

RICHMOND CIRCULAR CITY STRATEGY



Cities and regions are where people, knowledge and ideas come together, where innovation is cultivated, and where most natural resources are consumed and waste generated. These dynamics position local governments at the heart of the circular economy transition.

In 2021, the City of Richmond joined the Circular Cities and Regions Initiative (CCRI), to be part of a one-year pilot to advance circular economy knowledge sharing and capacity in the Canadian local government sector. The Initiative was developed and delivered jointly by the National Zero Waste Council, the Federation of Canadian Municipalities, the Recycling Council of Alberta, and RECYC-QUÉBEC. Over the course of one year, the CCRI provided direct support, guidance and a peer-to-peer exchange for a group of 15 cities and regions as they take steps to become more circular.

By working with cities and regions of different sizes, different local contexts and at different stages of readiness, the CCRI tested and prototyped training, tools, and guidance that will be most helpful in scaling innovative place-based circular economy policies, programs and services.

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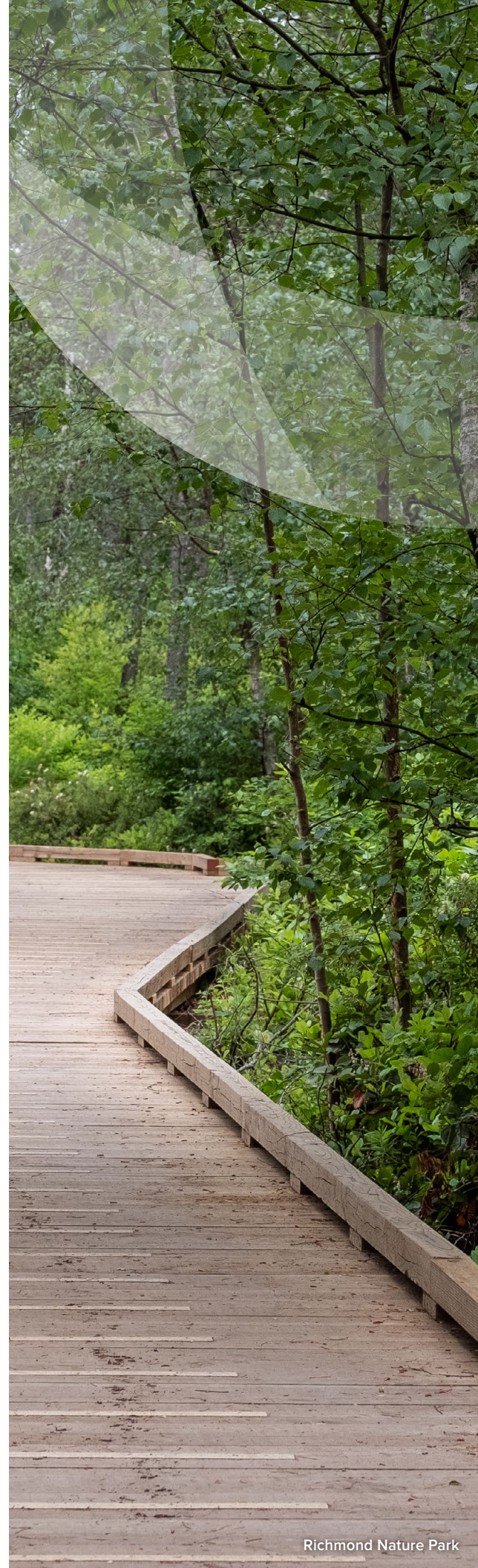
The circular economy is a systems-focused approach encompassing materials and energy flows, products and services value chains and actors across different sectors, offering a new model for innovation and integration between natural ecosystems, businesses, our daily lives, and waste management. This circular way of doing business decouples materials use from social and economic growth to generate prosperity, jobs, and resilience while reducing biodiversity loss, greenhouse gas emissions, waste, and pollution.

No one actor is responsible for the circular economy, and therefore is everyone's responsibility. This Strategy identifies directions and actions that the City will work in partnership with institutions, governments, businesses, non-profit organizations to move toward the local circular economy.

This Strategy places the City at the forefront of enabling a transition to a circular economy by integrating new and existing policies, building capacities, collaborating and engaging stakeholders, and stimulating innovation and participation across the food system, business, mobility, built environment and materials management sectors.

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STRATEGY-AT-A-GLANCE



This Strategy outlines a framework that will guide Richmond's transition to a circular economy.

The Richmond Circular City Strategy is an ambitious plan that is guided by a 25-year long-term vision. The Strategy has no precedent in North America, placing the City in a leadership position – a position that comes with the burden of navigating the unknown in the short term, developing best practices and processes, and seeking willing partners to support the transition to a circular city.

By following the Strategy's principles, directions, goals, and actions, the City and its partners will be able to achieve progress and results towards Richmond's vision of a circular city that maximizes the value of resources, by design, through responsible consumption, minimizing waste and reimagining how resources flow in a sustainable, equitable, low-carbon economy.



THE RICHMOND CIRCULAR CITY STRATEGY IS ALIGNED WITH CITY PLANS

The action-based approach of this Strategy is aligned with the goals as specified in the plans, strategies, programs and policies below, but is not redundant. Circular economy is about the flow of resources, materials, nutrients, products and energy. The actions in the Strategy augment the City work through an expanded focus on these flows.



- 5-Year Tourism Plan
- Agricultural Viability Strategy
- Barn Owls Nest Box Program
- Bat Friendly Community Recognition
- Biweekly Garbage Cart Program
- Blue Box/Blue Cart Programs
- City Centre Transportation Vision
- Community Energy & Emissions Plan 2050
- Cultural Harmony Plan
- Farming First Strategy
- Flood Protection Management Strategy
- Ecological Network Management Strategy
- Enhanced Pesticide Management Program
- Green Cart Program
- House Moving and Salvage Program
- Industrial Land Intensification Initiative
- Integrated Rainwater Resources Strategy
- Invasive Species Action Plan
- Litter Collection Program
- Large Item Pick Up Program
- Resilient Economy Strategy
- Official Community Plan
- Park and Open Spaces Strategy
- Partners for Beautification
- Poverty Reduction Plan
- Public Spaces Recycling Program, Event Recycling, Facilities Recycling
- Procurement Policy
- Reclaimed Asphalt Pavement Pilot Project
- Richmond Business Development Program
- Richmond Food System Action Team
- Richmond Food System Assessment 2006
- Richmond Foodland Report 2013
- Richmond Garden Club
- Richmond Local Food Map
- Richmond Nectar Trail
- Richmond Pesticide Management
- Riparian Areas Regulation Response Strategy
- Single-Use Plastic and Other Items Bylaw No. 10000
- Tree Management Strategy
- Wellness Strategy

MOVING FROM A LINEAR TO A CIRCULAR ECONOMY

BEYOND PLANETARY BOUNDARIES

We need natural resources to sustain our economy, prosperity and well-being.

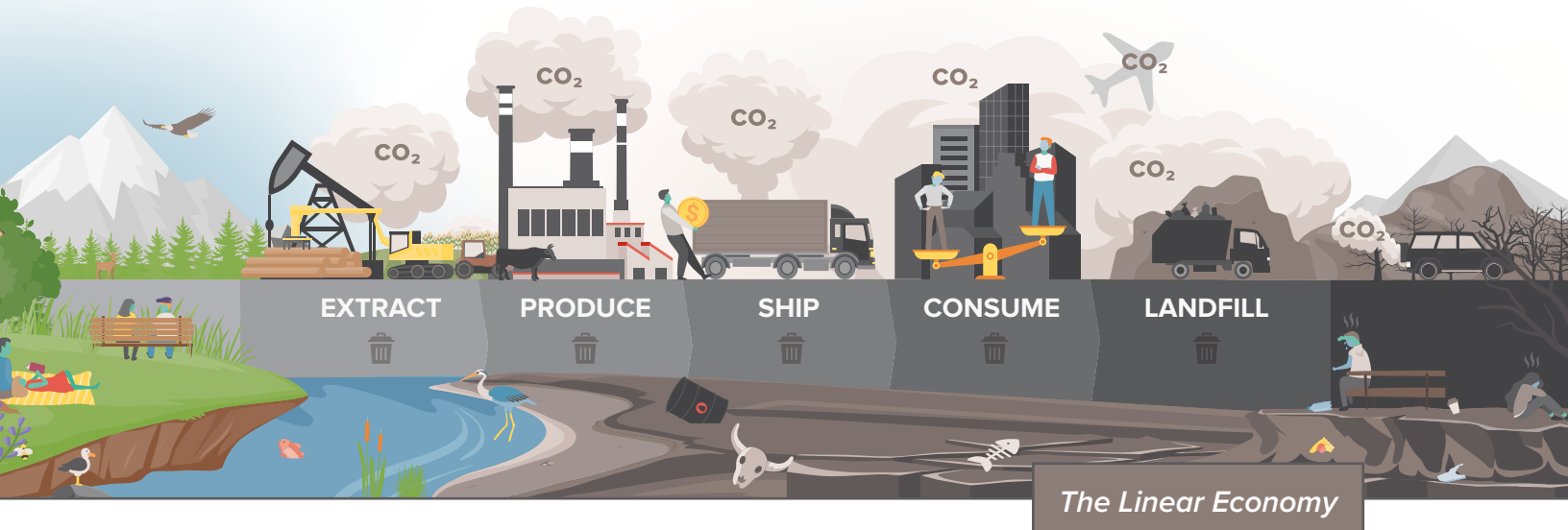
The current economy of “take-make-use-dispose” is called the linear economy, meaning things are made from virgin raw materials, used for a short period of time, and then disposed.

The biological capacity available per person on Earth is 1.6 global hectare (gha per capita). An ecological deficit occurs when the demand for natural resources exceeds the biocapacity of the planet. Our current footprint in Canada -demand for natural resources- is 8.1 gha which indicates that we need 5.1 planets to satisfy our needs. Coupled with existing waste disposal models, the over-exploitation of natural resources has led to environmental problems such as soil contamination, lost natural capital, human health problems and climate change.



Canada’s current ecological footprint (8.1 gha) would require 5.1 planet earths.

To narrow virgin raw material needs by 2050 and achieve 2030 climate commitments requires at least doubling the current portion of resources that re-enter the circular economy.



LIVING WITHIN PLANETARY BOUNDARIES

The implementation of the circular economy emerges as a counterpoint to the linear economy by closing resource loops. This model combines economic growth with a development cycle that preserves and enhances natural capital, optimizes resource production and minimizes risk through the management of limited resources and renewable loops. A circular economy, in essence, uses as few new resources as possible.

The City of Richmond’s vision for a circular economy is to maximize the value of resources, by design, through responsible consumption, minimizing waste and reimagining how resources flow in a sustainable, equitable, low-carbon economy.

Additionally, it has the potential to enable companies to reduce production costs and losses, generate new sources of revenue and reduce their dependence on natural raw materials. A circular economy strategy maintains the highest value of products and materials as long as possible to conserve critical resources, prevent waste generation, and reduce the emissions from the production of goods and services.



Wild native Yarrow

Richmond offers a diversified land use with 409 ha (1,011 acres) of industrial space, comprising 21% of Metro Vancouver’s regional inventory, and 4,993 ha (12,338 acres) of Agricultural Land Reserve with 189 farms, representing 39% of the city’s total land base. The park system consists of more than 200 acres of recreational trails and over 145 parks spread across over 1950 acres.

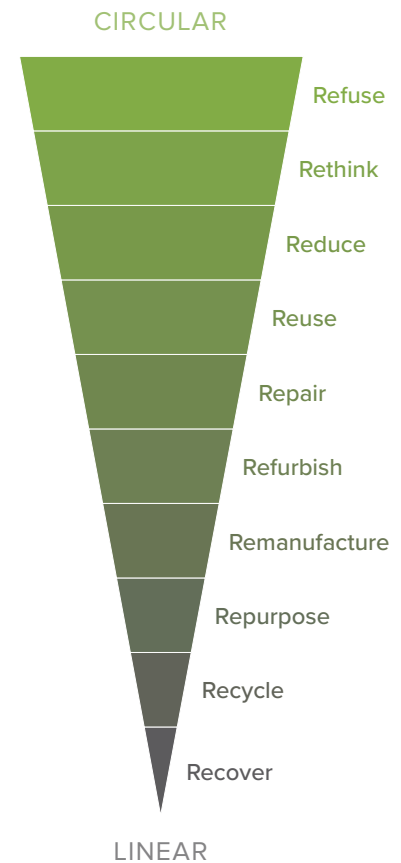


Figure 1: Circularity Ladder. We propose a circularity ladder, so called R-ladder. A variety of R-models are used to extend circular strategies, ranked in priority order. The R-ladder can be seen as a hierarchy where the highest possible step would be more ideal for a circular strategy.



Richmond North-Arm Dike

Circular cities create opportunities for a new urban future - one connected with our planet, communities, and our wealth in service of prosperity and equity in a world of finite resources. Cities and governments are moving away from a linear economy.

Moving to a circular economy will bring with it exciting opportunities to address systematic changes. The City has demonstrated leadership in sustainable development through innovative policies, programs, and services shaped

by community and stakeholder participation. Adding a circular economy focus to the City's work will contribute to achieving sustainable development, mitigating climate change, conserving natural resources, and improving the state of the environment, all while generating economic growth and jobs.

It is time to pivot to a new model of economic prosperity and adopt a holistic approach to the systemic transformation of communities.



Richmond South Dike

Regenerative production provides food and materials in ways that support positive outcomes for nature, including but not limited to healthy and stable soils, improved local biodiversity, and improved air and water quality. A regenerative building system uses low-carbon materials, reclaimed resources and nature-based solutions to provide better insulation, absorb rainwater, reduce air pollutants, and create habitats for wildlife.

PRACTICAL PRINCIPLES TO DRIVE CHANGE

The Strategy is built on the circular economy principles supported by the City to strengthen the systemic transformation from a linear to a circular economy.

The City has started using circular economy criteria in various ways, guided by the following principles:

- Design clean
- Keep using
- Collaborate to co-create
- Regenerate
- Maximize value



GROWTH WITHIN PLANETARY BOUNDARIES FOR SOCIAL EQUITY

Canada is extracting natural resources 5.1 times faster than our planet’s regenerative biocapacity, placing citizens and communities at risk.

While a transition towards a circular economy does not guarantee a more equitable society, it provides an opportunity to achieve societal benefits such as poverty reduction, meaningful employment, and human well-being. An equitable transition can help ensure that the benefits (and risks) of the circular economy are equally distributed through society. The Richmond Circular City Strategy incorporates equity considerations to identify possible pathways for sustainability and outlines directions that are resource-efficient and people-centred.

BENEFITS OF A CIRCULAR ECONOMY

Richmond's circular transition will be achieved through active collaboration among different sectors and stakeholders, as well as national and international cooperation with all level of governments.

The benefits of moving to a circular economy include:

CAPACITY-BUILDING

Strengthening knowledge about the value of moving to the circular economy is crucial for the growth of businesses and entrepreneurs throughout the value chain, especially for specific key sectors such as tourism, food production and construction. Businesses and jobs related to the circular economy can gain new skills through development opportunities.

PROSPEROUS AND RESILIENT ECONOMY

Sustainable consumption models, closing (waste) material cycles, establishing collaborative partnerships among business sectors and regional stakeholders, and piloting innovative ideas are all critical to invigorate new and existing local business products and services.

COLLABORATION BETWEEN MULTIPLE STAKEHOLDERS

Multi-stakeholder cooperation is essential to encourage and support residents, businesses, non-profit organizations and institutions to participate actively in the circular economy as part of the transformation. The creation of a circular framework of collaboration tools and networking platforms will provide a common ground so that Richmond's small and large businesses can work together to implement circular economy practices.

FOSTERING INNOVATION

Circular business models can be used to accelerate innovation and benefit small and medium-sized businesses to engage in value-retention activities like repair, refurbishment, and re-manufacturing.

NEW GREEN JOBS

Studies have indicated that circularity has the potential to create jobs when businesses focus on low-carbon targets and circular sectors.

PROTECT AND RESTORE LOCAL ECOSYSTEMS

Solutions that utilize functioning ecosystems as natural infrastructure to provide ecological services for residents and the environment are expected to emerge.

REDUCE CARBON EMISSIONS

The circular economy can contribute to a 50% reduction in greenhouse gas emissions.



Recycling generates an estimated **36 JOBS** every 10,000 tonnes of "waste"



Reuse and refurbishment can create more than **250 JOBS** for every 10,000 tonnes of "waste"

A study assessing Canada's circular economy potential found the total gross domestic product (GDP) of industries assumed to have the capability to integrate secondary materials into circular practices such as refurbished or re-manufactured products in Canada was



CAD 277 BILLION which represented 14.7% of national GDP in 2016.

CHALLENGES OF A CIRCULAR ECONOMY

The global economy extracts roughly 84 billion tonnes of materials worldwide every year. This overwhelming demand for raw materials continues to increase due to growing prosperity and an equally growing world population. Richmond's critical challenges to move towards the circular economy include:

A KNOWLEDGE GAP

There is a general lack of local knowledge and data which is required for strategic planning and decision-making. Additionally, Richmond's case studies about circular business models and the results of their implementation are lacking.

SILOED SECTORS

Specialized suppliers often operate in silos that prevent industry cooperation. Cross-sectoral collaboration and taking a systems approach are required to achieve circularity.

LACK OF ECONOMIC INCENTIVES

Due to linear supply chains, low incentives, and a lack of practical information, businesses find it complex to adopt circular approaches and strategies.

SHORT-TERM FOCUS

Sectors are focused on short-term, fast, bottom-line results without considering long-term costs and benefits.

GROWING POPULATION

The demand for better infrastructure and energy is increasing as more people move to Richmond in search of better jobs, services, and culture.

CULTURE AND LIFESTYLE

In Canada, consumerism is the dominant culture, promoting overconsumption, discouraging the use of refurbished products and recycled materials, and preventing individuals from adopting circular practices.

LOW COST OF VIRGIN MATERIALS AND DISPOSAL

The Lower Mainland has low landfill and virgin material costs, limiting waste reduction and by-product materials.

SMALL BUSINESSES FACE HIGH INVESTMENT COSTS

Because the investment cost is high in some circular business models, small businesses with limited access to capital have difficulty funding long-term investments and uncertainty on adequate returns.

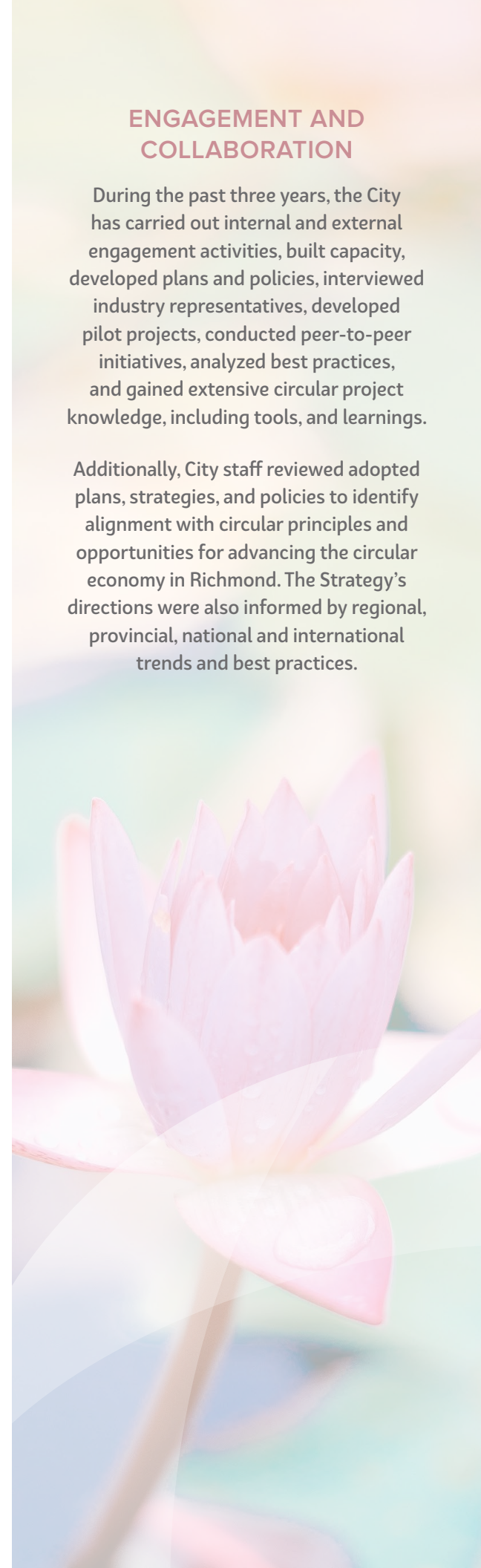
FINANCIAL RISK AND FEASIBILITY

The financial risk associated with new and innovative projects and their feasibility and a lack of clear economic incentives can hinder the adoption of circular approaches. Applying circular practices may pose short-term budgetary challenges, including the initial cost of implementing cutting-edge technology, the disruption of existing business models and material flows, and the need to secure funding and investment. Businesses may encounter challenges in selling or purchasing specific waste streams as by-products or obtaining pre-used materials for their processes due to the lack of suitable markets, users, suppliers, or sellers.

ENGAGEMENT AND COLLABORATION

During the past three years, the City has carried out internal and external engagement activities, built capacity, developed plans and policies, interviewed industry representatives, developed pilot projects, conducted peer-to-peer initiatives, analyzed best practices, and gained extensive circular project knowledge, including tools, and learnings.

Additionally, City staff reviewed adopted plans, strategies, and policies to identify alignment with circular principles and opportunities for advancing the circular economy in Richmond. The Strategy's directions were also informed by regional, provincial, national and international trends and best practices.





IMPLEMENTATION APPROACH

The following six key attributes guide our approach to strategy implementation.

OPPORTUNISTIC AND STRATEGIC

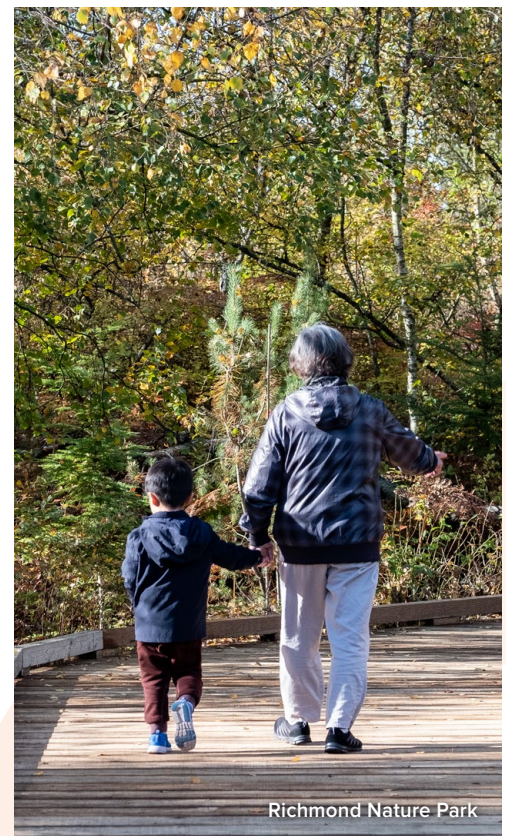
Becoming fully circular by 2050 will require a scale-up of activity. The City will take advantage of new opportunities that may arise over the years, with respect to new Federal and Provincial programs, expanded regulatory mandates, and emergence of 'break-through' technologies and approaches. Some actions will require comprehensive research and technical assessments before they can be considered for implementation.

A SET OF GUIDELINES, NOT A WORK PLAN

This document is not a detailed, phased work plan. Rather it is a blueprint that empowers the City and other actors to pursue opportunities when they are presented. This Strategy provides a sufficient level of guidance and definition so that implementation can be in the short, medium and long-term, while allowing flexibility to further refine or modify plan actions as needs arise, and developing detailed work plans as needed.

RESOURCES TO MATCH AMBITION

Sufficient resources will need to be assembled to match the scale of effort required by the Strategy. This includes identifying sources of external or partner funding, creating dedicated operating budgets for initiatives that span several years, including additional level funding requirements. Increased competency and knowledge capacity for sectors related to building electrification and decarbonization should receive high priority.



DRIVING MARKET TRANSFORMATION THROUGH COLLABORATION

Advancing the Strategy towards a circular economy will require taking advantage of collaboration and engagement opportunities between various sectors, actors, and stakeholders, as well as national and international cooperation with local governments. Collaboration has emerged as both an enabler and a necessity. To build trust and establish a foundation for collaboration, the strategy brings a comprehensive approach that allows an analysis of the current system, and enables stakeholders to work together to develop solutions to their specific needs. This approach allows stakeholders to come together to discuss data, identify areas of common need, develop capacity-building, benchmark opportunities and design pilot projects that are scaled and replicated, establishing a long-term framework for new policies and regulations.

EQUITABLE TRANSITION TOWARDS THE CIRCULAR ECONOMY

The Strategy acknowledges the opportunity to address not only environmental challenges but also social ones. With planet and people in mind, the Strategy can help us create an equitable space for all people in Richmond, including Indigenous people and First Nations, visible minorities, low-income households, women, seniors, new Canadians and persons with disabilities. To bring about true change, environmental goals need to be matched with social objectives.

DATA FOR DECISION-MAKING OR CIRCULAR ECONOMY THINKING

Monitoring the flow of materials and how they are used in society is essential to measuring Richmond's circularity throughout its metabolism. Material flow analysis produces visual maps which provide a holistic view of the input, throughput and output of resources, nutrients and energy within, or by sectors, and how these materials subsequently flow out of the sectors in the form of wastes and emissions. Since material flows are accounted for in mass, it is possible to identify the origins, stocks and leakages, as well as calculate embodied carbon. Based on the current trends of the resources use, the analysis is able to anticipate what material consumption and waste generation patterns could look like in 10 years if left unchanged. This can provide a useful baseline to compare the impact of circular scenarios, reveal economic opportunities directly linked to environmental impacts and provide technical data for decision making and planning, which would be helpful for prospective policy intervention.



STRATEGIC DIRECTIONS

SIX STRATEGIC DIRECTIONS TO ACCELERATE THE CIRCULAR ECONOMY IN RICHMOND



Richmond's six directions for achieving a circular city focuses on different resource flows by engaging a productive 'making' approach that empowers citizens, industry leaders and City's staff.

Each direction and its guiding actions focus on its own local topic, dynamic, cultural, social, economic, and technical challenges. The directions are a result of three-year comprehensive engagement activities, capacity-building actions, plan and policy development, industry interviews, pilot project development, peer-to-peer initiatives, best practices analysis and extensive project knowledge, tools, and learnings. They will guide many Richmond actors to co-create, test and implement circular practices within their local and regional context, fostering the transition towards a regenerative and circular city, providing valuable examples for other cities to engage in this necessary transition.

Six priority directions are defined to achieve the ambitions in the sectors in which the City has the most substantial impact. Progress in these areas will remove barriers that stand in the way of the transition to a circular economy.

The Strategy does not concern a particular industry, but instead proposes holistic actions to systemically change and benefit the entire community.

The progress in these six priority areas will be assessed qualitatively and quantitatively. Learning and findings will be used to improve this Strategy and design new initiatives. In this way, we will take concrete steps to accelerate Richmond's journey towards a fully circular city by 2050.

Businesses, academic institutions and research organizations, consumers, residents, and vibrant communities are all needed to achieve change. At the same time, there is still much to learn. The City's approach is a "learn-by-doing" that builds on the values of collaboration, innovation, resiliency, and adaptability. By following this approach, we can strike the right balance between being concise and remaining flexible to embrace circularity in the coming years.

The adoption of these directions can reduce the overall level of materials flowing into Richmond's economy by increasing material efficiency—in other words, getting more (or the same) from fewer resources.

SIX DIRECTIONS TO ACCELERATE THE CIRCULAR ECONOMY IN RICHMOND





1

MAXIMIZING ECOSYSTEM SERVICES

Enhance natural ecosystem services through regenerative ecosystem management, increasing the environment's ability to provide public benefits and economic resilience.



1. MAXIMIZING ECOSYSTEM SERVICES

Enhance natural ecosystem services through regenerative ecosystem management, increasing the environment's ability to provide public benefits and economic resilience.

Natural ecosystems are essential to support human health, wealth, culture, identity, happiness and well-being. Richmond's residents enjoy a high quality of life thanks to the abundance of open spaces in and around the City. Residents also benefit from ecosystem services, including pollination for our food production, water and air purification, climate regulation, nutrient cycling, habitat, recreation, health, protection from natural disasters, recreation, and cultural and spiritual well-being. Richmond's economic activities have an impact on its natural ecosystem services. Natural ecosystem services benefit from active management to ensure their functions are maintained for us now and into the future.

Wetlands, forests, shorelines, and old fields act as the foundation of Richmond's Ecological Network (EN) - a long-term ecological blueprint for the collaborative management and enhancement of the natural and built environments throughout the city. Consistent with the draft Metro Vancouver Regional Green Infrastructure Network, the EN was first introduced with the adoption of the Richmond 2041 Official Community Plan to achieve ecologically connected, livable and healthy places in which residents thrive. The EN vision and goals provide a framework for managing and guiding decisions regarding the city-wide system of natural areas and the ecosystem services they provide.

The City's **Environmentally Sensitive Area (ESA)** extends over approximately **8,015m²** compensated for by adding over

7,000

NATIVE TREES AND SHRUBS.

The City has also improved civil improvements (culverts) and ecological enhancements (native plantings) to about

1,800m

OF CHANNELIZED WATERCOURSE along Sidaway Road and Steveston Highway.

Over

200

VOLUNTEERS

planted more than

3,000

NATIVE TREES AND SHRUBS

along Richmond's greenways and parks.

The **Partners for Beautification Program** allowed community members to **ADOPT STREETS, GARDENS, PARKS, TRAILS PROACTIVELY, AND OPEN SPACES** to remove litter and invasive plants from these areas.

WHY CIRCULARITY IS IMPORTANT?

Human prosperity arises from using a combination of social capital, human capital and built capital, but these are all based on natural ecosystems. Conservation and restoration efforts alone are crucial, but they will not be enough, making opportunities for regenerative ecosystem goods and services that only nature can provide. By including the value of natural ecosystem resources and services into innovative business models and financial decision-making, circular economy approaches offer the opportunity reconciling Richmond’s economic and environmental interests leveraging and accelerating the City’s efforts to manage and enhance our ecological assets, strengthen city infrastructure, create, connect and protect diverse and healthy spaces and engage through stewardship and collaboration. A circular approach

can be used, to integrate Richmond’s natural capital assets into the corporate financial accounts, providing economic value for ecosystems services as a means of supporting future growth and identifying innovative solutions, exploring their synergies, and highlighting how they fit into the current financial accounting. Consequently, Richmond’s natural ecosystems and green infrastructure can be increased by implementing innovative nature-based solutions to enhance economic activities and ecosystem services to the community. Additionally, Richmond’s green infrastructure and community and household yards can increase regenerated natural areas that can be integrated into Richmond’s Ecology Network.



EQUITY FOCUS

Ensure that natural ecosystems and ecological services benefit all Richmond residents by promoting resource use without compromising their availability for future generations.

1. MAXIMIZING ECOSYSTEM SERVICES

ACTIONS		TOOLKIT	RESOURCES
1.1.	Promote a comprehensive, multi-level regulatory and support framework to facilitate a shift towards sustainability and circularity in ecosystem management		
1.1.1.	Integrate assessment opportunities as a means to identify cultural, market and technological barriers that limit the development of a circular economy.		•
1.1.2.	Advocate for system-level policy measures based on outcomes of the assessments.		••
1.2.	Advance the value of Richmond’s natural capital assets		
1.2.1.	Conduct a natural capital assessment to identify Richmond’s natural ecosystem inventory and services.		•••
1.2.2.	Integrate natural capital assets and the ecosystem services they provide into the City’s decision making and the corporate financial accounts, providing economic value for ecosystems services as a means of supporting future growth and identifying innovative solutions, exploring their synergies, and highlighting how they fit into the current financial accounting in a standardized way.		••



POLICY + REGULATION



INNOVATION, PILOTS + INITIATIVES



INCENTIVES

RESOURCES



COLLABORATION + PARTNERSHIPS



ADVOCACY

























OUTREACH + CAPACITY BUILDING

• LOW







•• MEDIUM

••• HIGH

1. MAXIMIZING ECOSYSTEM SERVICES

ACTIONS		TOOLKIT	RESOURCES
1.2.3.	Maintain a soil management procedure(s) that identify opportunities for sustainable urban development, while enhancing soil health and fertility.	 	•
1.3. Promote nature-based solutions			
1.3.1.	Explore opportunities to foster the development of contemporary landscapes and architecture that incorporates natural and living materials while optimizing the use of land through policies, measures, and actions that promote their use.	   	••
1.3.2.	Collaborate on the promotion of climate-regulating solutions associated with local micro-climates and soil water retention through the use of vegetated landscapes.	  	•••
1.4. Build capacity and raise awareness about the value of ecosystem services to the City			
1.4.1.	Collaborate with educational institutions and community partners to launch projects aimed at discovering community-based solutions and opportunities for re-wilding Richmond's green spaces and landscapes.	  	••
1.4.2.	Develop tools to encourage households and businesses to adopt practices that support the preservation and improvement of natural ecosystems.	  	••
1.4.3.	Promote revitalization of Richmond's green spaces by establishing projects in collaboration with other senior governments and nonprofit organizations.	   	••
1.4.4.	Maintain an environmental improvement grant program to provide resources to community members and organizations to facilitate ecological improvements.	  	•••



 POLICY + REGULATION	 INNOVATION, PILOTS + INITIATIVES	 INCENTIVES	RESOURCES
 COLLABORATION + PARTNERSHIPS	 ADVOCACY	 OUTREACH + CAPACITY BUILDING	• LOW •• MEDIUM ••• HIGH



2

REGENERATIVE FOOD SYSTEM

Foster an agricultural and food production system that rehabilitates and enhances soil productivity, water management and fertilizer use.



2. REGENERATIVE FOOD SYSTEM

Foster an agricultural and food production system that rehabilitates and enhances soil productivity, water management and fertilizer use.

Richmond holds a central position in regional food production, from agriculture to extensive community gardens to post-secondary education to the food processing industry. Although Richmond has become a diverse city, agriculture remains a crucial part of the economy and a significant land use. The Richmond Local Food Map 2022 shows the wide variety of local produce and seafood directly available from producers and merchants, as well as Farmers' Markets to showcase food and local artisans. Approximately 4,993 ha of Richmond's land base, or 39% of the City, is within the Agricultural Land Reserve (ALR). The amount of land in the ALR has remained relatively stable in the last 30 years. The 184 farms reported in the 2021 Census of Agricultural recorded gross farm receipts of \$66.1 million, with an average of \$305,820 per farm. This is an increase from \$57.8 millions by 189 farms in 2016, \$48.6 million of gross farm receipts reported by 211 farms in 2011, \$40.5 million of gross farm receipts reported by 172 farms in 2006, and \$37.6 million of gross farm receipts reported by 182 farms in 2001.

In April 2021, Council adopted the Farming First Strategy, a long-range strategy that includes policies to guide decisions on land use management of agricultural land, enhance public awareness of agriculture and food security issues, and strengthen agricultural viability in Richmond. The themes, objectives and policies contained in the Farming First Strategy are a result of a multi-phase process, which included a review of existing policies and practices in Richmond, best practice research from other jurisdictions, and input from the

City's Food Security and Agricultural Advisory Committee (FSAAC) and Richmond residents. Richmond's food system is essential to the well-being of communities, and a robust and resilient food system supports community health, environmental sustainability, and economic development. It is imperative to keep the food system's transition to resource-efficient strategies.

The Garden City Lands is a remarkable open space in Richmond's Agricultural Land Reserve. It is situated in a transition zone between a rapidly growing urban area on three sides and a large natural and agricultural area to the east. The Park Development Plan includes 16 hectares of agricultural land. In most of the farming zone, the public will have access to trails that can also be used for farm service. The Lands can play a significant role in supporting key outcomes, such as showcasing the City's unique landscape, food, arts, and culture.

To support research, the city provides Kwantlen Polytechnic University (KPU) with access to two parks. There is an 8ha farm on the Garden City Lands operated by KPU's Department of Sustainable Agriculture. Around 2.6ha of this farm is actively farmed by students enrolled in the four-year degree program. On the South Dike Agricultural Lands, KPU's Richmond Farm School operates intensive agriculture activities on incubator farms for new farmers. On both sites, cover crops are planted in large portions of the fields to nourish the soil and to promote the population of beneficial insects.

WHY CIRCULARITY IS IMPORTANT?

Even though the current food system has supported a rapidly growing population and fueled economic growth, productivity gains have been environmentally costly. The Future of Our Food System by the Province of British Columbia predicts that the current agricultural and food system will reduce food self-reliance in the region from 48% to 36%. Given the production technology available today, over half a hectare of farmland (0.524 ha) is needed to produce the food for one person for one year. Considering existing production technology based on the linear economy, to maintain the current level of food self-reliance through to the year 2025, the farmland with access to irrigation will be required to increase by 92,000 hectares or 49% over 2005 levels, and farmers will need to increase production by 30% over 2001 levels. Richmond's food system also faces many challenges, including pressure to urbanize the ALR, rural/urban conflicts, high land values, the economics of farming servicing and infrastructure limitations. Often the potential impacts of urban-based decisions on the industry are not studied.

Circular solutions positively enable the entire food system to benefit both local communities and the economy by increasing productivity, creating added value and improving profitability while responding to the many unique

regional contexts. The adoption of sustainable and circular practices that mimic natural functions can increase the crop production per unit area of soil while regenerating soil health, and increasing biodiversity, including the use of agroforestry and multi-cropping within the city limits. The circular economy approach also provides a broad range of actions for supporting a Richmond closed nutrient cycles to reduce the dependency and consumption of chemical fertilizers and reduced food waste. Combining the principles of circular economy with inclusion, collaboration, innovation and sustainability, is possible to improve the farm-to-fork resource-efficient food chain with shorter value chains and a lower ecological footprint. We can rethink how and where we grow food and support the local food production in household and community gardens throughout Richmond, increasing the local self-reliance of the organic food consumed in Richmond. Enhancing collaboration based on circular principles between all actors in the food systems, the City can support existing and new community partners and non-profit organizations to provide programming and educate Richmond residents on the importance of local food systems and local food hubs.














EQUITY FOCUS

Promote access to food for all residents and make Richmond's food systems more resilient. A circular food system can be made sustainable by rethinking investments and innovations to avoid increasing food production costs. As an essential contributor to the local economy, the circular approach increases collective capacity and effectiveness, fosters community involvement in food-sharing platforms and initiatives, and monitors access to organic, healthy food options.



2. REGENERATIVE FOOD SYSTEM

ACTIONS		TOOLKIT	RESOURCES
2.1	Establish a nutrient and resource flow inventory for Richmond’s food system		
2.1.1	Conduct a comprehensive assessment of Richmond’s food system to determine nutrient and resource flows, prioritize opportunities for improving food production and soil productivity, and establish interconnections between different growing practices to ensure a consistent flow of healthy nutrients for all residents.		••
2.1.2	Collect and analyze data to identify the potential and challenges in enhancing sustainable food production in urban areas to meet local demand for nutritious and healthy food, utilizing different plant cultivation methods in compact spaces.		••
2.2	Shorten the food chain from the farm to the fork		
2.2.1	Promote the direct relationship between farmers, food producers, residents and stakeholders.		•
2.2.2	Encourage a preference for locally sourced food in food service establishments.		•
2.2.3	Encourage the implementation of vertical farming in industrial lands and other urban areas.		••
2.2.4	Provide residents with information about local food suppliers with circular menus and organic farming practices.		•
2.2.5	Monitor the affordability of circular food options for consumers and track access to healthy food products for low-income households.		•
2.3	Increase local food production		
2.3.1	Establish a comprehensive urban agriculture program that incorporates community gardens, green spaces, backyard gardens, and cultivation on City-owned lands. Assess opportunities for the use of rooftops for urban agriculture.		••
2.3.2	Collaborate with residents and key stakeholders to enhance food production in community and household gardens.		••
2.3.3	Innovate practices that support the creation and engagement of a community-based food-sharing platform and initiative.		••
2.3.4	Promote education initiatives to increase understanding and awareness among residents about the benefits of using local and seasonal produce to prepare nutritious meals.		•



POLICY + REGULATION



INNOVATION, PILOTS + INITIATIVES



INCENTIVES

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COLLABORATION + PARTNERSHIPS



ADVOCACY












OUTREACH + CAPACITY BUILDING

• LOW

•• MEDIUM

••• HIGH

2. REGENERATIVE FOOD SYSTEM

ACTIONS		TOOLKIT	RESOURCES
2.3.5	Collaborate with local businesses to provide residents with information on local food production and Richmond community benefits.		•
2.4 Reduce food waste in all the food chain			
2.4.1	Minimize food waste throughout the entire food chain by supporting the establishment of circular food marketplaces using both physical spaces and digital platforms.		•
2.5 Reduce the need of chemical fertilizers and pest control while increasing land productivity			
2.5.1	Inspire farmers to adopt regenerative agriculture practices and utilize nature-based solutions to increase agricultural productivity per unit area of soil, enhance biodiversity, and improve cost-benefits.		••
2.5.2	Advocate for the adoption of regenerative agriculture regulations and practices using nature-based solutions in agricultural activities in the Province, including the use of agroforestry and multi-cropping within the city limits.		••
2.5.3	Advocate for access to funding for regenerative farming programs for local farmers.		••
2.5.4	Promote the implementation of nature-based solutions to increase circularity in the food system, and closing nutrient cycles which have reduced the consumption of chemical fertilizers and reduced food waste in all supply chains.		••
2.6 Build capacity and raise awareness among the food system industry and stakeholders			
2.6.1	Support existing and new community partners and non-profit organizations to provide programming to educate Richmond residents on the importance of local food systems and regional food hubs.		••
2.6.2	Develop a toolkit for an educational program in the K-12 curriculum on Richmond's agricultural and food system to raise community knowledge to identify community-based solutions to increase food security, prepare nutritional meals using local food production, reduce waste along the food chain and increase household nutrient recovery.		••
2.6.3	Support training opportunities for local food producers on circular economy practices for farming and businesses.		•
2.6.4	Support local academic institutions to increase professional training in sustainable farming and circular solutions for the agricultural and food system.		•



POLICY + REGULATION



INNOVATION, PILOTS + INITIATIVES



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OUTREACH + CAPACITY BUILDING

• LOW

•• MEDIUM

••• HIGH



3

RESILIENT AND INNOVATIVE ECONOMY

Empower cross-sector businesses in the adoption of circular strategies in their business practices.



3. RESILIENT AND INNOVATIVE ECONOMY

Empower cross-sector businesses in the adoption of circular strategies in their business practices.

Richmond has a strong and diversified local economy with a stable base of employment and economic opportunities. In 2022, more than 13,000 businesses employ 130,000 people in various sectors, including aviation, manufacturing, agrifood production, clean technology, tourism and logistics. There are 1.35 jobs for every resident worker in Richmond, making it a major employment center for the region. Employment lands in Richmond include 4.9 million square feet of office space and over 45 million square feet of industrial space.

Guided by the Resilient Economy Strategy, the City and stakeholders support local businesses and foster the conditions that enable key sectors to grow and become more resilient to economic and environmental change.

Approximately 37% of all jobs in Richmond are located on industrial land, but vacancy in the region is at an all-time low with limited options for new development. This lack of industrial space poses a challenge for the retention and expansion of key industries; however, this is also driving efforts to optimize the use of existing land by the private and public sector. This includes the City of Richmond's Industrial Land Intensification Initiative. A series of bylaw and policy changes were adopted by Council in 2021 to encourage more intensive utilization of existing industrial land and reduce barriers to multi-level and other innovative forms of industrial developments.

The Supply Chain Resiliency Program was undertaken in partnership with the City of Surrey, Township of Langley and the BC Tech Association to gain a more in-depth understanding of regional manufacturing activities which can lead to further industrial efficiencies across jurisdictions and sectors. This program also encourages technology adoption by manufacturing businesses to help them become more resilient to challenges such as the shortage of space and workers, and supply chain disruptions.

The City continues to seek ways to help businesses maximize the use of resources and adopt circular economy practices into their operations. For example the City partnered with FoodMesh, a Vancouver-based company that facilitates food redistribution, to develop the Richmond Food Recovery Network. This platform enables local food businesses to divert their unsold surplus food from waste streams to higher value uses. Fifty-nine organizations participated in the first year of the program, which resulted in the diversion of 414,555 kg of food from waste stream and the creation of 644,800 meals for those in need. For this initiative, the City won the 2021 Community Project Award from the British Columbia Economic Development Association.

WHY CIRCULARITY IS IMPORTANT?

It is possible to implement circular strategies from multiple perspectives and increase business collaboration to achieve common goals through joint solutions. By optimizing resource consumption, businesses can access cheaper resources, reduce waste handling costs, and increase competitiveness. The circular economy brings opportunities to localize supply chains and build local economic growth, employment and labour forces. An Ontario study estimates that increasing the province's waste diversion rate to 60% would create nearly 13,000 new direct and indirect full-time jobs. Since this

estimate is based on a waste-diversion strategy only, the full employment potential of a comprehensive circular economy strategy could be much more significant.

Richmond's businesses can benefit from circular economy strategies by creating a collaborative Circular Innovation Hub, which will foster innovation to develop sustainable products as a service and enable better business solutions to close the material loop.

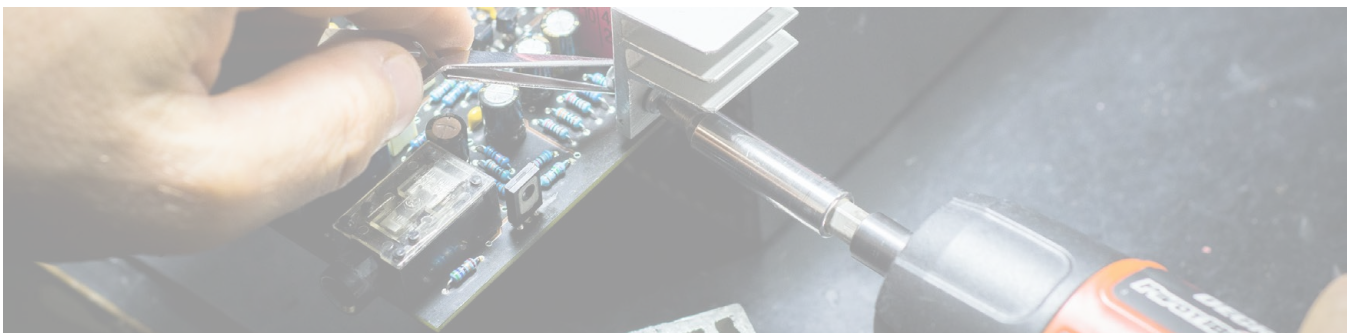


EQUITY FOCUS

The circular economy for sharing, repairing and offering second-hand products needs to diversify consumers' opportunities and make consumer goods more accessible to residents, especially those who have less to spend.

3. RESILIENT AND INNOVATIVE ECONOMY

	ACTIONS	TOOLKIT	RESOURCES
3.1.	Strengthen Richmond's business sector by fostering sustainable growth through circular practices		
3.1.1.	Conduct a technical review of regional legislation to identify opportunities, barriers and gaps to successfully implement circular practices in Richmond's commercial and industrial sectors.		••
3.1.2.	Analyze business material metabolism to identify opportunities to maximize efficiency and symbiotic resource use.		••



POLICY + REGULATION



INNOVATION, PILOTS + INITIATIVES



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ADVOCACY





















OUTREACH + CAPACITY BUILDING


• LOW

•• MEDIUM


••• HIGH

3. RESILIENT AND INNOVATIVE ECONOMY


ACTIONS	TOOLKIT	RESOURCES
3.2. Increase businesses' resilience and innovation with circular strategies		
<p>3.2.1. Create a Richmond Circular Hub for innovation to support entrepreneurs, ventures and businesses as they develop circular strategies and business applications, including initiatives such as:</p> <ul style="list-style-type: none"> • Support local businesses to integrate new circular strategies in all their supply chain by developing innovative solutions and local pilot projects; • Promote the development of circular business models in business sectors by advocating for changes to regional regulations and policies; • Develop guidelines to help SMEs implement circular business models in strategic areas; • Facilitate the sharing of workspaces, accommodations, equipment, tools, transportation, and materials between businesses; • Build industry synergy and develop more resource-efficient loops. 		
3.3. Develop a circular framework which aligns with the sustainable development goals		
<p>3.3.1. Explore the opportunity to work with local and senior governments to enhance legislation to accelerate the transition of regional markets to a circular economy.</p>		
<p>3.3.2. Work with interested municipalities to promote circular sharing over ownership and minimize the risks related to the business.</p>		
3.4. Encourage synergies and collaboration in the local market		
<p>3.4.1. Collaborate in the development of a virtual B2B marketplace that links waste streams with product inputs as by-products, facilitating material flow throughout the city and region.</p>		
<p>3.4.2. Encourage businesses to assess opportunities for regenerative, nature-based products and to promote sharing, reusing models to utilize materials at their optimum levels for as long as possible.</p>		
<p>3.4.3. Engage and collaborate in regional projects, case studies, and initiatives to support co-creation of innovative solutions in a pre-competitive environment.</p>		
3.5. Build capacity and awareness among businesses and stakeholders		
<p>3.5.1. Collaborate with industry, academic institutions and interested municipalities to support capacity building in businesses and stakeholders adopting circular strategies.</p>		
<p>3.5.2. Develop a communication strategy to raise awareness and educate residents about using materials and products in a circular way and improving relationships with local businesses that do the same.</p>		
<p>3.5.3. Participate in regional and international events to identify new opportunities for circular products, technologies and approaches.</p>		



POLICY + REGULATION




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ADVOCACY



OUTREACH + CAPACITY BUILDING

● LOW ●● MEDIUM ●●● HIGH



4

SHARED MOBILITY

Explore and support a shared transportation and mobility system.



4. SHARED MOBILITY

Explore and support a shared transportation and mobility system.

A city's life depends on mobility and access. Everyone needs to get to work, live, play, and access health care, recreation, shopping, and cultural activities. Greenhouse gases (GHGs) emitted by cars, light and heavy-duty trucks accounted for 57% of Richmond's total emissions in 2017. Cars account for about 54% of all trips in Richmond. Approximately 69% of all trips take place within Richmond. The average trip length in Richmond is 14.2 km by transit, 8.8 km by car, 4.5 km by bicycle, and 0.9 km by foot. Council endorsed the Community Energy and Emissions Plan 2050 in 2022, aiming to ensure 90% of Richmond residents live within 400 metres (5-minute walk/roll) of transit and no more than 1,600 metres from a neighbourhood mobility hub. Additionally, the Plan aims to facilitate electrical mobility for all residents and businesses in Richmond, with expanded options for charging at home,

work, and on the go for personal electric vehicles, electric car-share, e-bicycles and e-scooters. To contribute to a future where transportation is shared, affordable, and carbon-free, the City introduced its app-based pilot program in Richmond in May 2022. The Richmond Green Ambassadors worked with the City to develop a new outreach program to promote electric vehicle awareness among youth. The outreach program, known as the Richmond EVie Lesson Toolkit includes lesson plans for both kindergarten to grade seven students and one for grades eight to 12. In 2020, the Richmond Active Transportation Network provides nearly 80 km of bicycle and walking routes, including on-street routes, off-street greenways, and multi-use paths (excluding unpaved dyke trails). Up from 65 km at end of 2014.



Bike Lane on No3 Road and Saba Road

WHY CIRCULARITY IS IMPORTANT?

There are many improvement opportunities for a circular mobility system. The dream of owning a personal vehicle is no longer an attractive one. People can access the things they need - space, products or transport - in new ways. Our experience during the COVID-19 pandemic taught us that a practical way to reduce travel is to provide hubs at regional and local levels, shared and virtual offices, workplace flexibility, e-learning options, and telecommuting. This can be through sharing rather than owning, connecting people to their neighbours and communities, or through product-as-a-service contracts.

Mobility planning can employ circular economy strategies in several ways of sharing models that optimize material use to minimize waste, reduce miles traveled, and cut costs. Shared mobility services, carpooling, ride-sharing, and public transportation can be used to reduce energy consumption and the number of vehicles on the city's roads. The adoption of a circular strategy can also contribute to a new form of urban social infrastructure enabling collaborations between people, ideas and connecting places.



EQUITY FOCUS

Circular interventions in the mobility strategy can reduce Richmond's carbon emissions while expanding access to jobs and enabling participation in the community. The adoption of enablers and addressing risks will ensure social equity and prevent people from being left behind. Moreover, vulnerable communities may be targeted for provision of an accessible, affordable, and effective multi-modal mobility structure.

4. SHARED MOBILITY

ACTIONS		TOOLKIT	RESOURCES
4.1	Calculate the mobility material intensity and resource efficiency		
4.1.1	Conduct an extended input-output analysis to assess the environmental footprint of Richmond's mobility sector, understanding the sector demands of resource flows and the generated environmental impacts.		••
4.2	Reduce the use of virgin materials and material footprint in the mobility system		
4.2.1	Reduce the generation of e-waste from infrastructure and low carbon vehicles by supporting to implement batteries and electric vehicles within the region.		•••
4.2.2	Collaborate with industry partners and other local governments to increase the amount of recycled materials that are utilized in the construction of roadways, sidewalks, and pathways as well as other mobility infrastructures in Richmond.		•
4.2.3	Investigate energy harvesting technologies in Richmond areas with high transit.		•



POLICY + REGULATION



INNOVATION, PILOTS + INITIATIVES



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COLLABORATION + PARTNERSHIPS



ADVOCACY



OUTREACH + CAPACITY BUILDING

• LOW •• MEDIUM ••• HIGH

4. SHARED MOBILITY

ACTIONS		TOOLKIT	RESOURCES
4.3	Facilitate the implementation of an integrated mobility sharing vehicles infrastructure and “mobility as a services” solutions		
4.3.1	Develop a communication strategy to raise awareness and educate residents about using vehicles, transit and sharing infrastructure.		•
4.3.2	Collaborate with TransLink and other mobility providers to connect Mitchell Island and other island areas to be fully integrated by transit, shared vehicles and mobility-as-a-service options to reduce the need of use personal cars.		•
4.3.3	Plan and implement mobility-as-a-service pilots as part of Mobility Hubs throughout the city.		••
4.3.4	Support educational opportunities to assist residents in choosing circular options of vehicles.		•
4.3.5	Advocate for the Province to introduce new options of low carbon mobility beyond pilot projects.		•
4.4	Reduce distances by increasing access to co-working spaces, digital solutions and virtual services		
4.4.1	Assess the provision of affordable co-working spaces in Richmond where residents, entrepreneurs and students can access remote work services and e-learning programs through land use policy tools.		••
4.4.2	Assess the opportunity to increase shared spaces in the City’s community centres and library branches, as well as other strategic facilities in Richmond, where residents can access online for digital meetings, remote work, and e-learning opportunities.		••
4.4.3	Advocate for low cost, high-speed internet access for all neighborhoods and communities in Richmond.		•
4.5	Support continuous improvement in the local logistic system		
4.5.1	Incorporate innovations and digital business solutions to address urban logistics challenges as part of transportation planning.		••
4.5.2	Advocate for the creation of a regional logistic reverse strategy that enhances the movement of goods and reduces costs and environmental footprint.		•



POLICY + REGULATION



INNOVATION, PILOTS + INITIATIVES



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ADVOCACY



OUTREACH + CAPACITY BUILDING

• LOW

•• MEDIUM

••• HIGH



5

ADAPTIVE BUILT ENVIRONMENT

Maximize the optimal use of construction materials and buildings, infrastructure, and land.



5. ADAPTIVE BUILT ENVIRONMENT

Maximize the optimal use of construction materials and buildings, infrastructure, and land.

Richmond is the fourth most populated municipality in the Greater Vancouver area. Between 2016 and 2021, the City's population grew by approximately 11,628 people (5.9%), the fifth-highest overall growth after Surrey, Vancouver, Burnaby, and Langley Township. There is a significant need for infrastructure development and creates opportunities for transformation. In Canada, the built environment is one of the most extensive user of raw materials and energy consumers and the most critical contributor to waste streams by weight. A total of 3.4 million tonnes of construction material is disposed of in landfills annually in Canada, resulting in an estimated 1.8 million tonnes of embodied carbon. The construction sector is an essential part of Canada's economy. It generates nearly 7% of the country's GDP and employs approximately 7.5% of the workforce. It is estimated that Canada will need to invest over C\$1.6 trillion in infrastructure between 2016 and 2040. An anticipated 230 billion square meters of new construction will be built within the next 40 years—doubling the current global floor area.

While the City's Demolition Bylaw for single-family units is a step in the right direction to divert 70% of waste from landfills, more emphasis needs to be placed on shifting focus from downstream waste management to upstream resource flow management to ensure sustainable growth and prosperity for the expanding population without relying on virgin resources.

Richmond's growth functions within a larger regional ecosystem, transforming from a source of carbon emissions into a carbon sink through the development of new buildings,

as planned in the Community Energy and Emission Plan 2050. Refurbishing buildings and reusing the materials they were built will be a new normal. We can use circular economy to rethink how Richmond can sustain its growth by using materials more efficiently. That is a massive change for big industry strategies. The next and most challenging step is for economic structures and institutional behaviour to move away from the traditional construction industry and toward a circular low carbon industry. In June 2018, Council adopted into Richmond's Building Regulation Bylaw the BC Energy Step Code requirements to reduce greenhouse gas (GHG) emissions from the buildings sector. The BC Energy Step Code is a provincial standard that provides an incremental and consistent approach to achieving more energy-efficient buildings, intending to construct net-zero energy-ready buildings by 2032.

The City wholly-owned Lulu Island Energy Company implements and operates district energy systems throughout Richmond to provide space heating, cooling, and domestic hot water heating services to connected developments. Through the use of locally-sourced renewable energy sources such as geo-exchange and sewer heat recovery technology, these district energy initiatives are projected to reduce greenhouse gas emissions by over one million tonnes by 2050. Richmond's city centre is a planned growth area, where 70% of new residential development is occurring, resulting in several thousand new housing units a year in the area. These new homes are connected to the Lulu Island Energy Company low carbon energy services.

WHY CIRCULARITY IS IMPORTANT?

Buildings have improved in energy efficiency and liveability over the last few decades. Still, today’s built environment continues to rely on linear ‘take-make-dispose’ models. Over the last several decades, efforts have focused mainly on waste diversion and, to some degree, resource recovery. Despite advances in downstream strategies, little has been achieved in upstream circular strategies, such as using circular inputs and a product-as-a-service approach. A variety of opportunities are emerging throughout the life cycle of buildings and infrastructure that drive the adoption of circular business practices. Several industries and critical stakeholders in Richmond are becoming more aware and interested in circular economy solutions.

When applied to a sector of high growth, such as the built environment, circular economy approaches represent an enormous opportunity for boosting secondary materials markets by offering high-quality products for new construction and renovation projects in Richmond and its

region. By using circular business models and collaborative partnerships, buildings in Richmond can be more sustainable by implementing innovative products and technologies to enable maximum material re-use and longer building life and keep materials at their highest intrinsic value. Implementing appropriate instruments to monitor the City’s material flow, embodied carbon and the resource footprint of buildings and infrastructure can ensure resource efficiency throughout the construction lifecycle. The transition to a circular economy will involve innovative strategies that enable both current and new buildings to be used flexibly and perform more efficiently. Using circular principles in the design, operation, and maintenance of built assets can allow for higher adaptability, use of renewable, recycled materials, and thorough deconstruction at the end of its useful life. Such thinking can be seen as a natural extension of the holistic approaches already applied by architects, engineers and planners.



EQUITY FOCUS

Circularity in the built environment can support affordability of living and working spaces, as well as strengthen support for all residents and workers.

5. ADAPTIVE BUILT ENVIRONMENT

ACTIONS		TOOLKIT	RESOURCES
5.1	Assess the material usage in the built environment		
5.1.1	Conduct a material flows analysis and an urban metabolism assessment to identify opportunities and priorities for improving the overall circularity of Richmond’s built environment into a circular economy.		••
5.1.2	Collect data that create a database that contains information about the flow of construction materials available in Richmond’s region, including embodied carbon-related data, to support the development of Richmond’s Construction Material Strategy.		••
5.1.3	Collaborate with other local governments to develop a detailed map of Richmond’s social and ecological boundaries, outlining its strengths and weaknesses.		••



POLICY + REGULATION



INNOVATION, PILOTS + INITIATIVES



INCENTIVES

RESOURCES



COLLABORATION + PARTNERSHIPS



ADVOCACY



OUTREACH + CAPACITY BUILDING

• LOW •• MEDIUM ••• HIGH

5. ADAPTIVE BUILT ENVIRONMENT

ACTIONS		TOOLKIT	RESOURCES
5.2	Regenerate materials flow by promoting salvage and secondary-use materials		
5.2.1	Promote the use of secondary and recycled materials in the construction of new buildings and infrastructure.		••
5.2.2	Develop strategies to retain resource value in the region and develop Richmond's salvaged and reclaimed material market.		••
5.2.3	Promote refurbish options to extend lifetime of buildings and infrastructure.		••
5.2.4	Advocate for strengthening the construction industry's ability to use reclaimed components and materials.		•
5.2.5	Advocate for the development of a local and regional hub for reclaimed material from deconstruction.		••
5.3	Develop sectoral capacity and skills		
5.3.1	Assess local needed circular skillsets and knowledge to support new green employment opportunities in the building retrofit sector.		••
5.3.2	Work with local partners and municipalities to identify circular best practices in the built environment.		•
5.3.3	Develop suitable instruments to monitor the City's material flow, embodied carbon and resource footprint of buildings and infrastructure to ensure resource efficiency throughout the construction sector's life-cycle.		••
5.4	Promote the use of new materials and develop research and pilot projects		
5.4.1	Advocate for a regional Circular Construction Hub to develop new techniques for circular constructions and pilot the use of recycled materials in the renovation and construction of new buildings and infrastructure.		••
5.4.2	Promote the use of low-emission concrete and asphalt pavement or alternatives to concrete and asphalt pavement in City and development projects.		•
5.4.3	Support the circular design for adaptability, and modular housing and buildings to implement circular strategies, such as replacing aging components more easily.		•
5.5	Promote circular standards for constructions		
5.5.1	Advocate for the adoption of the extension of buildings and infrastructure lifetime supported by Total Cost of Ownership or Life Cycle Assessment methodologies.		•



POLICY + REGULATION



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ADVOCACY



OUTREACH + CAPACITY BUILDING

• LOW

•• MEDIUM

••• HIGH

5. ADAPTIVE BUILT ENVIRONMENT

ACTIONS		TOOLKIT	RESOURCES
5.5.2	Undertake technical studies to assess the feasibility of implementing policies and regulations that promote the use of innovative, renewable, and low-carbon materials where opportunities exist.		●●●
5.5.3	Collaborate with regional and national organizations to improve construction material data accuracy and quantity to support material flow analysis and circular strategies.		●
5.5.4	Advocate for regional and provincial standards (i.e. building code) to include circular economy requirements.		●
5.5.5	Support the integration of buildings and infrastructure with green infrastructure and natural ecosystems to reduce maintenance and material use throughout the lifecycle.		●●
5.6	Collaborate to create joint value		
5.6.1	Partner with other organizations to develop a hub database of sustainable, renewable and recyclable construction materials that can be used in successive life-cycles and have low embodied carbon content.		●●
5.6.2	Create a collaboration network of building managers who implement circular economy principles in building operations to share their experiences.		●
5.6.3	Collaborate with regional municipalities to identify common circular approaches, common goals, and procurement templates that can be used in the built environment.		●
5.7	Integrate zero carbon energy solution in the built environment		
5.7.1	Promote on-site heat recovery in new developments. City centre, such consideration will occur in partnership with the City's wholly-owned district energy Lulu Island Energy Company.		
5.7.2	Promote the on-site use of renewable energy in new and existing buildings and infrastructure, such as solar energy, wind energy, heat recovery and other innovative zero-carbon solutions.		



	POLICY + REGULATION		INNOVATION, PILOTS + INITIATIVES		INCENTIVES	RESOURCES
	COLLABORATION + PARTNERSHIPS		ADVOCACY		OUTREACH + CAPACITY BUILDING	● LOW ●● MEDIUM ●●● HIGH



6

CONSUMER MATERIALS MANAGEMENT

Promote the efficiency of consumer product development,
manufacturing, and end-of-life.



6. CONSUMER MATERIALS MANAGEMENT

Promote the efficiency of consumer product development, manufacturing, and end-of-life.

Richmond is well-positioned to support the transition to a circular economy thanks to its comprehensive recycling programs and residents' commitment to diverting waste from landfills. As a result of the City's sustainable waste management programs, household items can be reused, repurposed, and recycled multiple times into new products. In 2021, residents diverted 79.3% of their waste from landfills through various programs, including curbside and centralized collection programs and convenient, one-stop recycling services at the Richmond Recycling Depot, which is open seven days a week and continues to accept a variety of items.

The Recycling Depot collected 7,581.56 tonnes of recyclable materials in 2021. In its Rethink Waste campaign, the City also encourages community members to reduce waste overall by reassessing buying decisions and extending product lifespans. Adopting the Single-Use Plastic and Other Items Bylaw No. 10000 was a key achievement. In order to introduce Bylaw 10000, a comprehensive community engagement campaign was conducted, which included working directly with businesses, and educating the public and promoting the use of reusable items. The City expanded its use of online outreach to host its first virtual Repair Fair focused on repairing and maintaining gas lawnmowers.



WHY CIRCULARITY IS IMPORTANT?

Between 1990 and 2017, the world population grew from 5 to 7.5 billion people, and global gross domestic product (GDP) per capita increased by 50%. Richmond’s population growth between 2016-2021 was 5.9%. The global annual material consumption per capita grew from 22 kg in 1990 to 33 kg in 2017 (OECD, 2019). A person’s “ecological footprint” is a measure of how much biologically productive land they require to provide them with resources and absorb their waste. In the last 20 years, the ecological footprint of each Canadian has grown by 15% (from 7 to 8.1 hectares). To support Richmond’s current population using this figure, an area 373 times larger than the city itself would be required. Based on what we know today, recycling is a necessary component of a circular economy, but it should only be

used when there are no other options, such as reusing, refurbishing, remanufacturing, or repairing.

Transitioning to a circular economy involves smarter economic solutions, regulation and practices, and greater behaviour change. Awareness campaigns and initiatives are continually developed as a part of the City’s ongoing efforts to encourage residents to share, repair and reuse items such as textiles, electronics, furniture and other products and materials. In order to decouple economic growth from resource use, increase competitiveness, and boost innovation, the City can stimulate innovation and collaboration among knowledge institutions, businesses, and consumers.



EQUITY FOCUS

In a circular economy, we prevent waste by preserving the value of products, components and raw materials in closed loops for as long as possible, resulting in a decrease in waste. This way we can reduce our impact on the environment without compromising quality. By sharing more, reusing more and repairing more, we will also contribute to a cleaner and more inclusive city.

6. CONSUMER MATERIALS MANAGEMENT

ACTIONS		TOOLKIT	RESOURCES
6.1	Understand the urban metabolism of Richmond		
6.1.1	Assess the city’s material flows of consumer goods to help prioritize Richmond’s circular economy opportunities.		••
6.2	Promote new circular consumption behaviors and material use		
6.2.1	Use community-based social marketing and educational community programs to inspire behaviour change within the community to encourage the adoption of reusable materials, demonstrate how residents may benefit from the circular economy and how they can support local businesses.		••



POLICY + REGULATION



INNOVATION, PILOTS + INITIATIVES



INCENTIVES

RESOURCES



COLLABORATION + PARTNERSHIPS



ADVOCACY



OUTREACH + CAPACITY BUILDING

● LOW ●● MEDIUM ●●● HIGH

6. CONSUMER MATERIALS MANAGEMENT

ACTIONS		TOOLKIT	RESOURCES
6.2.2	Collaborate with schools to implement circular volunteer programs to encourage circular economy principles among youth in the community.		••
6.2.3	Develop circular certification programs to create community pride.		••
6.3 Support the urban industry symbiosis by fostering collaborative relationships			
6.3.1	Promote and advocate the creation of a regional co-operation network that develops circular economy-based business models for the textile-recycling ecosystem.		••
6.3.2	Promote tracking material assets and flows by Richmond businesses and stakeholders to maximize the use of existing resources and reduce waste generation.		••
6.3.3	Identify opportunities for synergies with businesses to share data on material flow and waste streams to create closed loop waste and material flows in the city.		•
6.4 Enhance upcycling infrastructure for consumer goods' materials			
6.4.1	Advocate incorporating technical information about recycled materials into a digital library, which would increase knowledge about materials in product design, encourage industrial symbioses and enhance the materials flow in the Richmond area.		•
6.4.2	Pilot a "Reuse Centre(s)" and "Tool Library(ies)" that offers free space for community education, repair events, and circular information dissemination.		•••
6.4.3	Work with residents, commercial business and industry to identify opportunities to generate revenue from waste "by-products".		•••



POLICY + REGULATION



INNOVATION, PILOTS + INITIATIVES



INCENTIVES

RESOURCES



COLLABORATION + PARTNERSHIPS



ADVOCACY



OUTREACH + CAPACITY BUILDING

• LOW

•• MEDIUM

••• HIGH



IMPLEMENTATION TOOLKIT

The City of Richmond has six tools to facilitate the transition to a circular economy. Each of these tools can be used separately or together when developing and implementing the Strategy's directions and actions. Different elements of the local government "toolkit" can be used, depending on specific toolkit leveraged to advance action, relative jurisdiction or level of control by the City, and resources or investment required.



POLICY + REGULATION

City Council can develop and implement bylaws that set out legal regulations to govern specific activities within the City of Richmond. Provincial legislation sets the areas in which Council has jurisdiction to implement bylaws. The City has the right to enforce adopted bylaws when a bylaw is violated. City Council may also adopt policies setting out standard procedures and priorities that staff and Council can use when evaluating and implementing plans and projects.



INNOVATION, PILOTS + INITIATIVES

Local governments can undertake the development and implementation of research and development projects, pilot projects, studies, measurement frameworks and solution testing that benefit the residents and economy of the City. These enable local governments assess the performance and progress of the circular initiatives and identify what can be improved in the future.



INCENTIVES

City Council can provide incentives to encourage circular action by adjusting the allocation of City resources. Council can adjust the criteria by which the City charges municipal taxes or fees and/or prioritizes service delivery. Incentives can only encourage; they cannot prevent (or require that) an action be taken. However, well-designed incentives can influence decision-makers to choose circular options more often than they would otherwise.



COLLABORATION + PARTNERSHIPS

Local governments may need to partner with provincial or federal governments or other agencies to have a sufficient mandate to implement prioritized circular economy actions. It may be more cost-effective for external agencies or non-governmental associations to implement specific climate actions on behalf of the City, or work with several governments to implement circular strategies together.



ADVOCACY

In some areas, local governments have little or no legal mandate to implement policies or programs to accelerate the transition towards a circular economy. In these cases, City Council can make formal requests to the provincial and/or federal governments and their agencies on behalf of Richmond residents for policy changes and/or new regulations to be implemented. The City regularly calls on senior levels of government to take more significant action on sustainability and circular economy issues.



OUTREACH + CAPACITY BUILDING

Local residents and businesses have a crucial role in many decisions that affect the use of resources within Richmond. Local governments can allocate resources to increase awareness and empower economic actors to grow the circular economy and facilitate collaboration.



GLOSSARY

Biodiversity: The diversity of living organisms in an area helps maintain balance in ecosystems by supporting various species, providing resources for humans, and making ecosystems more resistant to natural disasters and climate change.

Biological Capacity: The capacity of an ecosystem to support life, as determined by its ability to absorb waste and provide water, determining how much the ecosystem can support, and when overloaded with waste or overgrazing, it may lead to collapse.

Built environment: The man-made spaces and structures in cities and towns that shape our lives, from the quality of the air we breathe to mental and physical health, economy, and social relationships.

Business material metabolism: It is the process of extracting, using and discarding materials within a business or economy to create new products, including sourcing raw materials for manufacturing processes; distribution routes, use-and-disposal of items; and energy and water consumption throughout this procedure.

Capacity Building: It is the advancement of individuals' skillsets and knowledge to enable them to meet their objectives more successfully.

Circular Economy: An economic system designed to be regenerative by design, which strives to keep products, components and materials at their highest utility and value with minimal raw material extraction, reintroduction of materials already present in circulation, and no waste production.

Circular Economy-based Business: A company operating according to the principles of a circular economy, emphasizing products designed for reuse, repurposing and recycling; emphasizing resource efficiency and reducing waste to lessen production and consumption's environmental impact.

Closed-loop recycling: Reusing and manufacturing a product again into the same item increases resource efficiency by reusing materials in their original form, decreasing landfill waste and conserving natural resources.

Co-creation: The collective creation of something with input from multiple stakeholders, drawing upon collective expertise to generate innovative and resource-efficient solutions that reduce waste and conserve natural resources.

Collaborate to Co-Create: Working collaboratively with multiple stakeholders to develop solutions that benefit everyone and identify new and better ways of using resources, leading to more efficient and sustainable use.

Consumer Materials Management: This field examines the management of materials used by consumers, from their source to use and disposal, creating systems to promote resource efficiency and identifying ways to reduce waste, reuse, and recycle materials.

Consumption Behaviors: Investigate the consumption patterns used by individuals and groups, such as what products and services people choose to purchase and their environmental impact; also, understand how different cultures have different consumption habits and their connection to sustainability.

Co-working spaces: Co-working spaces offer shared workspaces that enable individuals and organizations to work together, offering amenities like high-speed internet, printers, and conference rooms.

Decoupling Materials: It separates economic growth from natural resource consumption, minimizing waste generation and improving efficiency.

Decoupling Materials Use: Reduce the amount of materials used in production while maintaining or increasing productivity, using materials more efficiently, reusing and recycling materials, and decreasing the amount needed to produce goods and services while improving efficiency.

Design for Disassembly: Constructing products, components, and materials so they can be easily disassembled at the end of their usefulness, maximize reuse, repurposing, and recycling potential by creating products whose individual parts and materials can be repurposed again.

Design for Durability: Extending a product's useful life by making it more durable and disassemblable, increasing environmental footprint by using fewer resources to manufacture new items, and reducing waste disposal and recycling costs.

Design with Flexibility in Mind: Use design principles that enable easy space reconfiguration, accommodating changing needs and workflow patterns over time, thus saving on demolition and reconstruction costs when more significant alterations are necessary.

Design for Recycling: Designing products with end-of-life recycling in mind helps minimize materials used, minimizes waste generated during production, and conserves resources. This approach encourages designers to consider end-of-life recycling when creating new items so that components can be disassembled and reused elsewhere or repurposed within one product. Additionally, this reduces the need for new materials while conserving resources during manufacturing.

Design for Repairability: Encourage manufacturers to utilize fasteners, materials and processes that enable products to be quickly repaired or replaced, thus cutting waste and conserving resources using standardized components and replaceable parts to fix broken items promptly.

Design for Sustainability: An approach to product or service design that maximizes environmental and social benefits throughout its life cycle, considering the environmental and social impacts of production, use, and disposal, entangling using fewer resources, conserving energy consumption, and minimizing negative environmental effects.

Design for the environment: Designing products or services to minimize negative environmental impacts throughout their life cycle, considering sourcing, manufacturing, use and disposal; this helps create energy-saving and resource-saving items.

Downstream (downcycling) resource flow: Utilizing secondary materials that have lower economic value and cannot be reclaimed, recycling them into lower-grade products with a lower market value which is not necessarily suitable for reuse or further recycling.

Durability: The duration of time in which a product remains valued or functional. Maximizing the lifespan of a product helps reduce its environmental impact from production.

Ecosystem management: Maintaining ecosystem health and productivity while safeguarding essential ecosystem services for human well-being.

Ecosystem Services: Humans derive many benefits from ecosystems, such as clean air and water, pollination, soil fertility, flood and disease control, and recreation - which are preserved and maintained through ecosystem management.

Embodied carbon: The emissions caused by the production and transportation of a product, including those related to material extraction, manufacturing, and transport; additionally, emissions are caused by energy used during these steps.

End-of-Life: The stage in a product's life cycle when its original owner no longer values it and is disposed of, creating end-of-life emissions such as methane and other greenhouse gases and air and water pollution when not reused, recycled or composted.

Food system: All processes that bring food from farm to table, from production and processing to packaging and distribution - work together to guarantee food availability and safety for consumers.

Footprint: Measure the total environmental impact of human activities on a product or service across its life cycle by evaluating its carbon, water, energy, and material footprints to gauge its ecological effect.

From Farm to Fork: This process involves transporting food from its point of production to consumption, including harvesting, processing, packaging, storage, transportation, marketing and distribution - all to protect and improve consumer health by providing safe and quality ingredients.

Industry Symbiosis: When businesses collaborate to reduce waste and boost efficiency, sharing resources, lowering costs, and increasing profit margins - they create a more sustainable and productive economy.

Innovative Economy: An economic system that emphasizes creativity, collaboration and new ideas to spur innovation in product and service design and develop business models that remain competitive and profitable in the long term.

Learning-by-doing: This approach to education involves engaging in active problem-solving and experimentation to gain a comprehensive grasp of concepts.

Life Cycle Assessment: Examines the environmental effects of a product throughout its entire life cycle, from raw material extraction through manufacturing, transportation, use and disposal - to identify potential environmental harms and ways to reduce them.

Linear Economy: An economic system based on the take-make-dispose model, which prioritizes traditional production and consumption of goods without considering any environmental costs associated with their life cycle, leading to resource depletion, pollution, and waste production.

Low-carbon Economy: An economic system that produces low levels of carbon emissions by minimizing resources used in production, encouraging the reuse of materials and products, and using renewable energy sources and energy-efficient technologies to reduce emissions.

Material Flows Analysis: Examining the material and resource flows within a system to identify potential opportunities for conserving resources, increasing efficiency, and lessening environmental impacts.

Mobility as a Service: it is an integrated platform offering transportation services to reduce unnecessary trips and maximize the efficiency of these processes, thus cutting emissions, traffic congestion, and air pollution while providing convenient and budget-friendly options for consumers.

Mobility System: The interconnected systems that facilitate people and goods movement.

Narrow Material Needs: Minimizing materials needed for a product or process can result in cost savings, increased efficiency, and reduced waste generation.

Natural capital assets: They are the natural resources and ecosystems that provide economic advantages like clean water, fertile soils, biodiversity - essential for human well-being, recreational opportunities, job creation opportunities and local economies.

Natural Ecosystem Inventory: Compile an overview of different ecosystems and their characteristics.

Natural Resources: Naturally occurring materials that can be harnessed for economic benefit.

Nature-Based Solutions: They are solutions that utilize natural processes and ecosystems to address environmental challenges, such as restoring and protecting natural ecosystems like wetlands, and forests, mitigating climate change impacts by reducing water pollution and improving air quality; while providing benefits like biodiversity protection carbon sequestration, flood protection and supporting local economies through sustainable tourism/recreation activities.

Nutrient and Resource Flow Inventory: An inventory of the nutrients and resources flowing through an ecosystem to monitor their sources, sinks, and environmental impacts.

Planetary Boundaries: Scientists have identified physical, chemical and biological limits beyond which human activity may significantly affect Earth's environment. By understanding how Earth works and humans' interaction with it, they can make more informed decisions about using resources responsibly and sustainably.

Recover: Recovering materials from waste as raw materials helps reduce landfill accumulation and conserve natural resources. Recovered materials may be repurposed in their original form or processed for different products.

Recycle: Recycling is an effective way to reduce waste and conserve natural resources. It involves collecting, sorting, processing, and remanufacturing materials into new products. Recycling also saves energy, reduces greenhouse gas emissions, and creates jobs.

Reduce: Reducing waste and pollution can help safeguard the environment while saving resources. Strategies such as minimizing product packaging, using energy-saving appliances and transportation, and opting for products made with sustainable materials and production methods all play a role.

Refurbish: Refurbishing products are an economical way to conserve resources and money by restoring them back to their original condition or improving their appearance or functionality. Refurbishing typically involves fixing or replacing parts without significant alterations, unlike remanufacturing or rebuilding.

Refuse: Refusing unsustainable or unnecessary materials and products helps reduce waste and conserve resources, including using reusable bags and containers, selecting products with less packaging, and avoiding single-use items.

Regenerate: Regeneration is the practice of replenishing natural resources and ecosystems, such as soil, water, and biodiversity. Regenerative practices promote sustainable agriculture, forestry and land use, and help mitigate climate change's effects.

Regenerative by design: it is an engineering strategy designed to create self-sustaining and regenerative systems. This strategy considers a product or system's long-term environmental and social effects, striving to minimize negative impacts while amplifying positive advantages.

Regenerative Systems: Regenerative systems work to restore natural resources and ecosystems while providing economic advantages. They promote sustainable land use, agriculture, biodiversity preservation, and ecosystem health.

Remanufacturing: Remanufacturing involves disassembling, cleaning and rebuilding products back to like-new condition. This process helps conserve resources and money by extending the usefulness of items.

Renewable Loops: Closed loop systems that use renewable resources for production and consumption, thus decreasing reliance on nonrenewable resources.

Repair: Repairing products and materials can extend their usefulness, reduce waste, and conserve resources. Repair may involve correcting minor or significant problems and replacing damaged parts if necessary.

Repurpose: Repurposing products and materials for a new purpose can reduce waste and conserve resources, including using items for different purposes or creatively incorporating them into new things.

Resilient Economy: A resilient economy can withstand and rebound from shocks and stresses. Resilient economies prioritize sustainable practices that benefit communities as well as natural resources.

Resource Loops: Closed loop systems in which resources are reused or recycled, reducing waste and conserving natural resources like energy and raw materials.

Rethink: Reexamining how we consume and utilize resources can reduce and conserve waste, considering both our actions' environmental and social impacts and making sustainable choices.

Reuse: Reusing products and materials can reduce waste and conserve resources, using items multiple times or finding creative ways to incorporate them into new products.

Secondary-use materials: Repurposed or recycled materials that can be put to another use, involving utilizing components from one product in another or finding creative services for them in nontraditional settings.

Social and Economic Growth: Social and economic growth is the increase of goods and services produced over time. Sustainable social and economic development occurs through responsible practices prioritizing people's well-being and the planet.

Symbiotic Resource Use: Symbiotic resource use involves making decisions that benefit multiple parties, including the environment, businesses and communities, and promotes sustainable practices and long-term viability for everyone involved.

Systems Thinking: Systems thinking is an approach to problem-solving that recognizes the interconnected nature of all elements within a system. This requires taking into account interactions and feedback loops between different parts and understanding how changes in one area can have ripple effects throughout the whole thing.

Systems-focused Approach: A systems-focused approach emphasizes the significance of considering the entire system when making decisions or taking action, considering connections and relationships among different parts of the system and considering how decisions affect it as a whole.

Total Cost of Ownership: The total cost of ownership accounts for all costs associated with owning and using a product, such as maintenance, repair, and disposal. By considering this comprehensive picture, consumers can make more informed purchasing decisions that promote sustainability and cost efficiency in the long run.

Upstream (upcycling) resource flow: Upcycling involves using waste materials as inputs for creating higher-value products, helping reduce waste, conserving natural resources, and creating economic value from materials that would otherwise go unused.

Urban Metabolism Assessment: An urban metabolism assessment involves examining an urban area's material and resource flows. This helps identify patterns and trends in resource use as well as waste generation, which can inform strategies for more sustainable and efficient resource usage.

Vertical Farming: Vertical farming is an agricultural practice in which crops are grown vertically stacked layers, often in a controlled environment. This technique permits the year-round production of crops while conserving water and other resources through hydroponic or aeroponic systems.

Virgin Raw Material: Virgin raw materials refer to materials that have never been used or processed before. These often come from nature and can have significant environmental consequences, such as habitat destruction and pollution. We can reduce these impacts while conserving natural resources by using recycled or repurposed materials instead of virgin raw materials.



The Strategy is a guiding approach for the City and Richmond stakeholders to update and strengthen policies, strategies and plans that support the regional innovation ecosystem. This Strategy will contribute to implementing circular principles in alignment with City policies, strategies and plans. It will also encourage stakeholders to adopt or update their circular economy strategies, plans, and measures.

The transition to the circular economy in Richmond will be systemic, deep, and transformative. It will sometimes be disruptive, but it will always be fair. It will require alignment and collaboration of all stakeholders at all levels - local, regional, national, and international.

The Strategy is guided by six directions and 84 actions to set Richmond on a path to becoming 100% circular. The Strategy will facilitate Richmond to move toward a circular economy, improving economic and environmental outcomes by continuously pausing, rethinking and acting to reuse, remanufacture, and recycle resources, materials, and nutrients.

RICHMOND CIRCULAR CITY STRATEGY

APRIL 2023

