING GROWTH AND OPPORTUNITIES

Nature-based climate solutions and green infrastructure projects involve organizations from several different industries. This section delves into five key industries driving these efforts, examining their employment trends in Alberta and British Columbia from 2016 to 2021. Detailed insights are presented in Table 1, which summarizes these trends.

To comprehend these industries' roles in addressing climate challenges, we identified key activities within each sector and sub-sector, matching them with corresponding industry groups in the North American Industry Classification System that most accurately represent these activities. This standardized framework analyzes labour market trends, providing valuable insights into implementing nature-based climate solutions (explore Tables 2 to 6).

These industry groups include Support Activities for Forestry, Support Activities for Mining and Oil and Gas, Other Heavy and Civil Engineering Construction, Management, Scientific and Technical Consulting Services, and Remediation and Other Waste Management Services. Through this lens, we uncover job prospects and challenges inherent in nature-based climate solutions and green infrastructure projects, offering businesses and job seekers a comprehensive view.

Table 1. *Employment Trends in Nature-based Climate Solutions-related Industry Groups*

	INDUSTRY GROUP (NAICS CODE)	2016 EMPLOYMENT	2021 EMPLOYMENT	CHANGE IN EMPLOYMENT WITHIN INDUSTRY GROUP (2016 TO 2021)
Alberta	Support activities for forestry (1153)	1,400	1,475	5% ↑
	Support activities for mining, and oil and gas extraction (2131)	72,090	39,315	-45% ↓
	Other heavy and civil engineering construction (2379)	1,310	1,860	42% ↑
	Management, scientific and technical consulting services (5416)	27,320	24,870	-9% ↓
	Remediation and other waste management services (5629)	2,315	1,570	-32% ↓
British Columbia	Support activities for forestry (1153)	5,435	5,075	-7% ↓
	Support activities for mining, and oil and gas extraction (2131)	11,020	6,275	-43% ↓
	Other heavy and civil engineering construction (2379)	1,930	3,875	101% ↑
	Management, scientific and technical consulting services (5416)	31,265	30,545	-2% ↓
	Remediation and other waste management services (5629)	2,000	1,405	-30% ↓

Note. Values represent the 2016-2021 change, where negative means a decrease, and positive indicates an increase. Employment changes in British Columbia and Alberta across all industries offer context. 2021 data may not fully reflect typical labour market trends due to the impact of the COVID-19 pandemic. Adapted from Statistics Canada's custom data service request for census data tables for 2016 and 2021.

SPOTLIGHT – STAFFING CHALLENGES OF ORGANIZATIONS SPEARHEADING NATURE-BASED CLIMATE SOLUTIONS AND GREEN INFRASTRUCTURE PROJECTS

In-depth conversations with organizations funding nature-based climate solutions and green infrastructure projects revealed that they often need to work on consistent funding and project seasonality, which significantly constrain their ability to hire and retain in-house full-time staff to undertake initiatives of nature-based climate solutions and green infrastructure projects. Consequently, these organizations revealed a heavy reliance on volunteers and contractors (such as the five key industries of focus in this section).

Table 2. *Support Activities for Forestry Industry*

Top Occupations	**Technical Occupations in Life Sciences:** Roles likely involve ecological research, biodiversity assessments, and the application of scientific knowledge to forestry practices.
	Logging, Forestry, Landscaping, and Related Labourers: Encompass many ground activities, including tree felling, maintenance, and conservation.
Employment Stability	**Alberta vs. British Columbia Dynamics:** Support Activities for Forestry employment in Alberta increased, while British Columbia saw a slight decline.
Employment Drivers	**Economic Dynamics:** Market demands for timber, shifts in forest management practices, or fluctuations in conservation initiatives might influence changes in employment.
	Technological Integration: As technology continues to advance, the workforce requirements may evolve accordingly. Automation could impact specific roles, while new positions focused on implementing technology in forest management may emerge.
	Sustainable Forestry Practices: With a growing emphasis on sustainability and climate solutions, this industry might focus on sustainable logging and reforestation, which could result in changes to employment demands potentially altering job demands.
	Climate Change Mitigation: Forests play a crucial role in mitigating climate change. As climate issues intensify, an increased emphasis on managing forest fires, controlling pests, and sequestering carbon may increase employment demands in the industry.

- Despite minor fluctuations, stable employment trends in Alberta and British Columbia.
- The industry's future success hinges on its adaptability to sustainable practices, embracing technological advancements, and effectively addressing climate challenges.
- There is a growing demand for specialized expertise in technical life sciences and hands-on forestry labourers, crucial for advocating nature-based climate solutions.
- Managing forest resources requires considering ecological, economic, social, and regulatory aspects in an integrated manner. Achieving a balance among these dimensions is crucial for sustainable forest management, which calls for ongoing adaptation and various stakeholder collaboration. However, the complexity of this field poses challenges in tracking workforce needs and changes.

Table 3. *Support Activities for Mining and Oil and Gas*

Top Occupations	**Contractors and Supervisors, Mining, Oil and Gas:** Roles oversee operations, ensuring safety and productivity in mining and extraction activities.
	Underground Miners, Oil and Gas Drillers, and Related Occupations: Involved in extraction processes, drilling, and other essential tasks related to resource extraction.
	Physical Science Professionals: Engaged in scientific roles related to resource exploration, environmental impact assessment, and technological advancements in extraction processes.
Employment Drivers	**Pandemic Impact**: COVID-19 pandemic likely influenced these declines, disrupting operations, reducing demand, and impacting global resource markets.
	Evolving Industry Dynamics: There might be a transition from traditional extraction methods to more sustainable practices, leading to reduced employment in conventional extraction roles.
	Environmental Concerns: As people become more aware of the impact of human activity on the environment, the industry may start looking towards nature-based climate solutions that could lead to new job opportunities focusing on sustainable resource extraction and reducing emissions.
	Transition to Sustainable Practices: Decrease in demand could indicate a shift in the industry towards more environmentally conscious practices. This shift may increase job opportunities related to environmentally sustainable extraction methods, remediation, and reducing emissions.
	Technological Advancements: Investing in technology to improve extraction processes, automation, and environmental monitoring could change the job requirements, giving preference to technology implementation and management skills.

- Alberta experienced a significant employment decline of 45%. British Columbia saw a 43% drop. Fluctuations in global market forces, especially commodity prices, significantly impact the decline in mining and oil and gas activities. Employment within these sectors tends to follow a cyclical pattern increasing alongside rising commodity prices and decreasing during periods of price decline.
- This trend suggests forthcoming job prospects in positions advocating for green practices, innovative technologies for cleaner extraction techniques, and efforts to minimize the environmental footprint of these industries.
- Anticipated opportunities in the future may focus on building a more specialized workforce that emphasizes sustainability, integrates technology, and champions environmental stewardship within the mining and oil and gas sectors.

Table 4. *Other Heavy and Civil Engineering Construction*

Top Occupations	**Contractors and Supervisors:** Oversee project operations, ensuring adherence to safety standards and project completion.
	Technical Maintenance Trades, Heavy Equipment and Transport Operators: Skilled workers handling machinery, equipment, and technical aspects of construction projects.
	Operators, Drillers, and Blasters: Involved in specific tasks like drilling, blasting, and specialized operations within construction sites.
	Trades Helpers and Labourers: Support roles involved in manual tasks, assisting skilled workers in construction activities.
Employment Growth	**Positive Trend:** Substantial increase in employment in this industry in both provinces (over 100% in British Columbia and 42% in Alberta) indicates a growing workforce potential.
	Implications for Nature-Based Climate Solutions: Significant increase in employment indicates workers for nature-based climate solutions and green infrastructure projects, which coincide with the necessary technical skills and construction expertise for these undertakings.
Employment Drivers	**Green Infrastructure Projects:** Increasing investments in green infrastructure and sustainable construction would increase demand for workers in this sector.
	Government Initiatives: Policies promoting sustainable infrastructure development could drive demand for skilled labour in this sector.
	Technological Advancements: Integration of new construction technologies and methodologies may require a larger workforce with specialized skills in these areas.
	Continued Demand: Steady rise in employment indicates sustained demand for construction workers in nature-based climate solutions-related projects, likely due to ongoing and upcoming green infrastructure projects.
	Skill Emphasis: Industry might prioritize workers with expertise in sustainable construction practices, renewable energy integration, and sustainable infrastructure development.

- Alberta and British Columbia has experienced a notable rise in employment, signalling positive prospects for nature-based climate solutions and green infrastructure projects.
- This increase suggests a potential shift towards sustainable construction practices, necessitating a skilled workforce possessing technical expertise and construction experience to execute sustainable infrastructure initiatives.
- The ongoing emphasis on green infrastructure projects anticipates a sustained demand for skilled labourers within this sector in the foreseeable future.
- This industry, specializing in heavy infrastructure construction and civil engineering projects, has demonstrated substantial employment growth in Alberta and British Columbia, indicating encouraging opportunities for nature-based climate solutions and green infrastructure projects.

Table 5. *Management, Scientific, and Technical Consulting Services*

Top Occupations	**Legislative and Senior Managers:** Leadership roles overseeing operations, compliance, and strategic decision-making within consulting services.
	Life Science Professionals: Experts in ecological sciences, biodiversity, and environmental impact assessment.
	Physical Science Professionals: Engaged in scientific analysis, research, and technological innovation, particularly in Alberta.
	Civil and Mechanical Engineers: Involved in the design, planning, and implementation of projects, especially in British Columbia.
Employment Stability and Decline	**Stable Employment with a Decrease:** Despite a relatively stable employment scenario with less than a 10% fluctuation, both provinces experienced a slight decrease in employment within this sector.
	Potential Influences: Factors contributing to this decline could include economic shifts, changes in project demands, or evolving market dynamics affecting consulting services.
Employment Drivers	**Economic and Market Dynamics:** Fluctuations in project demands, changes in client needs, or external economic influences could impact employment stability.
	Technology and Innovation: Advancements in technology might affect job demands, requiring updated skills and expertise to remain competitive in the consulting industry.
	Environmental Policies: Changes in environmental regulations and policies might influence the need for consulting services, particularly in response to climate-focused initiatives.
	Continued Demand: Despite slight declines, the industry's foundational role in nature-based climate solutions suggests a sustained need for consulting services in the foreseeable future.
	Skill Evolution: Industry might witness a shift towards specialized skills focusing on sustainable practices, environmental policy expertise, and innovative solutions for climate challenges.

- Despite a slight decrease in employment, this industry remains pivotal in nature-based climate solutions.
- This sector provides diverse expertise, encompassing senior managerial positions and scientific and engineering professionals, crucial for guiding and facilitating sustainable focused projects.
- Consulting services continue to be highly sought after, notably in British Columbia, where they exhibit the highest employment among the specified industries, underscoring their significance in bolstering and shaping nature-based climate initiatives.
- To sustain success, adaptability to shifting market dynamics, technological advancements, and evolving environmental policies is crucial within this consulting sector.
- This industry holds a key role in delivering advisory services and technical expertise, particularly in environmental consulting, displaying a stable albeit slightly declining employment trend in Alberta and British Columbia throughout the analyzed period.

Table 6. *Remediation and Other Waste Management Services*

Top Occupations	**Technical Occupations in Civil, Mechanical and Industrial Engineering:** Roles involving civil engineering, environmental remediation, and waste management expertise.
	Trades Helpers and Labourers: Support roles engaged in manual tasks, assisting skilled workers in waste management activities.
	Operators, Drillers, and Blasters: Engaged in specialized operations related to waste management, particularly in Alberta.
	Contractors and Supervisors, Technical Industrial, Electrical, Construction Trades, Related Workers: Leadership and technical roles are highly employed in British Columbia, overseeing waste management projects.
Employment Decline	**Similar Trends to Resource Extraction Industries:** Substantial decrease in employment in this sector aligns with the decline observed in Support Activities for Mining and Oil and Gas Extraction.
	Potential Influencing Factors: Decline might be influenced by reduced activity in resource extraction industries (oil and gas and mining) closely tied to waste management requirements.
Employment Drivers	**Industry Interdependence:** Close ties to the oil and gas and mining sectors might indicate employment fluctuations based on these industries' performance.
	Regulatory Changes: Changes in waste management regulations or remediation requirements could impact employment within this sector.
	Economic Factors: Economic downturns or shifts in resource extraction activities influence the demand for waste management services.
	Dependency on Resource Industries: Employment trends in this sector might continue to mirror the performance of oil and gas and mining industries, especially in regions closely tied to these sectors.
	Regulatory Focus: Any shifts in environmental regulations or increased emphasis on remediation efforts could alter future job demands.

- Has experienced a substantial drop in employment, with Alberta and British Columbia experiencing declines of 32% and 30%, respectively (refer to Table 8), resembling trends observed in resource extraction sectors.
- Its close association with the oil and gas and mining industries suggests that activities in these sectors may influence employment fluctuations in remediation and waste management services.
- The regulatory and economic landscape of resource extraction industries will likely influence future job demands in this industry.
- Expertise in environmental remediation and sustainable waste management practices remains crucial for professionals in this field.
- The demand for specialized skills in nature-based climate solutions across various Alberta and British Columbia industries is reflected in high employment levels within specific occupations relevant to this sector.
- Despite its critical role in waste management and remediating contaminated sites, this industry has significantly declined employment in Alberta and British Columbia throughout the analyzed timeframe.

Additional Insights – Employment Opportunities and Challenges In Nature-based Climate Solutions Related Industry Groups

In today's ever-changing job market, the spotlight on nature-based climate solutions and green infrastructure presents challenges and opportunities. As we delve into environmental careers, a significant shift is happening. It is not just about addressing climate change; it is also about embracing sustainable practices across different fields.

A growing demand for specialized skills in this area hints at a potentially competitive job market ahead. Occupations like Technical and Professional Life Sciences, Legislative and Senior Managers, and Civil and Mechanical Engineers in Alberta and British Columbia are seeing a rise in the need for expertise in nature-based climate solutions and green infrastructure projects. This shift highlights how these industries are evolving and the importance of having a skilled workforce that can navigate their interconnectedness.

The impact of the COVID-19 pandemic on industries reliant on natural resources has shown how interconnected different sectors are and how crucial it is to have adaptable, skilled workers. As these industries bounce back, people's demand to understand and embrace sustainability has grown even more vital.

Focusing on proactive talent development and strategic planning will be crucial as we navigate these changes. These strategies will guide industries toward sustainable practices and harness the potential of nature-based climate solutions and green infrastructure.

- The employment in specific occupations related to nature-based climate solutions in Alberta and British Columbia are high, suggesting a demand for specialized skills.
- The high employment rates in Technical and Professional Life Sciences, Legislative and Senior Management, and Civil and Mechanical Engineering across various industries for nature-based climate solutions, highlighting the importance of driving sustainable solutions.
- The pandemic's impact on resource-dependent sectors and related services has emphasized the interconnectedness of industries and the need for skilled workers who can adapt to changing economic and environmental landscapes.
- The demand for these specialized occupations will remain strong as the focus on nature-based climate solutions increases. Developing strategic workforce planning and talent development initiatives may be necessary to meet industry demands.

Key Occupations	**Technical and Professional Life Sciences:** These roles encompass expertise in ecological sciences, biodiversity, environmental assessments, and ecosystem management, which are critical for various initiatives of nature-based climate solutions.
	Legislative and Senior Managers: Leadership roles overseeing operations, compliance, and strategic decision-making, vital for guiding sustainability strategies and compliance within industries.
	Civil and Mechanical Engineers: Their involvement in the design, construction, and implementation of projects, mainly green infrastructure and sustainable development, positions them as crucial assets for nature-based climate solutions.
Employment Trends and Competition	**High Demand:** Consistently high employment levels in these critical occupations across nature-based climate solutions-related industry groups suggest a sustained demand for skilled workers in these fields.
	Competition for Skilled Workers: Increased demand might lead to heightened competition among employers seeking qualified professionals in these specialized areas. Factors like retirements, lack of qualified workforce, and competition for skilled talent might intensify.
COVID-19 Impact	**Economic Implications:** Lingering economic impacts of the COVID-19 pandemic, especially in the oil and gas sector, might have influenced the employment trends observed in industries closely linked to these sectors, such as Remediation and Waste Management Services and Support Activities for Mining and Oil and Gas Extraction.
	Production Decreases: Reduced production during the pandemic in oil and gas industries could have contributed to decreased employment in associated sectors, affecting demand for services like waste management and support activities.
Future Considerations	**Continued Demand:** Persistently high demand for these specialized occupations across initiatives of nature-based climate solutions indicates an ongoing need for expertise in ecological sciences, managerial leadership, and engineering within sustainable practices.
	Talent Retention and Recruitment: Retaining skilled workers and attracting new talent to these high-demand occupations will be critical for organizations involved in nature-based climate solutions initiatives.
	Evolving Industry Dynamics: Ongoing shifts towards sustainable practices and green infrastructure could further amplify the need for skilled professionals.

DECODING THE JOB MARKET:
OCCUPATIONS FOR NATURE-BASED CLIMATE SOLUTIONS AND GREEN INFRASTRUCTURE

This section analyzes the job market in nature-based climate solutions and green infrastructure. It covers labour trends, relevant occupational dynamics, gender representation, key professions driving nature-based climate solutions, essential skills for success, and educational and training pathways for roles in these areas.

LABOUR LANDSCAPE: INSIGHTS INTO OCCUPATIONS AND SUPPLY DYNAMICS

Government policies are pivotal in steering the workforce towards careers in nature-based climate solutions and green infrastructure projects. In December 2020, Canada's fall economic statement introduced the ***Natural Climate Solutions Funds,*** comprising three critical programs: the ***2 Billion Trees Program,*** the ***Nature Smart Climate Solutions Fund,*** and the ***Agricultural Climate Solutions Program.*** With each program set to span at least ten years, its primary objective is to mitigate and adapt to climate change while fostering biodiversity. The financial incentives provided through these initiatives aim to bolster the workforce engaged in natural resource occupations, contributing to achieving these ambitious goals for sustainable development and green economy.

Immigration is another significant factor influencing workforce supply, particularly in addressing shortages within the country (Statistics Canada, 2022). Studies consistently highlight the positive impact of new and established immigrants on employment patterns, especially in managerial, high-skilled, and medium-skilled occupations, effectively addressing labour shortages in these pertinent sectors.

According to Alberta's occupational outlook, approximately 66% of the projected labour supply from 2021 to 2030 will stem from in-migration, encompassing both interprovincial and international migration (Jobs, Economy and Trade, 2023). In British Columbia, the forthcoming labour supply will primarily comprise young individuals entering the workforce (constituting 48%), followed by new international immigrants over the next decade (WorkBC, 2022, p. 5). These demographic shifts underscore the evolving composition of the labour force and its potential impact on various sectors within these provinces.

We categorized occupations for nature-based climate solutions roles and green infrastructure projects into three main occupational groups:

TRADESPEOPLE AND LABOURERS
TECHNICIANS, TECHNOLOGISTS, ENGINEERS, AND SCIENTISTS
MANAGERS AND SUPERVISORS

We identified forty-two (42) occupations split into the three main occupational groups as pertinent to nature-based climate solutions and green infrastructure projects. These occupations are listed in Table 7 by their five-digit National Occupational Classification (NOC).

Table 7. *Occupations Relevant to Nature-based Climate Solutions and Green Infrastructure Projects Across Three Main Occupational Groups*

Main Occupational Group	Occupations (NOC code)
Tradespeople and Labourers	Welders and related machine operators (72106) Construction millwrights and industrial mechanics (72400) Heavy-duty equipment mechanics (72401) Heavy equipment operators (except crane) (73400) Construction trades helpers and labourers (75110) Oil and gas well drillers, servicers, testers, and related workers (83101) Logging machinery operators (83110) Oil and gas well drilling and related workers and services operators (84101) Chain saw and skidder operators (84110) Harvesting labourers (85101) Aquaculture and marine harvest labourers (85102) Mine labourers (85110) Oil and gas drilling, servicing, and related labourers (85111) Landscaping and grounds maintenance labourers (85121) Logging and forestry labourers (85120)
Technicians, Technologist, Engineers and Scientists	Biologists and related scientists (21110) Geoscientists and oceanographers (21102) Forestry professionals (21111) Civil engineers (21300) Mechanical Engineers (21301) Electrical and electronics engineers (21310) Mining engineers (21330) Geological engineers (21331) Geological and mineral technologists and technicians (22101) Biological technologists and technicians (22110) Forestry technologists and technicians (22112) Landscape and horticulture technicians and specialists (22114) Technical occupations in geomatics and meteorology (22214) Civil engineering technologists and technicians (22300) Electrical and electronics engineering technologists and technicians (22310) Power engineers and power systems operators (92100) Central control and process operators, petroleum, gas, and chemical processing (93101)

Managers and Supervisors	Senior managers – construction, transportation, production, and utilities (00015) Engineering managers (20010) Managers in natural resources production and fishing (80010) Managers in horticulture (80021) Supervisors, logging, and forestry (82010) Supervisors, mining, and quarrying (82020) Supervisors, supply chain, tracking and scheduling coordination occupations (12013) Contractors and supervisors, oil and gas drilling and services (82021) Contractors and supervisors, other construction trades, installers, repairers, and services (72014) Contractors and supervisors, heavy equipment operator crews (72021)

Note. Adapted from the Government of Canada's National Occupational Classification, **https://noc.esdc.gc.ca/**

MEETING LABOUR NEEDS: DYNAMICS OF KEY OCCUPATIONS

In the next ten years, numerous job opportunities will arise across various professions. The Alberta Occupational Outlook reports indicate that 60% of these openings will emerge due to retirements, people leaving the province, and individuals passing away (Jobs, Economy and Trade, 2023). A similar trend is observed in British Columbia, where 63% of job openings are projected to result from retiring workers (WorkBC, 2022).

This trend is closely tied to a significant demographic change. Statistics Canada notes a notable increase in individuals aged 65 and over, making up a quarter of the Canadian population (Statistics Canada, 2022a, 2022b; Bush, 2023). This shift, mainly due to the baby boomer generation's retirement, will create vacancies across diverse job roles and industries throughout Canada in the coming years.

We analyzed labour market information from Alberta's Occupational Outlook 2021-2030 (Jobs, Economy and Trade, 2023) and the British Columbia Labor Market Outlook (WorkBC, 2022) to identify the occupations that possess the essential skills for roles in nature-based climate solutions. This information contained descriptions of standard job positions and the education or training required in nature-based climate solutions and green infrastructure.

It is worth noting that the 10-year forecast mentioned in this report differs slightly between Alberta and British Columbia. Specifically, Alberta's forecast covers labour market trends from 2021 to 2030, while British Columbia's forecast covers estimated future labour supply and demand from 2021 to 2031.

LOOKING AT JOB OPENINGS RELATED TO NATURE-BASED CLIMATE SOLUTIONS OCCUPATIONAL GROUPS IN ALBERTA AND BRITISH COLUMBIA, INTERESTING PATTERNS CAN BE SEEN IN THEIR DISTRIBUTION.

Alberta	Approximately 49% of the expected job openings will pertain to Tradespeople and Labourers roles (see Table 8).
	Technicians, Technologists, Engineers, and Scientists will account for 29% of the job openings (see Table 9).
	Managerial and Supervisory roles will make up 23% of the anticipated job openings (see Table 10).
British Columbia	Around 34% of the expected job openings will be in Tradespeople and Labourers (see Table 8).
	Technicians, Technologists, Engineers, and Scientists are projected to contribute 35% of the job openings (see Table 9).
	Managerial and Supervisory will constitute 31% of the anticipated job openings (see Table 10).

The evolving landscape of employment opportunities in Alberta and British Columbia, with different occupational groups experiencing varying levels of demand, mirrors broader labour market trends tied to demographic changes and retirements.

For instance, Table 8 indicates that construction trade helpers and labourers will see more job openings in Alberta, while landscaping and grounds maintenance labourers will experience increased demand in British Columbia. Similarly, heavy equipment operators (excluding crane operators), welders, and related machine operators are projected to witness increased job opportunities in both provinces.

Table 8. *Projected Job Openings for Tradespeople and Labourers: Outlook and Growth Trends*

OCCUPATION (NOC CODE)	ALBERTA (2021-2030)	BRITISH COLUMBIA (2021-2031)
Welders and related machine operators (72106)	**850**	**2,970**
Construction millwrights and industrial mechanics (72400)	459	2,790
Heavy-duty equipment mechanics (72401)	624	1,790
Heavy equipment operators (except crane) (73400)	**890**	**3,620**
Construction trades helpers and labourers (75110)	**1,288**	**250**
Oil and gas well drillers, servicers, testers, and related workers (83101)	382	370
Logging machinery operators (83110)	29	120
Oil and gas well drilling and related workers and services operators (84101)	175	220
Chain saw and skidder operators (84110)	10	270
Harvesting labourers (85101)	7	280
Aquaculture and marine harvest labourers (85102)	1	130
Mine labourers (85110)	9	30
Oil and gas drilling, servicing, and related labourers (85111)	151	170
Landscaping and grounds maintenance labourers (85121)	**596**	**6,430**
Logging and forestry labourers (85120)	9	-40

Note. Forecast periods for both Alberta and British Columbia vary slightly and are noted for comparisons only. Adapted from Alberta's Occupational Outlook, 2021-2030, Re-issued with revised Appendix C, 15-72 and British Columbia's Labour Market Outlook, 2021 Edition, Appendix 3, 4, 64-120.

Table 9 sheds light on the outlook for technicians, technologists, engineers, and scientists. Civil engineers are forecasted to have the highest number of job openings in Alberta and British Columbia in the coming decade.

Table 9. *Projected Job Openings for Technicians, Technologists, Engineers and Scientists: Outlook and Growth*

OCCUPATION (NOC CODE)	ALBERTA (2021-2030)	BRITISH COLUMBIA (2021-2031)
Biologists and related scientists (21110)	125	1,080
Geoscientists and oceanographers (21102)	198	770
Forestry professionals (21111))	35	270
Civil engineers (21300)	558	4,410
Mechanical Engineers (21301))	440	2,210
Electrical and electronics engineers (21310)	311	2,430
Mining engineers (21330)	28	230
Geological engineers (21331)	67	430
Geological and mineral technologists and technicians (22101)	129	350
Biological technologists and technicians (22110)	42	430
Forestry technologists and technicians (22112)	29	380
Landscape and horticulture technicians and specialists (22114)	93	1,120
Technical occupations in geomatics and meteorology (22214)	82	660
Civil engineering technologists and technicians (22300)	176	1,140
Electrical and electronics engineering technologists and technicians (22310)	287	2,020
Power engineers and power systems operators (92100)	298	1,530
Central control and process operators, petroleum, gas, and chemical processing (93101)	409	680

Note. Forecast periods for both Alberta and British Columbia vary slightly and are noted for comparison only. Adapted from Alberta's Occupational Outlook, 2021-2030, Re-issued with revised Appendix C, 15-72 and British Columbia's Labour Market Outlook, 2021 Edition, Appendix 3, 4, 64-120.

In Table 10, within the managerial and supervisory occupational group, there is a consistent trend in the rising demand for contractors, supervisors in construction trades, installers, repairers, and services. Both Alberta and British Columbia anticipate increased job opportunities in this occupation in the years ahead.

Table 10. *Projected Job Openings for Managers and Supervisors: Outlook and Growth Trends*

OCCUPATION (NOC CODE)	ALBERTA (2021-2030)	BRITISH COLUMBIA (2021-2031)
Senior managers – construction, transportation, production, and utilities (00015)	265	3,960
Engineering managers (20010)	177	1,590
Managers in natural resources production and fishing (80010)	252	1,000
Managers in horticulture (80021)	15	270
Supervisors, logging, and forestry (82010)	15	470
Supervisors, mining, and quarrying (82020)	31	570
Supervisors, supply chain, tracking and scheduling coordination occupations (12013)	384	3,070
Contractors and supervisors, oil and gas drilling and services (82021)	440	530
Contractors and supervisors, other construction trades, installers, repairers, and services (72014)	**535**	**3,440**
Contractors and supervisors, heavy equipment operator crews (72021)	449	2,820

Note. Forecast periods for both Alberta and British Columbia vary slightly and are noted for comparisons only. Adapted from Alberta's Occupational Outlook, 2021-2030, Re-issued with revised Appendix C, 15-72 and British Columbia's Labour Market Outlook, 2021 Edition, Appendix 3, 4, 64-120.

SPOTLIGHT – GENDER DISPARITY IN VITAL ROLES FOR NATURE-BASED CLIMATE SOLUTIONS AND GREEN INFRASTRUCTURE PROJECTS

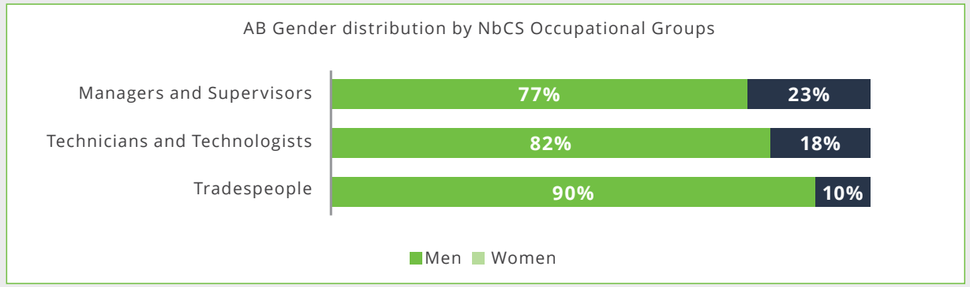
In Alberta and British Columbia, gender disparities persist in critical industry-related roles for nature-based climate solutions and green infrastructure projects. While advancements have been seen in technical roles, achieving gender diversity in managerial positions remains challenging. Imbalances in trades and labourer roles also require attention.

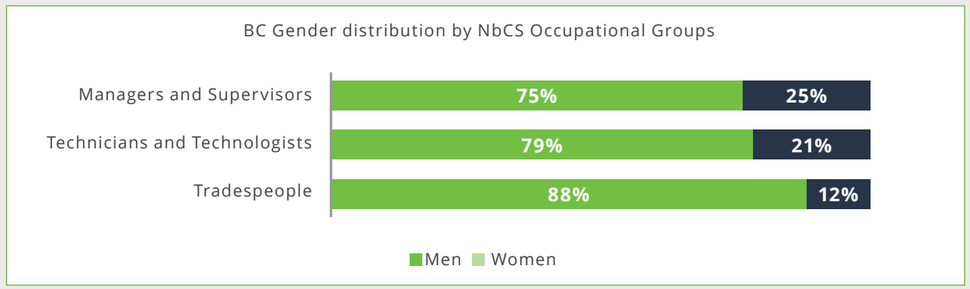
Gender equity in these sectors is vital to harnessing diverse perspectives and talent, pivotal for sustainable development and a thriving green economy. Encouraging women to pursue science, technology, engineering, and mathematics (STEM) careers, fostering inclusive work environments, and providing mentorship programs are vital strategies for achieving gender parity. These efforts are essential for the industry's success in shaping a sustainable future.

OBSERVATIONS OF GENDER DISTRIBUTION IN OCCUPATIONS ACROSS THREE MAIN OCCUPATIONAL GROUPS IN ALBERTA AND BRITISH COLUMBIA

Tradespeople and Labourers	These roles mentioned in **Alberta** and **British Columbia** show a significant gender imbalance, with men comprising 90% and 88%, respectively, and women only making up 10% and 12%.
	It is essential to implement programs that encourage the recruitment and retention of more women, who have historically been underrepresented in male-dominated industries, to ensure a more diverse workforce and maximize the potential of these positions
Technicians, Technologist, Engineers and Scientists	In **Alberta,** the gender gap in technical and technology roles is still significant, with 82% of these positions held by men and only 18% held by women.
	Similarly, in **British Columbia,** 79% of technical roles are filled by men, while women hold only 21% of these positions. Although progress has been made, more efforts are needed to promote gender equality in technical fields.
Managers and Supervisors	In **British Columbia,** women occupy just a quarter of the manager and supervisor positions, while men make up the remaining 75%. This disparity highlights women are significantly underrepresented in leadership roles in these critical sectors.
	Similarly, there is a significant divide in **Alberta,** with men holding 77% of managerial positions and women just 23%. It is crucial to promote gender diversity in leadership to ensure inclusive decision-making.

Figure 1. *Gender Distribution Across Occupational Groups in Alberta and British Columbia: A Comparative Analysis of Manager and Supervisor, Technical, Trades and Labourer Roles*





Source: Statistics Canada 2021 Census data custom tabulation. **https://www.statcan.gc.ca/en/public/beyond20-20**

MEETING LABOUR DEMANDS: CHALLENGES AND OPPORTUNITIES

Occupations related to nature-based climate solutions are in high demand across diverse industries throughout Canada. This growing demand calls for a skilled workforce to fill various occupations.

In Alberta's labour market outlook, with a forecast of 1,206,000 job openings and an estimated 1,160,800 market entrants and job seekers, there is an anticipated shortage of approximately 45,000 workers in the coming decade (Jobs, Economy and Trade, 2023). This scarcity might intensify competition among industries and sectors in their search for qualified workers, particularly in roles involving nature-based climate solutions and green infrastructure projects.

The construction industry faces its own set of challenges. BuildForce Canada's national report points to an aging workforce, pandemic-related exits of less experienced workers and apprentices, and an impending need for 171,850 workers by 2027 to meet construction demands (BuildForce Canada, 2022). However, provincial mobility, expected retirements (estimated at 156,000 workers), and the differing skill levels of incoming workers pose significant hurdles (BuildForce Canada, 2022).

The supply of available tradespeople and labourers is greatly affected by the registration and completion of apprenticeships. Recent trends in the Red Seal Trade Program Enrollments (see Table 11) show that fewer people have enrolled in trade programs over the last five years. Alberta has experienced a significant decrease in enrollment numbers in trade programs that provide training related to nature-based climate solutions and green infrastructure projects in various industries.

A crucial factor affecting the availability of tradespeople and labourers is the declining enrollment in apprenticeship programs, particularly noticeable in Alberta. Enrollment in programs relevant to nature-based climate solutions and green infrastructure projects across various industries has seen a marked decrease over the past five years.

Table 11. *Shifts in Enrollments: 5-Year Trends in Red Seal Trade Programs*

For technical occupations, recent data shows a 6.1% decline in graduates from Canadian Engineering

	ALBERTA			BRITISH COLUMBIA		
	2016	2021	5-year change	2016	2021	5-year change
Construction electrician	15,591	9,882	-36.6%	9,720	9,639	-0.8%
Carpenter	4,227	3,390	-19.8%	6,471	7,332	+13.3%
Plumber	5,016	3,741	-25.4%	4,107	4,827	+17.5%
Welder	8,709	4,707	-46.0%	2,007	1,221	-39.2%
Steamfitter/pipefitter	6,651	3,426	-48.5%	978	579	-40.8%
Heavy duty equipment technician	6,285	5,172	-17.7%	1,908	2,334	+22.3%

Source: Adapted from Statistics Canada. Table 37-10-0137-01 Number of apprenticeship program registrations in Red Seal trades DOI: **https://doi.org/10.25318/3710013701-eng**

Accreditation Board programs becoming licensed engineers in Canada (Engineers Canada/Ingénieurs Canada, 2023). Additionally, less than half, approximately 44%, of these graduates obtain the necessary licenses (Engineers Canada/Ingénieurs Canada, 2023) .

On a different note, there has been an uptick in post-secondary attendance in Alberta and British Columbia, especially in information technology (IT) and computer science (see Table 12). This trend might signal a favourable labour market for IT roles within various occupational groups like Technicians, Technologists, Engineers, Scientists, Managers, and Supervisors, considering expected labour shortages due to retirements across Canada.

Table 12. *Evolution of Enrollments by Program: 5-Year Trends in Post-Secondary Institutions*

	ALBERTA			BRITISH COLUMBIA		
	2015 / 2016	2020 / 2021	5-year change	2015 / 2016	2020 / 2021	5-year change
Business, management, and public administration	S30,510	34,500	+13.1%	45,654	51,975	+13.8%
Physical and life sciences and technologies	13,284	14,403	+8.4%	23,748	25,293	+6.5%
Mathematics, computer, and information sciences	5,604	9,117	+62.7%	9,933	15,285	+53.9%
Architecture, engineering, and related technologies	20,760	20,583	-0.9%	20,790	20,580	-1.0%
Agriculture, natural resources, and conservation	3,618	4,107	+13.5%	4,662	5,391	+15.6%

Source: Adapted from Statistics Canada. Table 37-10-0018-01 Postsecondary enrolments, by registration status, institution type, status of student in Canada and gender **DOI: https://doi.org/10.25318/3710001801-eng**

DEVELOPING TALENT: SUSTAINABLE WORKFORCE FOR NATURE-BASED CLIMATE SOLUTIONS AND GREEN INFRASTRUCTURE PROJECTS

Acquiring the necessary education and training enables individuals to adapt their existing skills and acquire new ones vital to subsectors for nature-based climate solutions and green infrastructure projects, meeting the rising demand in these fields. This adaptability is pivotal to address the workforce needs and sustainability objectives within nature-based climate solutions and green infrastructure projects.

Fostering a skilled workforce capable of driving nature-based climate solutions and green infrastructure projects is vital for a sustainable future. This section examines specialized skill sets crucial for nurturing a workforce. Understanding the interplay of these skill sets is essential in preparing a workforce that can effectively tackle challenges and seize opportunities in these critical sectors.

Additionally, the section explores proactive strategies for talent development and strategic planning. These initiatives serve as a compass, guiding the integration of nature-based climate solutions and green infrastructure into sustainable practices.

STRATEGIC SKILLS: TAILORING EXPERTISE FOR SUSTAINABLE GROWTH

Understanding the specific skill sets demanded by various industry sectors is pivotal. It is about more than just knowing the current requirements but also foreseeing future demands. This foresight is crucial for fostering a workforce capable of actively participating in sustainable development efforts and propelling us toward a more environmentally conscious economy.

Furthermore, the demand for specialized expertise is projected to stay consistently high. This demand emphasizes the importance of proactive strategies to anticipate and prepare for these skill demands. It is imperative to establish initiatives to cultivate and hone skill sets required to adapt to evolving needs of industries transitioning toward sustainability (refer to Table 13 for further details).

Table 13. *Specialized Skill Sets for Nature-based Climate Solutions and Green Infrastructure Projects Across Various Industry Groups*

INDUSTRY GROUP	SPECIALIZED SKILL SETS
Support Activities for Forestry Industry	**Adaptation to New Practices:** As the industry moves towards sustainability, there may be a need for workers skilled in ecological restoration, carbon accounting, geographic information systems, and remote sensing technologies
Support Activities for Mining and Oil and Gas Extraction	**Sustainable Expertise:** Demand may increase for professionals skilled in sustainable resource extraction, environmental impact assessment, and remediation techniques.
Other Heavy and Civil Engineering Construction	**Adaptability to Change:** Workers may need to stay updated with evolving construction techniques, sustainability standards, and technological advancements in the sector.
Management, Scientific, and Technical Consulting Services	**Diverse Expertise:** Consultants may need expertise in diverse fields such as environmental sciences, engineering, policy analysis, and project management to address varied client needs.
Remediation and Other Waste Management Services	**Environmental Expertise:** Expertise in environmental regulations, remediation techniques, and waste management practices will likely remain crucial for roles within this industry.

DEVELOPING EXPERTISE: EDUCATION AND TRAINING PATHWAYS

Education and training require a balanced approach that combines formal learning with hands-on experience to meet the growing need for nature-based climate solutions. This comprehensive strategy caters to the different requirements of various professions and is essential for those looking to succeed in occupations for nature-based climate solutions and green infrastructure projects.

Table 14 outlines educational pathways for different occupational groups. These pathways were created by analyzing relevant green infrastructure projects, emphasizing a combination of formal education and practical experience, including apprenticeships and on-the-job training. This approach recognizes the multifaceted nature of the field and the importance of balancing theoretical knowledge with hands-on practice to succeed in this growing sector.

Table 14. *Education Pathways Mapping: Sample Overview of Relevance to Various Occupational Groups*

OCCUPATIONAL GROUP	EDUCATION PATHWAY
Manual	Heavy Equipment Technician certificate Apprenticeships Advanced Welding Technology certificate Welding Engineering Technology Millwright Fundamentals Certificate Heavy Equipment Operator
Technical	Bachelor of Science in Engineering Bachelor of Science in Biology Conservation Biology Bachelor of Science in Civil Engineering Bachelor of Science in Mechanical Engineering Bachelor of Technology in Construction Management Power Engineering
Managerial	Master of Business Administration (MBA) Bachelor of Business Administration (BBA) Bachelor of Commerce Logistics and Supply Chain Management Bachelor of Applied Science: Environmental Management

Focusing on proactive talent development and strategic planning will be crucial to navigate these changes. These strategies can guide industries toward sustainable practices and harness the potential of nature-based climate solutions and green infrastructure.

Table 15 illustrates the strategic training requirements for nature-based climate solutions and green infrastructure projects across diverse industry sectors. The training emphasizes continuous learning, adaptability to evolving circumstances, technical expertise, adeptness in adopting new technologies and adapting to regulatory changes, and flexibility in response to market dynamics. It outlines future competencies for professionals engaging in nature-based climate solutions and green infrastructure projects, fostering resilience and preparedness within various industry groups.

Table 15. *Strategic Training for Nature-based Climate Solutions and Green Infrastructure Projects Across Industry Groups*

STRATEGIC TRAINING	INDUSTRY GROUP
Support Activities for Forestry Industry	**Continuous Learning:** In forestry, it may be necessary to engage in continuous training to stay current with changing environmental regulations, technological advancements, and evolving industry standards.
Support Activities for Mining and Oil and Gas Extraction	**Adaptability to Change:** Workers in this industry may need to adapt to changing roles, requiring retraining in new technologies, environmental regulations, and sustainable practices.
Other Heavy and Civil Engineering Construction	**Technical Proficiency:** Growing demand for skilled labourers with expertise in heavy construction and technical trades suggests a need for specialized training in sustainable construction practices and green technologies.
Management, Scientific, and Technical Consulting Services	**Adaptability and Innovation:** Ability to adapt to changing regulations, integrate new technologies, and propose innovative solutions will likely be crucial for consultants in this sector.
Remediation and Other Waste Management Services	**Adaptability to Market Changes:** Flexibility and the ability to pivot strategies in response to resource extraction or regulatory environment changes will be vital for industry success.

FINAL THOUGHTS – ALBERTA AND BRITISH COLUMBIA'S WORKFORCE FOR SUSTAINABLE SOLUTIONS

As we explore the workforce shaping nature-based climate solutions and green infrastructure projects in Alberta and British Columbia, it is evident that these regions hold immense potential for sustainable development. The competitive landscape for skilled talent underscores the importance of diverse expertise in steering environmental initiatives forward.

Our research findings emphasize the critical need for a versatile workforce with skills spanning diverse sectors, from environmental science to construction. While the competition for these skilled workers is steep, the adaptability of these skill sets bodes well for the rapid integration of talent into nature-based solutions and green infrastructure projects. As Alberta and British Columbia navigate the intersection of economic growth and sustainable development, a well-equipped and agile workforce emerges as a critical asset in steering toward a sustainable and resilient future.

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APPENDIX A: RESEARCH APPROACH & METHODOLOGY

The study focused on labour market research related to nature-based climate solutions and green infrastructure projects in Alberta and British Columbia, covering:

- Demand analysis about key occupations, skills, emerging trends and technology required for nature-based climate solutions.
- Supply analysis to natural resource sectors, communities, and workers seeking to transition to nature-based climate solution sectors.

The research aimed to create a clear framework defining the scope of research on the demand and supply of workers in nature-based climate solutions related sectors.

The demand-side definitional framework was designed to identify the most critical sectors and subsectors with the most significant funding and job prospects. The following guiding questions guided the design:

- Does the work relate to natural or green infrastructure?
- Does the work contribute to community resiliency or climate adaptation?
- Are there active or upcoming projects with major funding commitments in Western Canada?
- Could the key occupations relate to the skills of current workers in the natural resource sectors?

The supply-side definitional framework progressed to examine 42 occupations identified in the demand-side analysis, supported by secondary information from Alberta's Occupational Outlook, 2021 – 2030 and British Columbia Labour Market Outlook, 2021-2031 Forecast. 2021 Edition.

An in-depth examination of standard occupational descriptions provided insights into transferable skills and pre-qualifications relevant to nature-based climate solutions sectors. The following questions guided the analysis:

- What type of skills in the are most relevant to natural infrastructure?
- Which sectors and workforce segments are most relevant to green infrastructure opportunities?
- Which workforce segments are most ready to transition to green infrastructure work?
- Where are there gaps in required skills? What training could help fill those gaps?
- What is the value proposition for workers investing in reskilling and seeking a new career?
- What support may be needed to adjust to different workplace or industry cultures?

Primary research involved key informant interviews and an employer-focused survey with 38 respondents. Outreach targeted organizations capable of providing additional insights into the challenges faced by workers and job seekers, along with general labour market trends in the nature-based climate solutions space. The data validated existing insights and uncovered new perspectives regarding workforce segments and the sector.

APPENDIX B: FUNDING PROGRAMS FOR NATURE-BASED CLIMATE SOLUTIONS AND GREEN INFRASTRUCTURE PROJECTS

The demand-side analysis offers an overview of federal and provincial-funded programs. These programs aim to support nature-based climate solutions and green infrastructure projects. This non-exhaustive list includes various programs and corresponding projects, each aligned with one of the five subsectors in Alberta and British Columbia.

COASTAL RESTORATION

Restoring coastal areas plays a crucial role in adapting to climate change by addressing issues like floods, erosion control, and rejuvenating marine ecosystems. In British Columbia, numerous ongoing projects focus specifically on promoting and implementing coastal restoration efforts.

	PROGRAM	PROJECT, examples
Coastal Restoration Fund	Fisheries and Oceans Canada unveiled a 5-year $75 million Coastal Restoration Fund in May 2017 (ended 2022), with a critical goal to restore at-risk coastlines and preserve fragile ecosystems and marine habitats. By 2022, this initiative will have allocated $70.5 million across 64 projects spanning all coastal areas, with $26.8 million explicitly designated for 25 projects in British Columbia.	Projects supported by this program encompass various endeavors such as rehabilitating the 14.5-hectare **Tom Berry Gravel Pit – Largescale Salmon Restoration Project**, enhancing habitat connections in the Fraser River estuary, and formulating a comprehensive restoration plan for the Lower Fraser River.
Coastal Environmental Baseline Program	This program supports various activities, including fieldwork, lab analyses, technical training, local job creation, and acquiring scientific equipment. Up to 2021, it backed 60 initiatives across Canada in collaboration with 40 partners, providing an annual financial contribution exceeding $4.6 million to these partner-led projects.	The program has facilitated assessments of the coastal ecology in the Skeena River Estuary **(in the Port of Prince Rupert)** and the **Port of Vancouver area.** About nine projects in British Columbia have received funding via this program, primarily concentrating on gathering data about the coastal ecosystem and evaluating how port-related activities affect marine water quality.
Aquatic Ecosystems Restoration Fund (AERF)	This fund, part of the National Oceans Protection Plan, enhances aquatic restoration. To tackle the root causes affecting coastal and marine habitats, the AERF commits $75 million over five years (2022 – 2027). It is a revamped and enlarged version of the Coastal Restoration Fund (2017 - 2022).	The **Cowichan Estuary Restoration Project** in British Columbia is receiving funding from this program (2023 to 2027). Located within the traditional territory of the **Quw'utsun people (Cowichan Tribes)**. **Estuary Resilience** aims to restore 70 hectares of marsh habitat by removing human-made barriers and reconnecting freshwater channels to areas affected by tides. This restoration work aims to resume natural estuarine processes, restore fish and wildlife habitat, enhance ecosystem function, and increase estuarine resilience in the face of climate change.
Oceans Management Contribution Program	This program under Fisheries and Oceans Canada allocates $145 million over five years for communication, monitoring, and stewardship projects. These initiatives aim to achieve the Government of Canada's marine conservation objectives.	This program supports several noteworthy projects: the **Coastal Restoration Society** training program focused on marine conservation and restoration, the **Cortes Island Community Foundation** and its **Cortes Island Academy** initiative to enhance youth ocean science literacy, and the University of Victoria's project monitoring marine protected area networks.
Clean Coast, Clean Waters Initiative	Funded by the Government of British Columbia, this program invested around $18 million across nine projects, providing funding ranging from $300,000 to $3.5 million to applicants. Its goal is to assist in cleaning up marine shorelines and removing abandoned vessels in coastal towns of British Columbia.	This initiative supports projects such as the **Coastal Restoration Society's** plan to clear approximately 400 kilometres of coastline, aiming to create 150 job opportunities. Another project focuses on removing 30 derelict vessels, potentially generating up to 80 jobs. The **Ocean Legacy Foundation's** initiative also aims to clear debris from about 400 kilometres of shoreline.
The Environmental Damages Fund (EDF)	This federal fund is a special account managed by Environment and Climate Change Canada that channels funds from fines, court orders, and voluntary payments to critical projects that will enhance Canada's natural environment. The goal is to finance initiatives that rectify harm to the natural environment while also supporting the conservation of wildlife in a cost-effective manner. Fines that are directed to the EDF are used to finance projects that prioritize the following four categories: restoration, enhancement of environmental quality, research and development, as well as education and awareness.	**Resilient Coasts for Salmon: Nature-based Solutions for Climate Change** • A collaborative project launched in 2021 by **Pacific Salmon Foundation** and the **Stewardship Centre for British Columbia** received $1.9 million from **Climate Action and Awareness Fund** to carry out a five-year initiative to increase awareness about effects of climate change and shoreline development. The project also seeks to provide Green Shores training and promote stewardship on the shorelines of the southern and eastern coastlines of Vancouver Island.

FORESTRY

Forestry funding programs are essential for maintaining the health of forest ecosystems. These programs prioritize climate adaptation, wildfire management, and protecting biodiversity and species at risk. They provide vital support for the sustainable management of forest resources in Alberta and British Columbia. These initiatives also emphasize the importance of financial support for conservation, community resilience, and restoration of forest ecosystems, as well as the need for involvement from local and Indigenous communities.

	PROGRAM	PROJECT, examples
Community Resiliency Investment (CRI)	In British Columbia, the CRI program, which includes the **Crown Land Wildfire Risk Reduction** (CLWRR) and **FireSmart Community Funding and Supports** (FCFS), is a major endeavour. With a $60 million initial investment, the FCFS program helps local governments, including First Nations, carry out FireSmart initiatives that are backed by the BC FireSmart Committee. This program has provided 194 First Nations and local governments with financial support since its establishment.	FCFS program focuses on various areas, such as preventing the accumulation of combustible materials in high-risk locations, educating the public, developing new skills, implementing FireSmart practices on private land, updating community plans, and managing fuel. CLWRR program supports initiatives on provincial Crown land and has invested over $36 million in its first three years. Two BC Parks-approved Wildfire Risk Reduction (WRR) projects in the Kootenay Okanagan region are the Silver Star WRR and Manning Park WRR Prescription Development.
The Forest Resource Improvement Association of Alberta (FRIAA) - FireSmart Program	The FRIAA FireSmart Program in Alberta has funded 417 projects since its inception. The program aims to reduce the risk of fires across the province and protect the people, their homes, businesses, and communities. The program has allocated $3.2 million in funding for local communities in 2021-2022 and has committed an additional $3.7 million. This funding helps communities to lower wildfire hazards in their respective areas.	Projects include conducting assessments for wildfire prevention, creating policies to prevent wildfires in lake resort areas, and organizing educational programs for communities to increase awareness about wildfire risk reduction. FRIAA Review Committee **approved 47 projects for 2023 – 2024 year.** Projects include updating wildfire hazard/ risk assessments, wildfire mitigation strategies, and vegetation management.
Parks Canada - Conservation and Restoration (CoRe) Program	CoRe projects supports high-priority initiatives that support ecological sustainability, the preservation or restoration of ecological integrity, and the recovery of threatened species. The majority of the projects involve managing invasive species, restoring grasslands, reintroducing species into protected heritage regions, and restoring mountain park ecosystems through the use of prescribed fires.	**SKŦÁMEN QENÁL,ENEC SĆA - Sidney Island Ecological Restoration Project** Since 2018, Parks Canada has collaborated with various partners to develop and execute this forest restoration project for SKŦÁMEN (Sidney Island). The project's primary goals are to restore the native vegetation while removing invasive plant species, eliminate the invasive European fallow deer population, and sustainably manage the native black-tailed deer. The partners involved in the project include the **WSÁNEĆ Leadership Council** (representing **Tsartlip First Nation** and **Tseycum First Nation), Tsawout First Nation, Pauquachin First Nation,** Sidney Island residents, **Islands Trust Conservancy,** and the Province of British Columbia.
Crown Land Wildfire Risk Reduction (CL WRR)– British Columbia	In 2018, the government introduced the Community Resiliency Investment (CRI) Program to reduce wildfire risk in high-risk landscapes. The CRI program led to the Crown Land Wildfire Risk Reduction (CLWRR) program, which funds fuel treatments on high-risk Crown land near communities or critical infrastructure. Since then, $36M has been invested in provincial Crown land projects, covering 42 tactical plans, 11,000 hectares in prescription development, and 5,000 hectares in operational treatments, including fully funded cultural and prescribed fire projects.	**Ten main project regions.** Example of three projects: • WRR Treatments within 100 Mile Community Forest • Xaxli'p Community Forest WRR Treatment • Westview Estates WRR

MINING

Implementing reclamation programs for mined lands and undertaking projects focused on climate adaptation within these areas to promote nature-based climate solutions in the mining industry is crucial. The financing programs listed below support these initiatives in Alberta and British Columbia.

	PROGRAM	PROJECT, examples
Clean Growth Program	From 2018 to 2022 this program funded a total of $155 million over the course of four years in 43 clean technology research and development and demonstration projects in the following three industries: energy, mining, and forestry.	**Permanent Aquatic Storage Structure (PASS) Demonstration Pit Lake Research Project** • Project goal to boost oil sands sector's reclamation efficiency through reduction of land disturbance, speeding up closure schedules, mitigation of air impacts, and improvement of water quality in pit lakes. **BIOSALIX - Mine Reclamation using Fabricated Soils and Organic Residuals to Augment Soil Quality** • land reclamation project using municipal biosolids and organic waste to improve soil and grow fast-growing willow wood biomass on the reclaimed land. The wood biomass crop is used for clean energy, reclamation, and bioproducts
Alberta Innovates - Land and Biodiversity Program	This program contains subprograms for environmental monitoring, cleanup and restoration of Oil Sands Tailings, climate adaptation, and a fresh initiative for reclaiming abandoned wells.	**Operational Scale Legacy Restoration Efforts in an Operating Forest Management Area** • To evaluate several aspects of forest regeneration on reclaimed industrial sites that had previously been treated to address soil compaction and a lack of tree canopy development. **Assessing Wetland Reclamation in Alberta Oil Sands Region** • to verify a reclamation assessment approach that determined the environmental thresholds at which stress in young wetlands caused alterations in the biota (bioindicator scores).
Environment and Climate Change Canada - Environmental Damages Fund (EDF)	Directs funds received from fines, court orders and voluntary payments to priority projects that focus on restoration, environmental quality improvement, research and development and education and awareness. Purpose is to fund projects that restore damage to the natural environment and support wildlife conservation.	Removal of Mineral Footprint and Restoration of Ecohydrological Functions of Freshwater Peatlands • Funding was provided to the **Centre for Boreal Research**, Northern Alberta Institute of Technology for this project, which attempted to clean up the mineral footprint left behind by in-situ oil and gas operations in Northern Alberta. **Assessing Medium-term Environmental Damage and Recovery of Quesnel Lake** • Funding was granted to the **Quesnel River Research Centre** at the University of Northern British Columbia for the purpose of conducting an assessment of the environmental impact and recuperation of Quesnel Lake, subsequent to the Mount Polley Mine Tailings Pond breach.

OIL AND GAS

Effective waste and water resource management and climate adaptation measures are crucial to addressing climate change challenges in the Alberta and British Columbia oil and gas industry. Funding initiatives support sustainable practices and nature-based climate solutions. The emphasis on waste and water management and climate adaptation demonstrates proactive measures taken to address climate change challenges.

	PROGRAM	PROJECT, examples
Petroleum and Natural Gas Legacy Sites Restoration Program	The Petroleum and Natural Gas Legacy Sites Restoration Program (PNG LSRP) is a partnership between the Province of British Columbia and the oil and gas industry. Its goal is to address landscape management challenges caused by historical and legacy oil and gas activities in northeast British Columbia. $6.5 million is set aside to restore these sites. Several projects have restored seismic lines and other disturbed areas, ultimately contributing to environmental rehabilitation.	Since 2020, BC and the petroleum and natural gas industry jointly funded the restoration of 154+ km of historic or legacy PNG activities in northeast BC. This program was a trial run to advance restoration in ways meaningful to Treaty 8 First Nations. Nine projects received PNG LSRP funding for one or more restoration phases: pre-treatment inventory and planning, treatment implementation, and performance monitoring. **BC Oil and Gas Research and Innovation Society** (BC OGRIS) manages program funds to support **restoration projects.** **Groundbirch-Brassey Restoration Program** • Aski Reclamation LP and Silverberry Pro collaborated on the PNG Legacy Site Groundbirch-Brassey Restoration Program for 32km seismic line revegetation using live stakes and eco-cultural seedlings. **Nachii Adaage Area Restoration Project** • West Moberly-DWB LP received funding from BC OGRIS and completed Phase 1 (planning) in the Nachii Adaage study area, located east of Tumbler Ridge, BC and chosen by West Moberly First Nations within Treaty 8 Traditional Territory. This project aimed to assess seismic lines and well access roads in the study area, identify sites for restoration, and develop restoration plans for each feature. Indigenous groups and stakeholders provided input.
Site Rehabilitation Program - Alberta	This federal grant ($1 billion) program was an initiative that enabled oil field service contractors to carry out restoration work on wells, pipelines, and oil and gas sites. Its primary objectives were to get Alberta's skilled oil and gas workforce employed again as soon as possible, expedite site abandonment and reclamation activities, and efficiently complete a significant amount of environmentally important work.	**As of April 28, 2023:** 34,636 applications approved and work completed: • Abandonment: 17,514 applications • Phase 1 environmental site assessments: 3,522 applications • Phase 2 environmental site assessments: 4,571 applications • Reclamation: 8,165 applications • Remediation: 1,794 applications.
Dormant Sites Reclamation Program	This program, funded by the federal government's COVID-19 Economic Response Plan, remediates inactive oil and gas wells in British Columbia. With $100 million in funding, it had approved the restoration of over 5,000 oil and gas sites, offering financial assistance to contractors.	Approximately 119 companies in BC, with a combined financial contribution of around $91.4 million, were successful applicants. These approved companies were authorized to work on a total of 4,986 sites.

WATERSHED RESTORATION

Watershed restoration efforts are crucial for community resilience and align with nature-based climate solutions in Alberta and British Columbia. Below are funding programs and projects in these provinces that emphasize resilience against floods and droughts, along with effective erosion and sediment control measures. The highlighted funding initiatives offer a diverse range of activities, such as assessing the functions of the riparian area, creating rain gardens, constructing off-stream reservoirs, and improving wetland management.

	PROGRAM	PROJECT, examples
Watershed Resiliency and Restoration Program (WRRP)	Alberta Environment and Parks introduced this program in 2014. The main objective is to improve the natural ability of watersheds to lessen the effects of floods and droughts. The program implemented various measures to mitigate the impact on watersheds to accomplish the program's objective. Between 2019 and 2020, the government of Alberta provided financial support to 31 projects led by external partners. The total funding approval amounted to $4.2 million, with an average of $141,000 per project. For 2023 and 2024, the government has committed to providing $7 million in financial support for eligible initiatives led by external partners.	**Pembina River Watershed Shorelines Project** • The **Athabasca Watershed Council** is managing this project with the aims to enhance the resilience of this watershed by conducting riparian habitat assessments, implementing educational initiatives, initiating restoration efforts, and executing conservation projects. Ultimately, contribute to the broader objective of improving flood and drought resilience in the region.
The Wetland Replacement Program (WRP	This program aims to replace wetlands in all municipalities and watersheds throughout Alberta. Priority is to watersheds that have lost the most wetlands since 2015 and areas with a history of high loss rates. The program works towards this goal by collaborating with municipalities and non-profit organizations that share an interest in wetland replacement (restoration or construction). These partners assist private or public landowners in achieving mutual wetland replacement and conservation goals.	**Project highlights** • County of Grande Prairie is working on restoration and construction to improve water quality of Saskatoon Lake and wildlife habitat within Trumpeter Swan Buffer area. Involves restoring and modifying existing dugouts, as well as creating ribbon wetlands along eroded drainage ditches. • **Lockend Lake (Rocky View County)** Ducks Unlimited in partnership with Alberta Conservation Association restored a ditch plug on a historical ditch to increase flood storage protection and provide critical habitat for wildlife.
Disaster Mitigation and Adaptation Fund (DMAF)	In 2018, the Canadian Government launched the DMAF, committing $2 billion over ten years to support projects that aim to strengthen communities' resilience to natural disasters caused by climate change. The 2021 budget has allocated $1.375 billion to renew the DMAF program for 12 years, with at least $138 million specifically designated to benefit Indigenous recipients.	**Spring Bank Off-Stream Reservoir** • To protect Calgary and surrounding communities from floods along the Elbow River. The project (2021-2025) is part of a comprehensive flood mitigation system designed to work with Calgary's Glenmore Reservoir. The aim: to enable the reservoir to manage water volumes equivalent to those seen during the 2013 flood. The goal: to reduce the risk of flooding by regulating downstream river flow rates and volumes while preserving the river's integrity and protecting critical habitats and wildlife.
The Healthy Watersheds Initiative (HWI)	As part of the B.C. Economic Recovery Plan, the Province of British Columbia set aside $27 million in stimulus funding for over 60 pre-selected projects. The Real Estate Foundation of British Columbia manages this funding through the Healthy Watersheds Initiative (HWI). In 2021, 61 projects received funding totalling $24.7 million, with an average allocation of $405,000. These projects have the potential to create 957 job opportunities across the province.	**Wetland Workforce** The **B.C. Wildlife Federation** is working with First Nations and conservation organizations to enhance the condition of wetlands in British Columbia. This collaboration involves restoring, stabilizing, and monitoring these vital ecosystems, leading to better inventory tracking, management, and decision-making and supporting over 100 jobs through this project, with workers receiving training in the **Wetlands Ecosystem Services Protocol** and Wetland Inventory.

APPENDIX C: OCCUPATIONS IN DEMAND FOR NATURE-BASED CLIMATE SOLUTIONS AND GREEN INFRASTRUCTURE PROJECTS

Table C1 provides a comprehensive overview of sectors and subsectors, outlining occupations common for nature-based climate solutions and green infrastructure projects. It underscores the potential for workers in these occupations to find employment across many different types of nature-based climate solutions and green infrastructure activities and the challenge faced by employers seeking workers for these projects.

Table C1. *Occupational Mapping for Nature-based Climate Solutions and Green Infrastructure Projects: Aligning Diverse Roles with Evolving Demands and Skill Sets.*

OCCUPATION - NATIONAL OCCUPATIONAL CLASSIFICATION (NOC) CODE	COASTAL RESTORATION – CLIMATE ADAPTATION	COASTAL RESTORATION – FLOOD PREVENTION & HABITAT RESTORATION	FORESTRY - CLIMATE ADAPTATION WILDFIRE	MINING AND OIL AND GAS –LAND RECLAMATION	MINING AND OIL AND GAS – LAND REMEDIATION	WATERSHED RESTORATION – EROSION AND SEDIMENT CONTROL	WATERSHED RESTORATION – FLOOD AND DROUGHT RESILIENCY
MANAGERS and SUPERVISORS							
Senior managers – construction, transportation, production, and utilities (00015)	X	X		X	X	X	X
Supervisors, supply chain, tracking and scheduling coordination occupations (12013)					X		
Engineering managers (20010)	X		X	X		X	X
Contractors and supervisors, other construction trades, installers, repairers, and services (72014)				X	X	X	X
Contractors and supervisors, heavy equipment operator crews (72021)	X	X	X	X	X	X	X
Managers in natural resources production and fishing (80010)	X	X	X	X	X	X	X
Managers in horticulture (80021)				X			
Supervisors, logging, and forestry (82010)			X	X		X	
Supervisors, mining, and quarrying (82020)				X	X		
Contractors and supervisors, oil, and gas (82021)				X	X		
TECHNICIANS, TECHNOLOGISTS, ENGINEERS and SCIENTISTS							
Biologists and related scientists (21110)	X	X		X		X	X
Geoscientists and oceanographers (21102)	X	X			X	X	
Forestry professionals (21111)			X	X		X	
Civil engineers (21300)	X	X				X	X
Mechanical engineers (21301)	X	X				X	
Electrical and electronics engineers (21310)		X					X
Mining engineers (21330)				X			
Geological engineers (21331)				X		X	X
Geological and mineral technologists and technicians (22101)				X	X		
Biological technologists and technicians (22110)	X	X		X		X	X
Forestry technologists and technicians (22112)			X	X		X	
Landscape and horticultural technicians and specialists (22114)				X		X	
Technical occupations in geomatics and meteorology (22214)	X	X	X	X	X	X	X
Civil engineering technologists and technicians (22300)	X	X				X	X
Electrical and electronics engineering technologists and technicians (22310)							X
Power engineers and power systems operators (92100)		X					X
Central control and process operators, petroleum, gas, and chemical processing (93101)					X		
TRADESPEOPLE and LABOURERS							
Welders and related machine operators (72106)					X		
Construction millwrights and industrial mechanics (72400)	X	X	X	X	X	X	X
Heavy-duty equipment mechanics (72401)	X	X	X	X			
Heavy equipment operators (except crane) (73400)	X	X	X	X			
Construction trades helpers and labourers (75110)				X	X		
Oil and gas well drillers, servicers, testers, and related workers (83101)		X		X	X		
Logging machinery operators (83110)			X	X		X	
Oil and gas well drilling and related workers (84101)				X	X		
Chain saw and skidder operators (84110)			X				
Harvesting labourers (85101)				X		X	X
Agriculture and marine harvest labourers (85102)	X	X				X	X
Mine labourers (85110)				X	X		
Oil and gas drilling, servicing, and related labourers (85111)				X	X		
Landscaping and grounds maintenance labourers (85121)				X			
Logging and forestry labourers (85120)			X				

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