



# From Pipe Dreams to Healthy Streams

*A Vision for the Still Creek Watershed*



**The Integrated Stormwater  
Management Plan for the  
Still Creek Watershed**

**DRAFT**  
May 2006





**FROM PIPE DREAMS TO HEALTHY STREAMS:  
A VISION FOR THE STILL CREEK WATERSHED**

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FOR THE STILL CREEK WATERSHED

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## EXECUTIVE SUMMARY

### Still Creek: 'From Pipe Dreams to Healthy Streams'

This is a vision for the enhancement of Still Creek and its watershed. But what and where is Still Creek? It seems few people know Still Creek or its tributaries unless they live or work near one of its water courses. While most area residents have likely crossed its narrow channel many times by road, they may not have noticed the creek below. During large rainstorms, however, Still Creek becomes highly visible when it floods low lying areas, disrupts businesses and creates public inconvenience.

Still Creek, once a salmon bearing stream, remains a major identifying feature in this part of the Lower Mainland and part of the Brunette River system. Today, its physical appearance is understandably much changed. Dense urbanization has impacted the entire Still Creek watershed and buried or channelized large sections of the creek system creating rainwater management (flooding) issues, environmental damage (poor water quality and degraded wildlife habitat) and lost recreational opportunities.



*Encroaching urbanization reduces riparian habitat and runoff buffering capacity – Still Creek.*

Despite 100 years of urbanization, most of Still Creek remains open. The Creek flows into one of the major habitat

reservoirs in the Lower Mainland – Burnaby Lake Regional Nature Park. This area is critical for Lower Mainland biodiversity supporting over 210 species of birds, including the Great Blue Heron, over 15 mammal species and 14 species of amphibians and reptiles along the lower reaches of Still Creek and its tributaries - Beecher, Crabapple, and lower Guichon Creeks. In the process of developing new neighbourhoods and industry, it became evident that a better job needed to be done to protect these creeks and make use of the unique recreational opportunities they provide.



*Protecting natural areas for wildlife and recreational use - Renfrew Park, Vancouver.*

In the course of developing this Plan, a number of initiatives have already begun such as enhancing creek sections, daylighting enclosed portions, building connecting trails and generally elevating the profile of Still Creek. These steps are part of a new direction for managing changes in the Still Creek watershed. This Plan helps to harness and organize the collective efforts required by governments, land owners, streamkeepers, and communities to mitigate flooding, improve water quality, create new recreational spaces and recapture and enhance important pieces of the Still Creek system for all to enjoy.



## Why an “ISMP”?

The ISMP is unique in integrating land use planning with flood management, environmental protection, and recreational enhancement strategies and initiatives, hence the formal name - The *Integrated Stormwater Management Plan*.

Achieving the Plan’s Vision requires a range of actions all working together. Rainwater management initiatives include: reducing hard surfaces and using permeable paving; using absorbent soils in landscaping; and creating vegetated swales in parking areas. Recreation initiatives include reconnecting people with an enhanced Still Creek through a comprehensive system of parks, green spaces and trails. Environmental initiatives include improvements to stream habitats, public education on the natural water cycle and careful disposal of toxic substances.

Ultimately, by the year 2055, flooding damage should be reduced despite increased building in the watershed, the water will be safe for human contact,



*Connecting people with the environment – public education.*

## How was the Plan developed?

The plan was developed by a core team from the City of Vancouver, City of Burnaby, and Greater Vancouver Regional District. Other key players included:

- British Columbia Institute of Technology (BCIT),
- streamkeepers,
- Department of Fisheries and Oceans (DFO), and
- local residents and landowners who shared their ideas in working sessions and open houses.

These ideas were then integrated into a vision, and goals and actions incorporating shared values and a new perspective on the Creek’s role and importance.



*Maintaining urban green spaces for recreation – Still Creek canoeist.*

there will be more natural areas and the Still Creek corridor will be a connected system of unique natural green areas - a major recreational asset for people in Burnaby and East Vancouver.



## The Still Creek Vision

*The Vision for the Still Creek watershed is:*

***To protect or enhance the aquatic and terrestrial ecosystems and the human populations they support in an integrated manner that accommodates growth and development.***

This Vision embraces the concept of “natural capital” – the value of nature as an essential part of our economy, and the fundamental interdependence between the health of our natural environment and human health and well-being. This philosophy is the basis for a growing trend towards more environmentally sensitive land use practices generally, and in particular where watercourses are present. The Integrated Stormwater Management Plan (ISMP) provides specific goals and directions under three key areas: Rainwater Management, Environmental Protection and



*Creating streamside areas for social and educational benefit.*



*Protecting and enhancing stream habitat and wildlife habitat*

Recreational Enhancement to protect and enhance the “natural capital” of the Still Creek watershed.



*Managing Rainwater naturally – street side vegetated swales.*



## A Brief History of Still Creek

The theme of Still Creek as a centrepiece of a system of parks and greenways running from Vancouver to Burnaby Lake is not new. In the early 20<sup>th</sup> century, Still Creek was a favourite destination for local residents – picnicking and fishing along the banks, and swimming in the slow-moving water. In his 1929 plan for Vancouver, Harland Bartholomew envisioned the Creek as part of his “Parks and Pleasure Drive” system connecting Vancouver and Burnaby.

Throughout the 1950s and ‘60s, buildings were located directly on the Creek’s edge in anticipation of a completely enclosed system, creating flood risk, erosion, poor water quality and related problems. Before Full culverting was complete, however, the philosophy of stormwater engineering shifted back to the preservation of more natural, open streams. Consequently, there is now a legacy of a mixed “controlled/natural” system.

Land development created large paved surfaces and piped stormwater to the creeks. The large quantity of water that previously soaked into the ground, or was intercepted and used by vegetation, became overland flow. This resulted in a major increase in the rate and volume of water carried by the Creek during rainstorms and much reduced flows in the dry periods – both



*Culverting Still Creek near 29<sup>th</sup> Avenue – Vancouver, 1960.*

Bartholomew’s Vision never took hold and in the rapid urbanization of Vancouver and Burnaby, engineered solutions prevailed and sections of Still Creek and its tributaries were culverted, channelized, and relocated to move water quickly and efficiently and to reduce the flooding risk.



*Historic Streams in the Region*



*Placing the culvert to enclose Still Creek – Vancouver, 1955*

destructive to the Creek ecology. It also limited the ability of the watershed to naturally filter sediments and pollutants before they enter the creeks and Burnaby Lake.

While we can’t turn back the clock, there are many opportunities to preserve and enhance what remains and recapture pieces of what has been lost.



## The Watershed Perspective

While a restored Creek and its tributaries (including Beecher, Guichon, Chub, and Crabapple Creeks) is the centrepiece of the Vision, the health of Still Creek and its tributaries is directly affected by land use activities within the entire watershed – that is, all the lands that drain to Still Creek, the Brunette River basin and eventually into the Fraser River. To make a meaningful impact, we must change land use practices in the entire Watershed. These include decisions to choose ‘green’ permeable surfaces over hard ones, to add landscaping and to prevent harmful materials from entering the Creek. These types of individual

and collective actions throughout the Still Creek watershed will give life to the main objectives of the ISMP contained in the following eight goals.

### Rainwater Management

1. Reduce flood impacts on people, property and the stream channel and strive to restore a more natural flow regime.
2. Reduce stream erosion and downstream sedimentation to levels approaching a more natural system.



*Integrating rainwater management into residential landscaping.*



*Natural stream bed*



*Treating road runoff naturally - street trees & bio-swale.*

## Environmental Protection

1. Protect and enhance streamside and aquatic habitats.
2. Protect and enhance urban forest and terrestrial habitats.
3. Protect and improve water quality.
4. Maintain and augment native species biodiversity.



*Protecting and enhancing wildlife habitat, e.g. Great Blue Heron.*



*Protecting existing natural areas.*



*Monitoring the environment  
- water quality sampling.*

## Recreational Enhancement

1. Connect people with the watershed and its streams.
2. Providing stream-related education.



*Connecting people to the stream by  
providing quiet rest spots.*



*Creating learning opportunities along the  
creek - Still Creek 'Stream of Dreams' public  
art project.*



## From Vision to Action

The implementation of the plan requires a comprehensive set of government actions for physical improvements, revised land use development regulations, environmental monitoring, public education, and actions of support of people who work, live or develop land in the watershed. The plan outlines short-term actions that can build a foundation for the longer-term actions in each of the three key areas. The actions include both site-specific measures such as those to retain and infiltrate rainwater on sites and watershed-wide initiatives such as creating the trail network or developing a habitat improvement strategy.

Figure 4-1 captures a detailed vision for the Still Creek corridor to illustrate the key actions that are required to achieve the 2055 Vision.

The good news is that through the efforts of area streamkeepers, the Cities of Burnaby and Vancouver, and the GVRD, many projects have already been initiated that have begun to build momentum and interest in achieving the Still Creek Vision. The following are some visual images of what has been done and what is planned to date.



*Planting native species  
– Renfrew Ravine community  
planting (photos: Carmen  
Rosen & Shannon Campbell)*



*Using innovative technology and design  
to reduce runoff from road surfaces –  
Sustainable street examples, Crown  
Street (left) and 'Country Lane' (bottom  
left).*





Other projects still in the planning phase include the following:

- Significant recreational and educational projects:
  - The Central Valley Greenway construction will be complete by 2007 to allow cyclists, roller-bladers, and pedestrians to have a safe path from Vancouver, through Burnaby and the Still Creek Corridor to New Westminster.
  - Pedestrian side-trails including trails east and west of Willingdon Avenue, viewpoints to Still Creek, and the trail system along Beecher Creek.
- Significant habitat improvement projects are underway, including:
  - transformation of industrial lands near Chub Creek into eight acres of park (Jim Lorimer Park), conservation lands, biofiltration ponds and trails.
  - Crabapple Creek habitat improvements.
  - Rehabilitation of seventy metre section of Still Creek, Danier Leather site in Vancouver.



*Creating recreational trails*



*Enhancing stream habitat – Danier Leather site in Vancouver*



*Developing Greenways for pedestrians and cyclists that feature drought tolerant landscaping – Central Valley Greenway*



- New stormwater management measures are being implemented in both Burnaby and Vancouver, including:
  - Innovative on-site stormwater management measures such as the biofiltration ponds and trails in Bridge Business Park and Brentwood town centre.
  - Multi-use green roofs over both parking lots and buildings (e.g. the new Electronic Arts expansion near Guichon Creek,

which will be a LEED-registered green building).

- Research into the stormwater and energy benefits of green roofs at the award-winning BCIT Green Roof Research Facility.

These projects are all creating momentum and propelling the vision of the Still Creek ISMP forward.



*Green roof – close-up of GVRD building on Kingsway in Burnaby.*



*Green building with green roof – design concept for Electronic Arts building in Burnaby.*



*Biofiltration pond – Bridge Business Park in Burnaby.*





## What's Next

After adoption of the Plan by the Council's of Burnaby and Vancouver, a series of steps will be implemented to build partnerships with the public, private industry and other government agencies, and to develop a strategy to integrate Plan actions with corporate objectives and financial resources.

Looking forward to 2055, the Plan provides a road map to harnessing community growth and change that provides a healthier and more livable vision for the Still Creek corridor, its watershed and its residents. The vision is ambitious, but the rewards will make the effort worthwhile.

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### Other Stakeholders

Still Creek Stewardship Society  
Beecher Creek Streamkeepers

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## Chapter 1: Background

Without a holistic approach, urban growth and development can place pressure on watersheds leading to flooding, environmental damage, and a disconnection between residents and their local waterways. With this in mind, planners, engineers, parks personnel, watershed residents and other stakeholders together developed a plan and a roadmap to follow as the Still Creek watershed evolves over the next 50 years.

This report provides an overview of the process, reviews the issues and outlines the vision, goals and strategies that will allow the watershed to evolve over the next 50 years. This plan's three key areas of rainwater management, environmental protection, and recreational enhancement are integrated in a manner that reflects the vision and

allows the watershed population to grow, but grow in a sustainable manner.

Technical appendices are available which describe in more detail, the ideas contained in this ISMP.

### ***An Integrated Plan***

An Integrated Stormwater Management Plan (ISMP) is designed to harmonize all aspects of rainwater management within a watershed. This new type of approach is an attempt to integrate watershed, catchment, master drainage, and rainwater plans, with relevant municipal planning processes such as Official Community Plans, Neighbourhood Concept Plans, recreation and parks plans, and even strategic transportation plans to address the impacts of rainwater on community values. Each of the





GVRD's member municipalities have agreed to undertake ISMPs on all local waterways by 2014.

### ***The Still Creek ISMP***

The particular emphasis of each ISMP is generally determined through an interactive public input process. In short, the previous montage of pictures represents the philosophy of most ISMPs. The Still Creek ISMP presents an opportunity for watershed residents and others to input into changes in the Still Creek Watershed over the next 10 to 50 years. It provides an opportunity

to help reduce the cumulative impacts of urbanization and to shape the watershed's future. Although rainwater management can be broad in nature, the Still Creek ISMP focuses on three key areas identified through public input sessions—**rainwater management**, **recreation**, and the **environment**—with the vision of managing the Still Creek rainwater cycle in a sustainable manner that conserves and enhances the watershed's natural hydraulic flow regimes and rainwater quality while accommodating growth and development. Many community values are captured within the umbrella of these key areas.





## Where is the Still Creek Watershed?

The Still Creek watershed is located in the Central Valley of the Lower Mainland of British Columbia (see Figure 1-1). The watershed covers an area of about 28 square kilometres with two thirds in the City of Burnaby and one third in the City of Vancouver.

The Creek was once a vibrant part of the local communities. There are many anecdotal stories of people catching large numbers of fish, and families picnicking along Still Creek, with their children swimming in the slow moving waters. Over the years, the creek has



*Recreational pathway and maintenance access road - Still Creek Burnaby*

been piped, channelized, and relocated several times, to meet the needs of an ever-growing society. Today, the mainstem of Still Creek begins in the Metrotown area of Burnaby where the original tributary channels have been replaced by underground piping systems. It flows westward in pipes into Vancouver where the creek emerges in the relatively undisturbed Renfrew Ravine and then flows through a channelized section in Renfrew Community Park. It is then piped

through a fairly steep residential neighbourhood to re-emerge in the Grandview-Boundary Industrial area where it generally remains above ground for the remainder of its length eastward to Burnaby Lake, with the exception of a few lengthy road culverts. There are several other tributaries within the watershed that flow into Still Creek.

Some of the larger ones include Chubb Creek, Beecher Creek, and Guichon Creek.

Numerous other smaller creeks flow into Still Creek as well (see Chapter 3 for details).

The watershed is home to about 100,000 residents and over the next 50 years that number is expected to increase to 150,000. Although this anticipated urban growth will place more pressure on the watershed, it also provides an opportunity to enhance the built and natural environments, while improving the existing and restoring some of the former recreational amenities of the waterways. For example, much of the new population growth is being accommodated on old industrial lands that have been cleaned up and re-zoned to residential towers surrounded by greenspace. The watershed is home to an abundance of wildlife including beavers, herons, fish, river otters, and coyotes. A small percentage of the watershed remains as green space or parkland. Still Creek and its tributaries currently offer some isolated recreational opportunities through public pathways, and informal trails.

"April 14, 1892. Still Creek in that day was a tortuous stream. The banks were lined with willow scrub and towards its lower end the low-lying land on either side of the stream was covered in a thick growth of wild crabapple. Wide-spreading lily pads of richest green floated on the waters and were interspersed with the aromatic blooms of yellow and white"  
*Excerpt from: History of Burnaby and Vicinity by George Green*  
 Copyrighted 1947, p 109-110



## History of the Creek

How did we get to where we are today? Vancouver was once a place of many streams, filled with salmon and trout, surrounded by a dense forest, and home to countless wildlife. Over the last 100 years, these streams have been lost – filled-in or buried in culverts. The locations of these historical streams are illustrated in Figure 1-2.

First Nations stories have long described Still Creek as a corridor used to move throughout the Lower Mainland area. Still Creek is more recently referenced after Europeans began exploring the region in the middle of the 19<sup>th</sup> century. It is described by one of the Royal Marines as a slow flowing river with an

The Vancouver Westminster and Yukon railway built a line from New Westminster to Vancouver. It followed the current line to the vicinity of Still Creek then crossed over the height of land around Trout Lake, then down to False Creek. It followed the south shore of False Creek (which at this time extended to Clark Avenue) to just past Main Street. Then it crossed False Creek at about Quebec Street (the bridge supports were at the east end of False Creek, now buried under Science World). The original VW&Y station was in China Town which became the Marco Polo restaurant (now torn down). Eventually, a new line was built (the cut) and the fill from the cut was used to fill in the east end of False Creek to make land for railway yards.

almost imperceptible motion similar to a canal. The watershed was always a central part of the early settlers lives as the majority of it lay between the new cities of New Westminster, and Vancouver.

In 1904, the first railway line was laid through what is now referred to as the Central Valley. It was known as the Vancouver, Westminster and Yukon Railway and

was used to support logging and the transportation of goods.

As the watershed began to evolve into what society of the day demanded, the Vancouver and District Joint Sewerage and Drainage Committee developed a master plan that stated:

*"It is of utmost importance that the natural drainage channels of this district should be conserved and some sound policy of developing them to meet the demands of the future adopted...it may be suggested that if the trees are retained, a little further expense in the way of paths etc., will convert these ravines into attractive park areas, which will add to the value of adjacent districts" ...R.S. Lea 1913*

Much of the early development occurred in the upland areas of the watershed. The lowlands were left as swampy area, with some businesses setting up shop. However, due to the rapid population growth in the watershed, development pressure began to build on the lowlands. The upland areas were beginning to fill out, and the lowland areas became more attractive as businesses set up to serve the area residents. Building in this area was seen as risky as the lands were prone to flooding, and offered poor foundations. As the uplands further developed and the natural surfaces were converted to roads and buildings, there

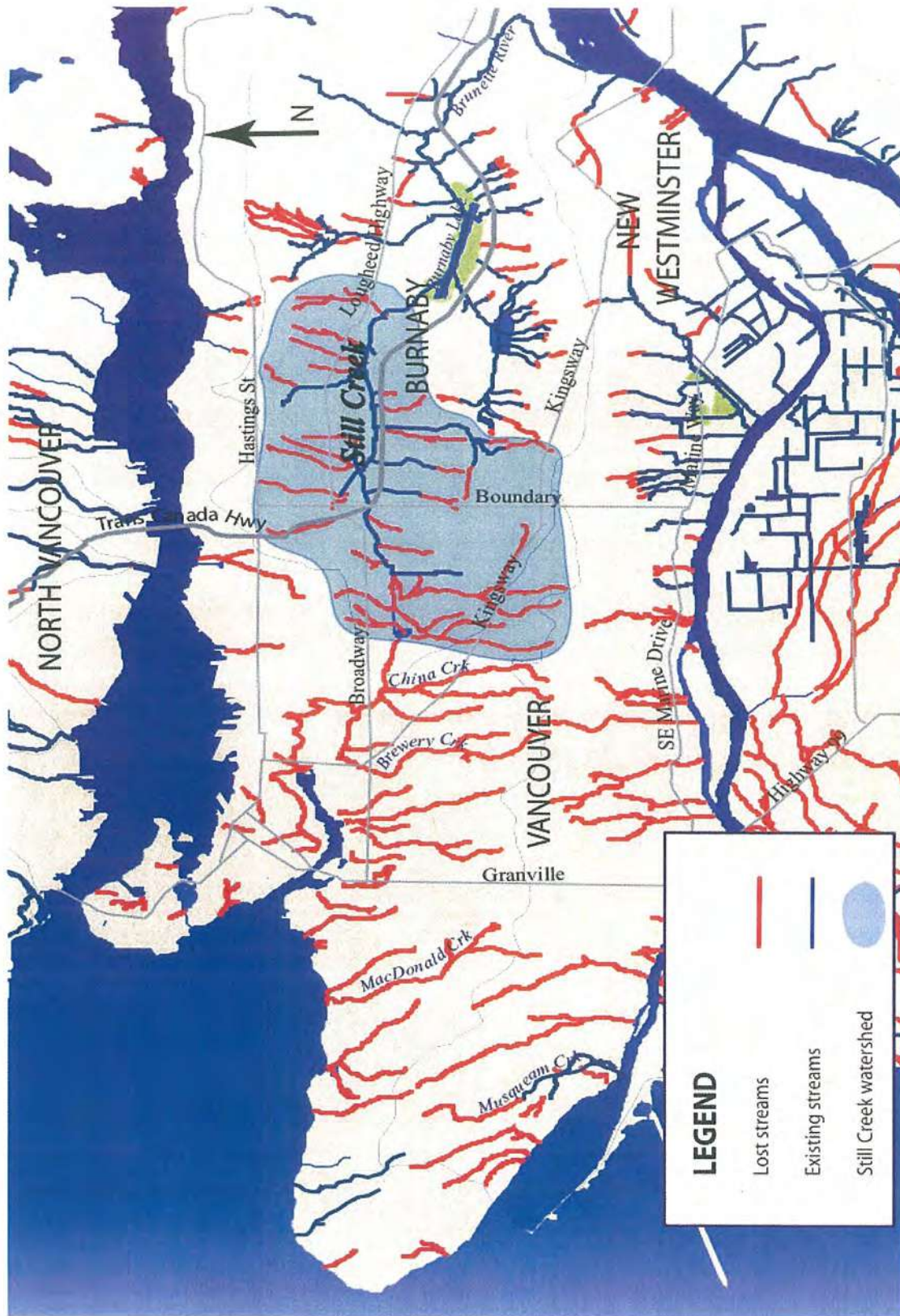
### Royal Engineers

This river [Still Creek] runs into a lake but with an almost imperceptible motion, it is also much deeper than any other part of the latter that I sounded. Its average depth being three fathoms, it also winds in small turns of every fifty of sixty yards but its general bearing is West, its shores are swampy and covered with alder, its general appearance might be likened to a Canal.

On the fourth day I tried to get up the River at the head of the Lake further than Captain Bazalgette had been but after three miles the snags were so numerous from the fallen trees that I found the labour of getting the Canoe over too great to proceed much further than he had already been the depth of the River continued the same at this point – it also flows through a perfectly unbroken valley which heads due West to Burrard Inlet.

*Lieut. G.S. Blake,  
Royal Marines Light Infantry,  
1859*





**Figure 1-2: Historical Streams in the Region**



was a tendency for the creek to flood more often. After a series of major floods that occurred during the '20s and '30s in the Still Creek watershed, lowland landowners demanded that something be done to relieve the flooding. It was determined that the best course of action for the residents of the region was to channelize and deepen Still Creek. This occurred throughout the Depression years and into the 1950s.



*Still Creek Channelized c 1935*

Eventually, in the 1950s a major report which was to set the direction for urban sewerage and drainage management for many years—the Rawn Report—was produced by the Vancouver & Districts Joint Sewerage & Drainage Board (precursor to the GVRD) which among other things stated:

*"It is proposed that Still Creek be eventually enclosed in suitable conduit from the vicinity of Renfrew Street in Vancouver to the vicinity of the upper end of Burnaby Lake"...A .M Rawn 1953*

The Rawn report is the basis for why the creek appears as it does today. As it was anticipated the creek would be enclosed, developments were allowed to encroach much closer to the creek than is allowed by today's standards. Streamside vegetation was removed along much of the creeks, and many of the tributaries were enclosed.

In 1973 Burnaby prepared a report entitled "Still Creek Walkway Study", which adopted the principles of:

- 1) *a pedestrian walkway along Still Creek between Burnaby Lake and Boundary Road, and*
- 2) *Still Creek be retained as an open waterway.*

In 1976, the City of Vancouver adopted a series of recommendations for Still Creek which included:

- 1) *No further enclosures of Still Creek south of Grandview Highway, and*
- 2) *East of Cornett Road, Still Creek be kept open where it is adjacent to a road or public access.*

The GVRD amended the Rawn Report to reflect these new policies. By this time, the area of the watershed surrounding the creek had felt the full



*Still Creek near 29<sup>th</sup> Ave Vancouver 1960*



impact of urbanization and in 1985; the Vancouver Health Department recommended to Vancouver City Council that the recreational use of Still Creek be discouraged by placing signs warning the public that the creek was unsafe for water contact. The report also recommended that Vancouver and Burnaby continue to work toward eliminating the sources of pollution.

Throughout the last decade, land use decisions have begun to reflect the community's wishes for the greening of the watershed. Rainwater management policies to reduce the impacts of rainwater runoff on the drainage system and the environment have been implemented. Greenroofs, raingardens, pervious parking surfaces, and wetlands have become common sites in new developments. Chapter 2 presents some of these and other initiatives that are already underway.



*Biofiltration wetland - Burnaby*

## ***Achieving a Healthy Stream***

The intent of this plan is to ensure that growth in the Still Creek Watershed is sustainable. Chapters 2, 3, and 4 help to set the context, explore some of the issues, and provide examples of where the watershed is headed over the next 50 years. Chapters 5, 6, & 7 lay out the goals; strategies and actions associated with the Plan, and Chapters 8 & 9 provide a roadmap to follow in order to achieve the vision.



*Greenroof over parking and business - Burnaby*



*National Works Yard—Greenroof and rainwater re-use-Vancouver*



**The Evolution of Rainwater Management – from Pipe Dreams to Healthy Streams**

A paradigm is defined as a way of thinking about something. Rainwater management in general has undergone a series of paradigm shifts over the past 150 years. The Still Creek watershed has mirrored these shifts in thinking. Figures 1-3 to 1-5 reflect the progressive transformation of the Still Creek watershed over the past 100 years from natural forest and farmland to urbanized city. As seen in Figure 1-3, the early settlers in the area were primarily involved in logging and agriculture. As such, rainwater runoff was treated as it would be on most farms, and was directed away in ditches. At the time, Still Creek was seen by some as the largest ditch in the area, so much of the runoff was directed toward it. Around the 1920s a new paradigm began to emerge, resulting from an expansion in urban living. This new paradigm recognized that the best way to deal with rainwater runoff, was to put it into pipes, and pave the area for development. Figure 1-4 reflects this way of thinking, as the watershed set the roots for its booming population growth. This paradigm lasted until the early 1970s when another way of thinking emerged. Instead of piping the rainwater away, leading to potential floods in other locations, the new idea was to keep waterways open, and to reduce the impact of runoff, by building detention ponds to hold the water and release it slowly when the weather dried up a bit. Today, the thinking has shifted more towards an ecological focus that sees rainwater and runoff as parts of the natural water cycle and tries to use rainwater as a resource and amenity, rather than a waste. The current focus is to integrate the natural and built environments and to more closely follow the natural water cycle. Figure 1-5 depicts the results of past cumulative impacts of urbanization on the watershed, but also demonstrates that there is a basis for today's more ecological approach. Parks and greenspace remain, and many of the waterways are still open.





First Nations people used the area as a seasonal food gathering site. Elk, deer, bears and wolves were still in the area into the 1910s



Still Creek watershed was especially fertile and used for farming and logging. The absorbent soils retained the rain and soaked up much of the run-off.



Early logging of the area changed the native landscape radically. Some areas were used for farming activities and residential purposes.

# Still Creek Historical Conditions -1890s-1930

## 1890s-1910

Estimated Population

1890 - 250

1910 - 2000

Land Use:

First Nations camps

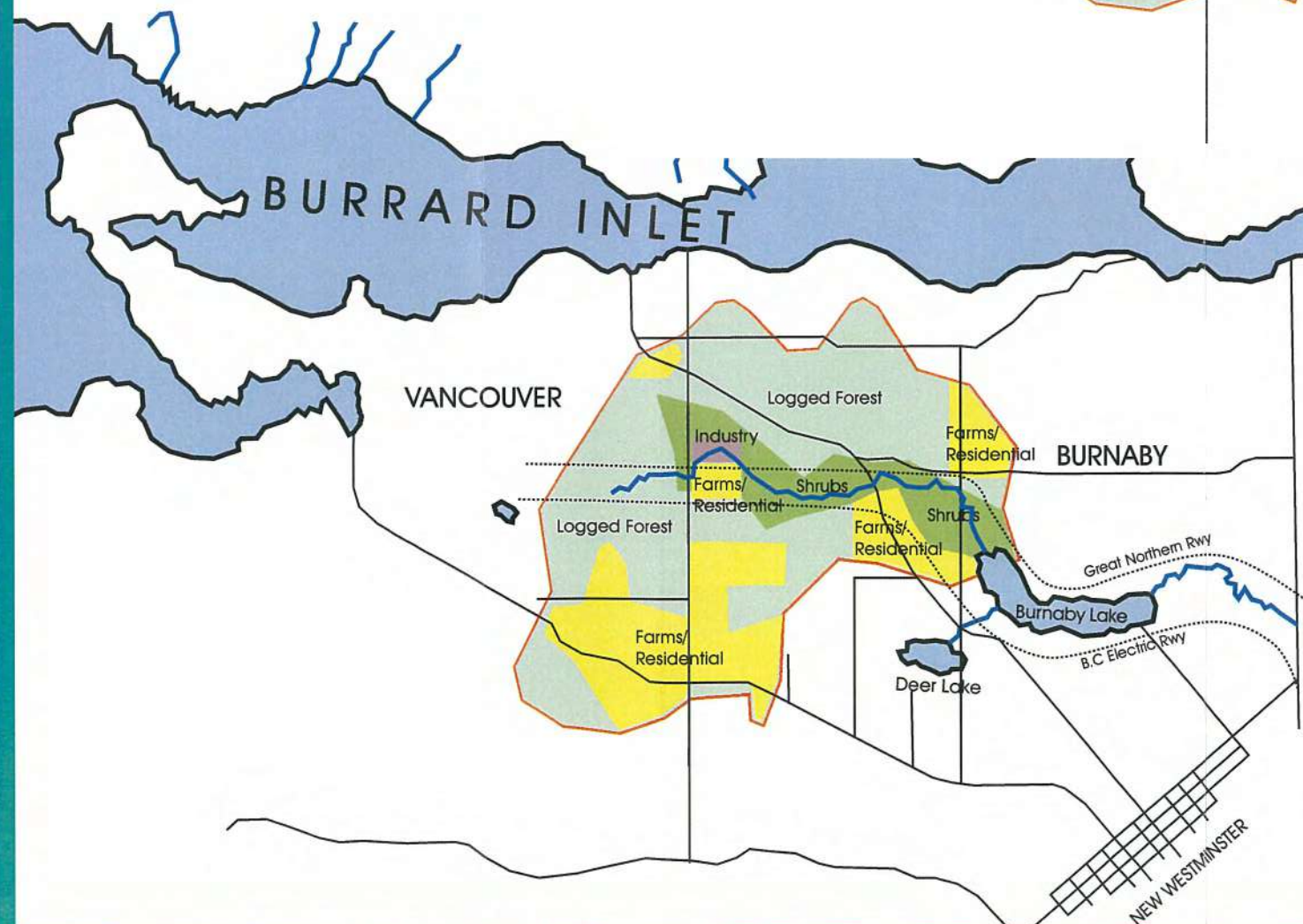
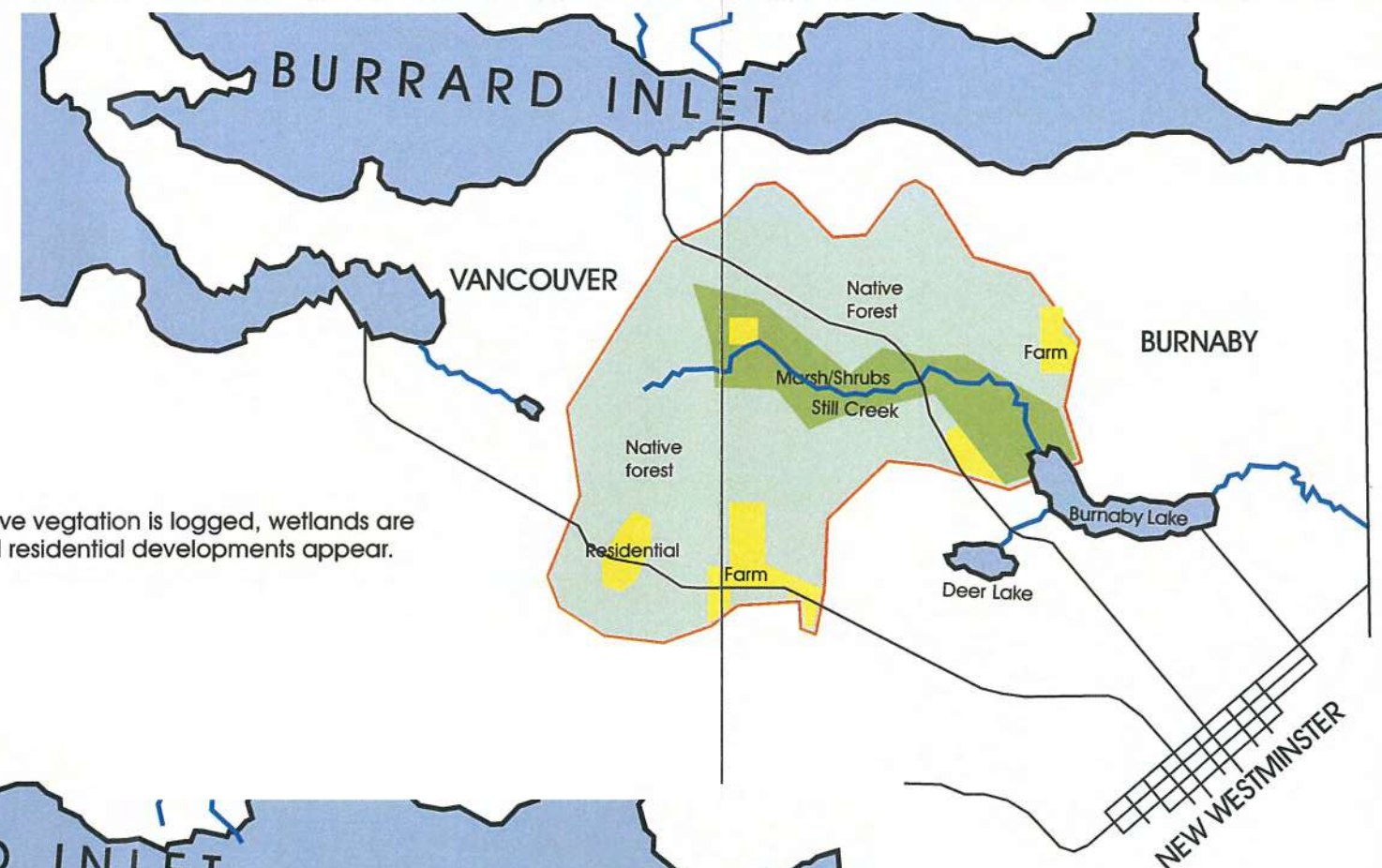
Logging camps and sawmills

Farming

Residential use (beginning)

Development Issues:

The watershed begins its transformation. Native vegetation is logged, wetlands are ditched and drained, and the first farms and residential developments appear.



## 1910-1930

Estimated Population

6000

Land Use:

Farming

Residential

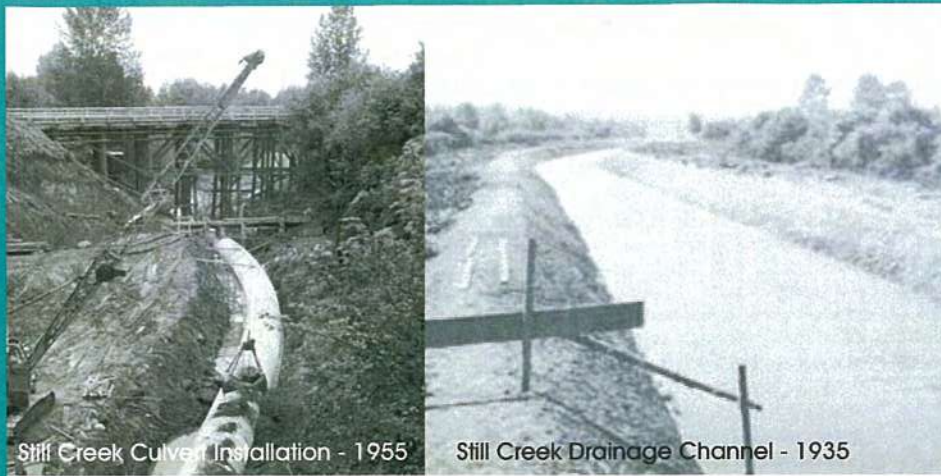
Industrial

Development Issues:

A network of roads and railways emerge, serving the growing watershed population. The first industrial plant is constructed on Still Creek within the creek floodplain. Efforts to manage natural flooding and stormwater issues begin. Park concept proposed for Still Creek and Burnaby Lake



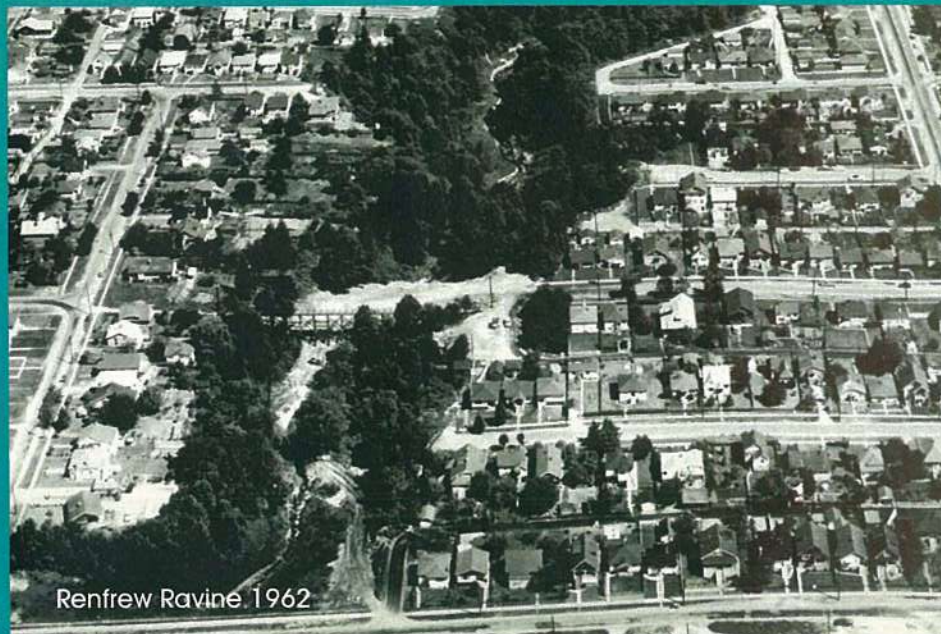
# Still Creek Historical Conditions - 1950s



Still Creek Culvert Installation - 1955

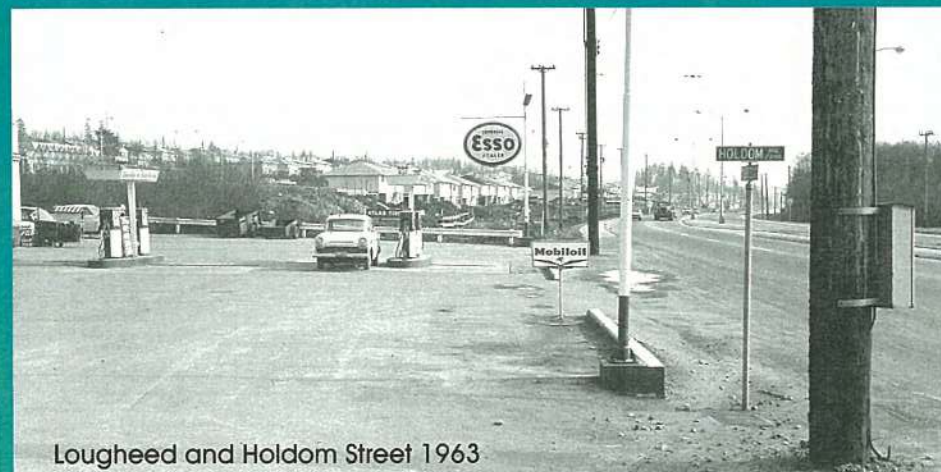
Still Creek Drainage Channel - 1935

Many of the natural watercourses were piped or channelized in the mid-1900s in attempts to improve its drainage efficiency. Flooding nonetheless continued.



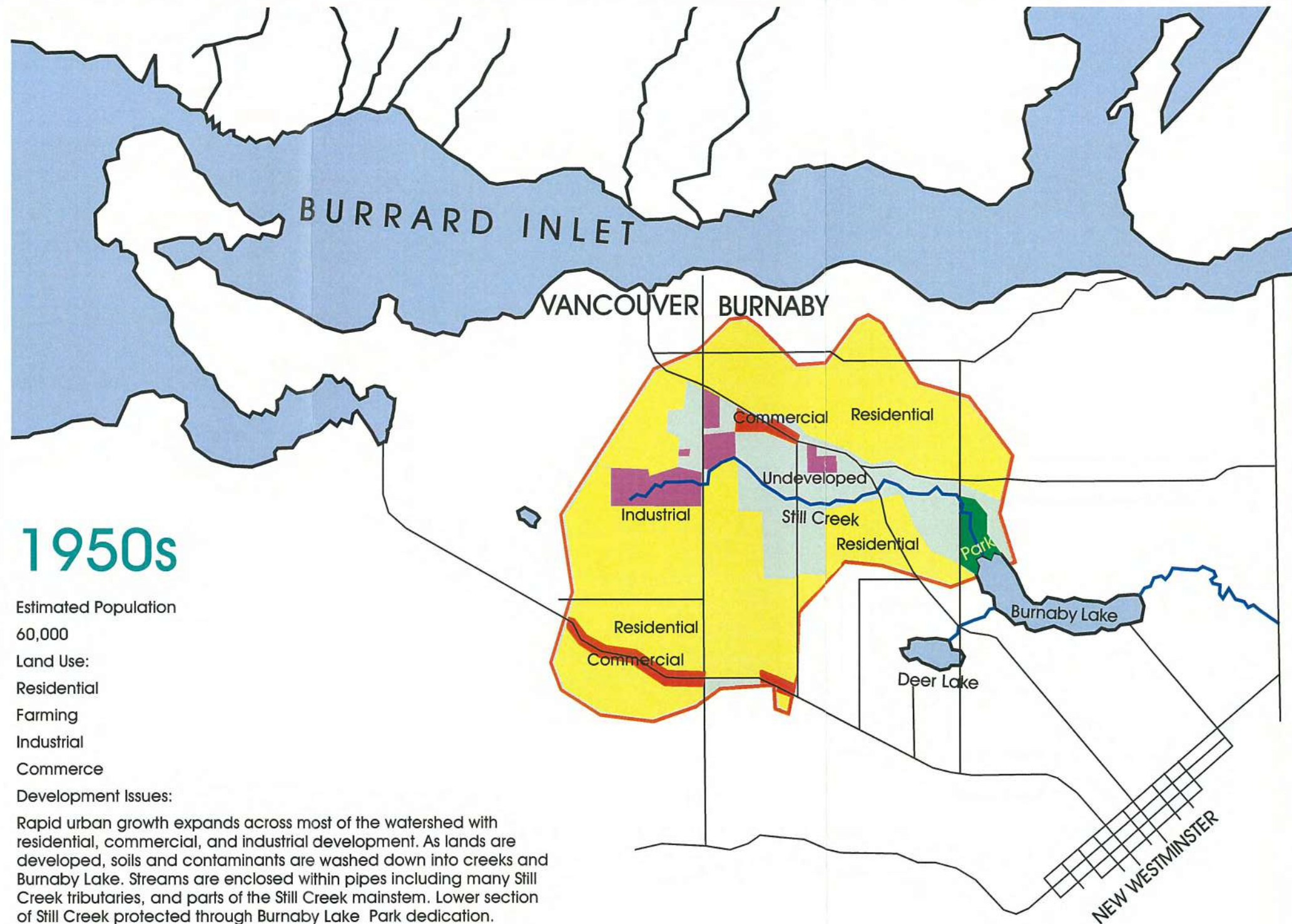
Renfrew Ravine 1962

Only portions of the original creeks were retained as Parkland when the development of the uplands took place. This discontinuity caused damage to the environmental value of the watercourses.



Lougheed and Holdom Street 1963

The post-war baby boom triggered a burst of residential and commercial construction resulting in the paving of much of the landscape. This increased the stormwater runoff and put strain on the drainage systems.



## 1950s

Estimated Population

60,000

Land Use:

Residential

Farming

Industrial

Commerce

Development Issues:

Rapid urban growth expands across most of the watershed with residential, commercial, and industrial development. As lands are developed, soils and contaminants are washed down into creeks and Burnaby Lake. Streams are enclosed within pipes including many Still Creek tributaries, and parts of the Still Creek mainstem. Lower section of Still Creek protected through Burnaby Lake Park dedication.

Figure 1-4



# Still Creek Existing Conditions - 2005



Flooding of Still Creek

Still Creek has been impacted by development in the Watershed, with an increase in surface runoff and stream degradation. This has resulted in chronic flooding and loss of fish habitat.



Pedestrian Path in Renfrew Park

Green spaces within the Watershed are small-scale and discontinuous.



Industrial and Commercial areas occupy the heart of the watershed; with Residential areas surrounding it. The watershed is fully built out and is undergoing large-scale redevelopment with higher population densities.

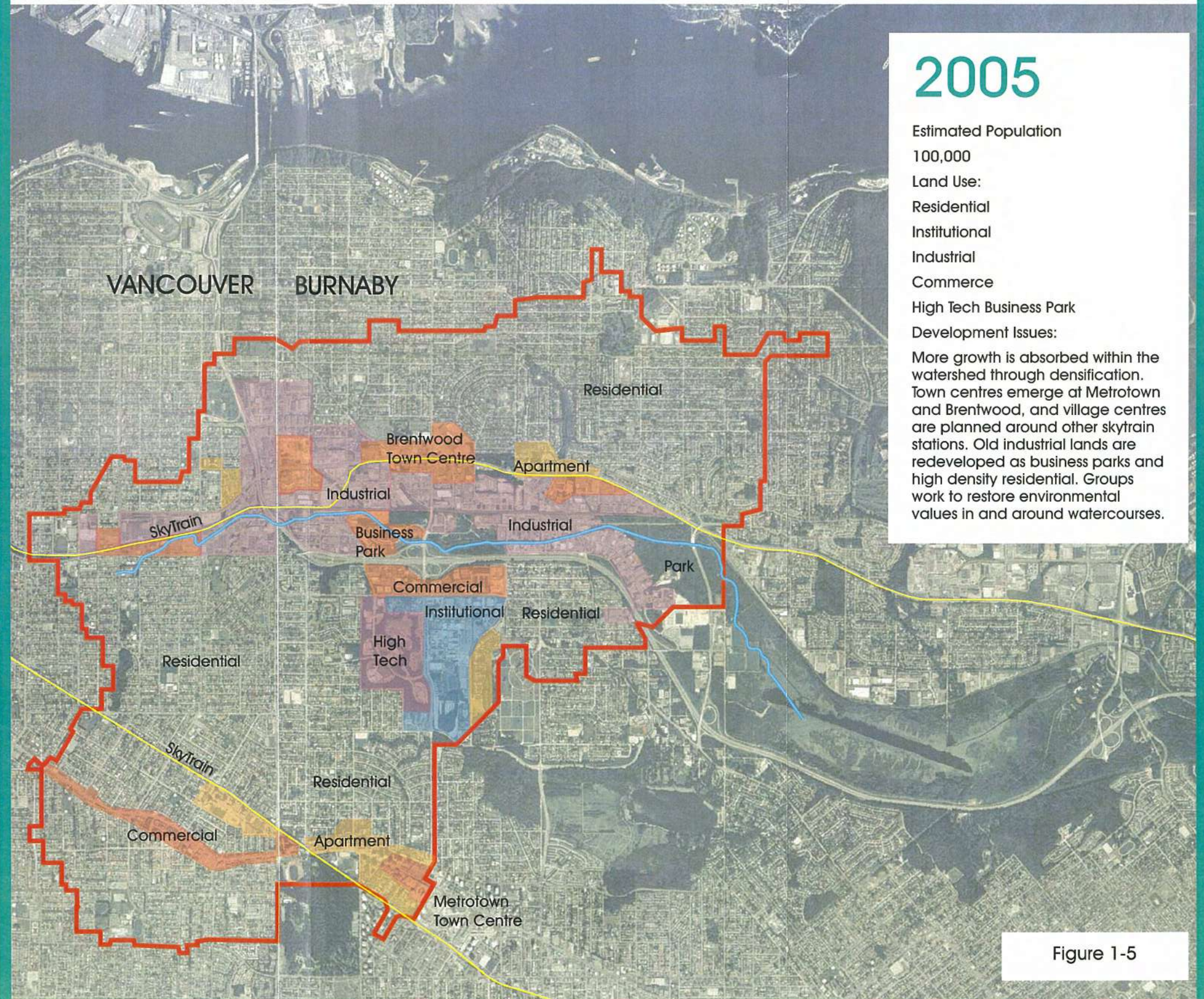


Figure 1-5



## Chapter 2: Context and Issues

### Partnership

The Integrated Stormwater Management Plan for the Still Creek watershed is a collaborative effort of the Cities of Burnaby and Vancouver, and the GVRD. In partnership with watershed residents, this plan was developed to best meet the needs of the varying stakeholders. In the Still Creek watershed, the role of managing rainwater runoff is shared by the municipalities and the GVRD. To streamline operations and maintenance issues, the GVRD was asked by Vancouver and Burnaby to manage flows within the mainstem of Still Creek. The tributaries and neighbourhood pipe systems are the responsibility of the individual municipalities. This ISMP allows for harmonization of management practices throughout the watershed, but as circumstances may differ in each municipality, the plan is designed to allow each jurisdiction the flexibility to choose when and where it will integrate the various strategies outlined in subsequent chapters.

### Process

One of the outcomes of the Still Creek ISMP is to re-connect people with their watershed. Consequently, a series of workshops and open houses have taken place providing opportunities for the plan to be reviewed and adapted to meet public expectations. Through the public process the plan evolved into its current form and reflects the input of the watershed community and the goals of the municipalities.

The following sections provide a brief introduction to the main issues addressed in the plan, many of which were identified by watershed residents.

### What is Rainwater Management?

In a natural landscape, one with trees, wetlands, and open areas, much of the rain that falls, is intercepted by plants and trees, with a good portion of the rest soaking into the ground. As a watershed urbanizes, the number of trees, and the areas available for rain water to soak into the ground are greatly reduced. Hence, the remaining water must be carried away. This is generally known as runoff. In a naturally forested environment only about 10% of the rainfall results in surface runoff. In a more heavily urbanized environment like Still Creek, more than 40% of that rainfall runs off quickly to the local waterways.

Rainfall around Still Creek is very familiar to long time residents. It rains a lot in this area, in fact, rain falls on 160 days in a typical year. In an average year, the watershed receives as much as 1500 mm of rain. Given that the watershed is 28km<sup>2</sup> that means an incredible 42 million cubic metres of rain falls into the watershed each year – that's enough to fill BC Place Stadium more than 20 times or Burnaby Lake over 25 times.

In the past, and even today, many residents have not given a second thought to what happens to the runoff. It is usually when a flood, or washout occurs, that people start to ask questions.



*Still Creek Flooding*



## Issues

### Continued growth and development

Urban growth and development have been linked to many of the problems observed in watersheds.

From flooding to water quality, to the environment, all have been impacted due to the pressures of urban development. Typical of urban creeks, large impervious areas in the Still Creek watershed create “flashy” stream systems that rise quickly to high velocities during storm events causing frequent minor flooding and erosion and occasionally significant flooding in low lying areas. Rainwater also conveys pollutants from vehicles and industrial sources, roadways parking lots, lawns and other hard surfaces to the creeks.

The challenge for this ISMP is to recognize that growth will occur in the watershed, and to manage that growth in an

integrated manner that takes into account the rainwater cycle, environmental, and recreational issues. This ISMP establishes that new development—along with redevelopment—offers opportunities to address some of the former challenges, and to reconnect residents with the waterways and natural environment in the watershed.

#### Biological Monitoring of the Still Creek Ecosystem

The Still Creek watershed is part of a unique pilot program to help monitor overall environmental health by monitoring a range of watershed species. One unique indicator that measures changes in the structure, diversity and abundance of benthic macroinvertebrate communities (bugs) is being used to assess the health of Still Creek watercourses. Unlike fish, benthic macroinvertebrate presence is independent of physical barriers and blockages, yet the index reflects the overall status and relative productivity of an ecosystem and can be monitored over time.

### Water quality

Water quality remains a major problem in the main stem of Still Creek mainly due to inappropriate sewer connections, urban contaminants and industrial runoff. Water quality is a good indicator of the ability of a watercourse to sustain aquatic life. Although the quality of water is much improved over the past 10 years, it is still poor overall and an impediment to the ecology and productivity of the stream.



*Water Quality Issues*

Water quality is particularly bad during the ‘first flush’, when contaminants that have accumulated on impervious surfaces and in the air during dry periods are conveyed to streams during the first rainfall, resulting in high initial concentrations of contaminants in watercourses. Usually, after the initial run-off, the levels of pollutants in the waterways decrease rapidly.

Narrow riparian areas, insufficient tree cover and channelization create high water temperatures, which contribute to low levels of dissolved oxygen, posing significant challenges to enhancing aquatic habitat.

One type of contamination – fecal coliform – led the City of Vancouver in the 1980s to recommend that the public not have primary contact with the water in Still Creek. Since that time, the Cities



of Vancouver and Burnaby along with the GVRD developed a monitoring program along Still Creek to help identify potential sources of contamination. The results have been improved fecal coliform numbers throughout the watershed, but there is still room for more improvement. Vancouver and Burnaby have source control programs that have resulted in the elimination of most industrial and commercial discharges to the storm sewer system. Vancouver and Burnaby have worked to eliminate sanitary sewer cross-connections in the past 10 years and so the majority of sources of coliform have been eliminated.

Other contaminants do remain, however, including residual coliforms and fecal coliform from waterfowl and domestic pets. Hydrocarbons and heavy metals from parking lots and roads, household detergents (car washing activities), and lawn care products (pesticides, fertilizers, etc) contribute significantly to the poor water quality. Pollutants may also be entering the water in Still Creek from contaminated sediments in the streambed as a result of historical activities.

The challenge for the ISMP is to continue to identify sources of pollution, and through source controls and other “green” programs, return water quality to a more natural state. However, because of the dense urbanization in the Still Creek watershed, it may be difficult to make large improvements to water quality.

### **Flooding**

Flooding occurs mainly along the middle and lower reaches of the main corridor of Still Creek. At the public open houses for the Still Creek ISMP, area

residents and businesses both identified this as a major concern. The flooding has become a chronic problem with many areas experience at least some inconvenience due to flooding several times a year. This does not include the large flooding associated with extreme rainfall events. These extreme rainstorms have occurred infrequently throughout the recorded history of the watershed, and have at least anecdotally produced flooding over large areas of the lowest parts of the watershed, generally from Burnaby Lake upstream to Gilmore Avenue.



*Still Creek Flooding*

The potential for source controls to reduce runoff volume for a developing land area was tested as part of the ISMP background technical evaluations. The results showed that for imperviousness values ranging up to 90%, as is representative of the Still Creek watershed, source controls such as raingardens, can be very effective. This type of approach is fundamental to the goals of reducing the impacts of flooding and

#### **Frequently Occurring Flood Events**

Historically, floods occur six to ten times per year and have been shown to be more severe in urbanized areas as a result of conversion from forested cover to impervious cover. These events can be mitigated using source control measures and other Best Management Practices (BMPs).

#### **Major Flood Events**

These are infrequent high intensity and typically occur near the end of a period of prolonged wet weather. They may occur only every 2-100 years, and require major conveyance systems to ensure the safe passage of infrequently occurring floods.



improving the Creek's environmental qualities. The incorporation of a variety of source controls and the use of BMPs generally within the Still Creek Watershed will reduce the risk of nuisance flood damage and increase the water quality in the creeks over the medium to long-terms. The challenge for the ISMP implementation is to introduce these practices in a comprehensive and cost-effective manner.

### Environment

The watershed is highly urbanized, with only 20% covered in vegetation, and only 6% of the area being in "natural vegetation" (forest, shrubs, and wetland). The watershed therefore

Still Creek flows into one of the major habitat reservoirs in the Lower Mainland – Burnaby Lake. The Lake and its surrounding lands are critical areas for Lower Mainland biodiversity supporting over 210 species of birds, over 15 mammal species, and 14 species of amphibians and reptiles. Many of these creatures will use the lower reach of Still Creek. Rainwater runoff from the entire Still Creek Watershed affects the water quality in Burnaby Lake.

lacks large areas of natural habitat for fish and wildlife. The most valuable ecological areas are along the open watercourses of Still Creek, Beecher Creek, and Guichon Creek, and where Still Creek enters Burnaby Lake. The remaining open watercourses do support fish and have been highly altered by human development

so are not as productive as in less urbanized areas. Some native species continue to use the watershed (eg great blue heron, coastal cutthroat trout, spotted towhee). However, many native plant and animal species have been replaced by non-native species that are tolerant of human disturbance - such as

the European starling, house sparrow, and Himalayan blackberry.

Despite its degraded ecology, the watershed is close to a number of regionally significant greenspaces, such as Burrard Inlet, the Fraser River, Burnaby Mountain, and Burnaby Lake, so the greenspace plays an important role for regional biodiversity.



*Great Blue Heron*

### Fish Habitat

Gradually, native populations of chum and coho salmon disappeared from the Still Creek system, (partially due to the Cariboo Dam) leaving the watercourse to hardier fish, such as a small population of cutthroat trout and larger populations of three-spine stickleback, carp and peamouth chub. Cutthroat trout also spend much of their life in the remaining open tributaries - particularly Beecher Creek, Crabapple and possibly Guichon Creek. The Boundary Road culvert is a barrier to fish migration, so no cutthroat trout have been found in Vancouver. Streamkeepers are trying to reintroduce coho salmon into the stream

Historically Vancouver's biggest salmon stream was Still Creek, parts of which still exist today. It rose in Central and Killarney Parks, and its several branches drained the Collingwood and Renfrew Heights districts, also much of Renfrew. Norman Freshwater reports that the trout fishing was fabulous on this creek near Rupert Street. Two of the six good trout streams [in Vancouver] were branches of Still Creek.

*Taken from DFO bulletin 32 Georgia Strait Salmon Head Recovery Program April-May 1977*



east of Boundary Road. The young fish are introduced into the system in the fall and some have survived the winter and have been seen heading out of the system on their journey to the ocean. To date a few chum, and no adult coho have been found returning to the Still Creek system. Streamkeepers' efforts are inspired by the stewardship success downstream in the Brunette River, where 30 years of habitat improvement work has led to returning runs of salmon. Good stewardship of the water quality and habitat in Still Creek system is important to protecting the downstream fisheries resource in the Brunette River.

### **Recreation**

While many recreational facilities exist within the watershed, a definite disconnect between the waterways and watershed residents has developed over the last 100 years. During the boom years of industrial and residential expansion, the area waterways were considered little more than ditches and were expected to be piped. As such, the waterways were squeezed into tighter and more confined corridors with businesses and residences moving into the former riparian lands. Rainwater is now viewed as more of a resource to provide aesthetic and recreational values to increase the livability of a community. Still Creek, its tributaries, and the open spaces within the watershed, present a framework upon which to expanded recreational uses in Vancouver and Burnaby. The challenge now is to decide on the best way to re-establish a buffer along the waterways that allows community recreation to once again flourish, while minimizing the impact on existing developments and restoring the natural environment in the stream corridor. Greenways, rivers, and trails

play an important role in increasing a community's quality of life, and are attractive to businesses and corporations. Office site locations adjacent to the Creek system or with direct trail connections are also likely to be attractive to prospective tenants.



*Pathway along Still Creek*

It is anticipated that roughly half of the new units projected to be built in all of Burnaby to 2021 will be in the Lougheed Corridor near the Millenium Skytrain line. Still Creek and these natural areas adjacent to it hold the key to meeting the growing recreational needs.

Additionally, connecting new residents and employees with the Creek provides opportunities for education and increased stewardship of the Creek and its environs, thus furthering the other goals of the ISMP.

### **Current Initiatives**

Still Creek has been gaining prominence over the past few years spearheaded by community groups and the municipalities. Several key management documents have been developed recently which set the groundwork for the ISMP. The Still Creek Action Plan (1997), the Brunette Basin Watershed Plan (2001), and the Still Creek Enhancement Study, (2002) all provide ideas for the ISMP to develop and implement. The image of



Still Creek has changed from one that only shows up on local and national news during extreme flooding events to one where Still Creek is being featured in local programming outlining community events and initiatives, as well as municipal initiatives such as the ISMP.

The ISMP is a tool to formalize this changed approach and the various processes that are currently underway, and to outline options for municipalities when they consider future initiatives.

The following provides some insight into some of the policies and programs currently being used by Vancouver, Burnaby, and the GVRD to help meet the ISMP goals. Some are comprehensive, some are small, but each one is a step toward achieving the vision for the watershed. Table 2-1 provides a more comprehensive list.

#### **Country Lanes, Vancouver**

A project within the city of Vancouver to reduce the areas of hard surfacing by replacing existing asphalt lanes with minimal concrete strips and pervious grass and pavers. It is one of the options available to residents under the local area improvement program.



*'Country Lane' - Vancouver*

#### **Roof Leader Disconnection**

This is a pilot program that attempts to reduce the amount of runoff that is directed toward the rainwater runoff system by allowing the majority of it to be re-used for irrigation, or soaking into the ground – similar to what happens in a natural environment.



*Roof Leader Disconnection pilot program*

#### **Stream Enhancement Sites**

Several stream and watershed sites are being enhanced to try and restore Still Creek to a more natural condition. One of these is the section of Still Creek in Vancouver north of Grandview Highway.



*Stream Enhancement Project at Grandview Highway*



<b>TABLE 2-1: Still Creek Watershed Current Initiatives/Programs by Vancouver (V), Burnaby (B), and the GVRD (G)</b>	<b>Rainwater</b>	<b>Environment</b>	<b>Recreation</b>
Brunette Basin Watershed Plan	VBG	VBG	VBG
Vancouver Still Creek Rehabilitation and Enhancement Study	V	V	V
Grandview/Boundary Industrial Area Policies and Guidelines	V	V	V
Sediment and Erosion Control requirements for new development	VB	VB	
Greenways (Urban Trail network plan)	VBG	VBG	VBG
Open Watercourse Policy	VBG	VBG	VBG
Integrated Pest Management Policy	VBG	VBG	VBG
Public cosmetic pesticide reduction strategy	VB	VB	
Park acquisition strategy	VB	VB	VB
Tree protection bylaw	VB	VB	VB
Park Management Plans	VB	VB	VB
Stream daylighting	VBG	VBG	VBG
Stewardship activities	VBG	VBG	
Limited street flushing	VB	VB	
Cross Connection elimination program	VBG	VBG	
Stormwater bulletins	VB	VB	
Still Creek educational sign program	VB	VB	VB
Total Stormwater Management Program	B	B	
Land Development guidelines	VB	VB	
Watercourse bylaws	VB	VB	VB
Environmentally sensitive areas strategy	B	B	B
Environmental memorandum of understanding with BCIT	B	B	
Environmental Enhancement Sites	VBG	VBG	
Redevelopment of impervious and/or contaminated industrial sites into residential and greenspaces	VB	VB	VB
Street Sweeping	VB	VB	
Catch Basin Cleaning	VB	VB	



### **Public Recreation**

Although limited in scope, there are some opportunities for recreation in and around Still Creek. From the kayaking course in lower Still Creek, and the

greenways throughout the watershed, to the park and ravine in its upper reaches, the groundwork is set to allow a more continuous network of amenities to be developed.



*Canoeist on Still Creek - Burnaby*



## Chapter 3: The Watershed in our Backyard

### *The Watershed*

As the Still Creek watershed has been urbanized over the past 150 years, much of the natural groundcover has been replaced with man-made surfaces, usually hard and impervious to rainfall. About 70-80% of the Still Creek watershed is currently impervious and in areas such as the Grandview Boundary Industrial Area the imperviousness is nearly 100%. This chapter provides a more detailed description of the watershed characteristics, and presents details on Still Creek and many of its tributaries.

### *Still Creek Watershed Characteristics*

Still Creek is the largest tributary of the Brunette River system flowing from the Boundary Road and Kingsway area of Burnaby west to Vancouver, through Renfrew Ravine and Park, then turning east to flow back into Burnaby and ultimately into Burnaby Lake. Much of the watershed was developed in an era when channel straightening, lining, removal of vegetation and culverting were customary management practices used to move water quickly and efficiently to reduce the risk of flooding. Before the plan to fully enclose the Creek was completed, the philosophy shifted to the preservation of more natural, open streams. Consequently, drainage managers were left with a legacy of flood area development on unstable silt and peat soils in anticipation of a very “controlled” system. Development encroached right onto

creek banks and the mixed “controlled/natural” system has left areas vulnerable to flooding and natural open sections vulnerable to erosion and sedimentation with consequent increased costs for maintenance, flood damage and environmental impacts.



*Limited streamside vegetation - Still Creek*

The majority of the watershed and Creek areas adjacent to the creeks are now occupied by residential and industrial/commercial development. In Vancouver much of the original Creek is piped underground. What remains above ground in both cities has been heavily channelized and in some cases contained in concrete flumes. Only about 5% of the Creek enjoys a wide riparian forest area (of 30m or more).



*Still Creek Watershed – early 1900s*



## Soils and Surficial Geology

Still Creek Watershed soils and surficial geology have been highly disturbed from their original state of the mid 19<sup>th</sup> century. First logging, followed by farming and most recently urban development have reshaped the landscape and altered soil characteristics.

As Still Creek flows from the Metrotown heights to the Burnaby Lake lowlands it passes through many land and soil types. In the upland areas, soils are primarily composed of sand and gravel many metres thick with bedrock more than 10m below the surface. Although the original rich forest cover shed a large amount of organic material, decomposition was rapid and the accumulation on the ground is seldom more than a few centimetres thick.

In the lowland areas the drainage is restricted or poor and this factor has produced a group of soils with characteristics based mainly on the height of the groundwater level. From semi-bog to bog, the lowland area has developed a layer of peat metres thick. This has created significant problems for



*Land settlement under building - Burnaby*

building foundations and drainage in these areas, with examples of subsidence

continuing to occur years after building construction in many cases. It is challenging in any urban watershed to slow the trend of ever increasing impervious cover. It is particularly difficult in the Still Creek watershed where population pressures are growing. However there are numerous low-impact development practices which reduce rainwater runoff using "source controls" such as infiltration swales and pervious paving. These low-impact development techniques can have significant benefits for the Creek if they are widely implemented.

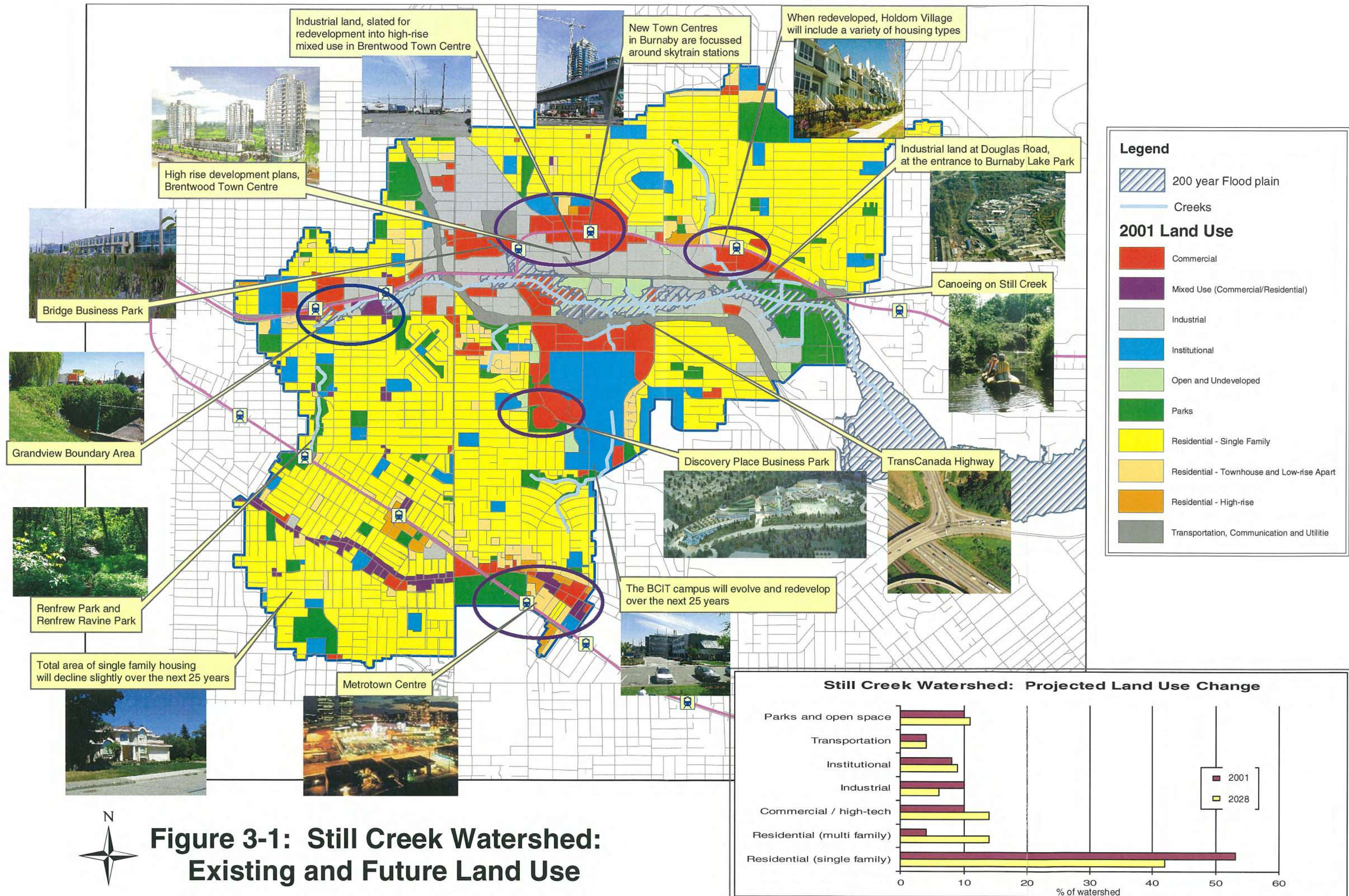
The GVRD has on site rainwater management guidelines which are available at [www.gvrd.bc.ca](http://www.gvrd.bc.ca)

## Watershed Land Use

The watershed is currently 80-90% developed with the remaining 10-20% in greenspace including parks and protected areas. While this overall ratio will likely remain constant, changes such as densification of residential areas or redevelopment generally can impact the percentage of impermeable surface and have other impacts. The watershed's population grew by about 10% between 1991 and 2001. The population is projected to grow to about 150,000 people by 2051 – a 50% increase.

Figure 3-1 shows the current generalized land uses for the watershed with projected areas of growth being the town centres in Burnaby and the Grandview Boundary Industrial Area in Vancouver. Redevelopment will intensify current land uses (e.g. multi-family projects replacing single-family and multi-story commercial replacing single-level commercial with surface parking). Aside from these growth areas, other changes are projected to be limited to small scale infill in the residential areas





**Figure 3-1: Still Creek Watershed:  
Existing and Future Land Use**



An average of 207,000 vehicle trips per day were recorded at key intersections in the watershed in 1985. In 1996 this had increased to 255,000 trips per day.

and on underdeveloped sites throughout the Watershed.

Growth and land use changes drive other changes that affect the watershed. Traffic intensity is a significant concern to air and water quality and has increased

with population and employment growth. Growth and change provide major challenges because densification usually results in a decrease in permeable ground surfaces which

exacerbates the issues of flooding, exaggerated high and low flows and related issues. However, redevelopment and change also provide opportunities to introduce source controls and other best management practices.

### ***Creek Sections***

The following pages provide a snapshot of Still Creek and its main tributaries from Renfrew Ravine, downstream to Burnaby Lake. Figure 3-2 provides a key map of the creek sections.



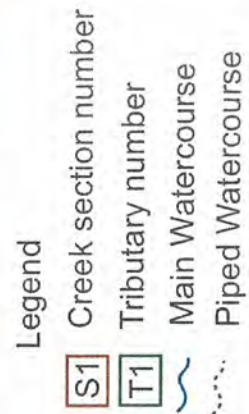
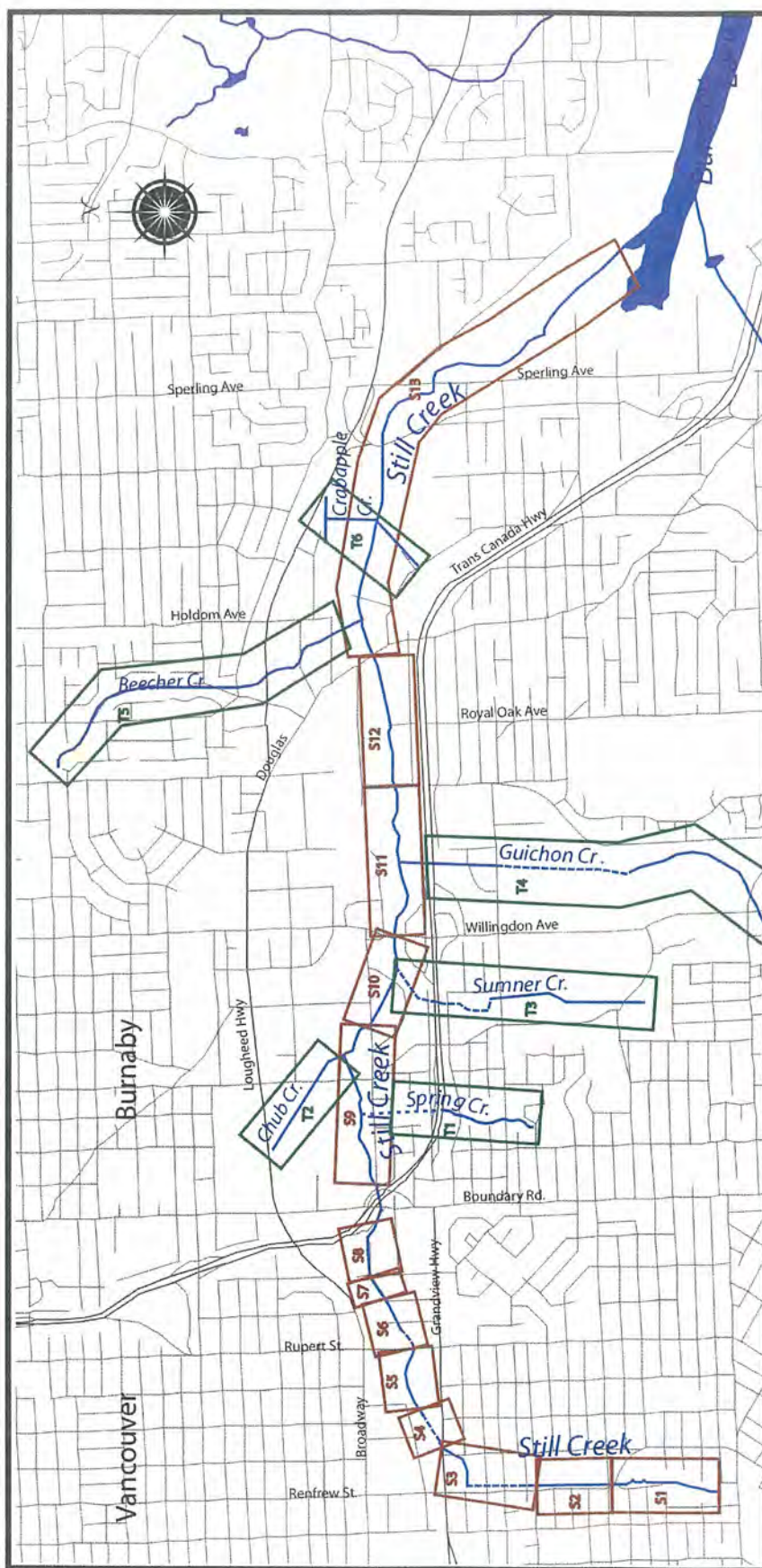
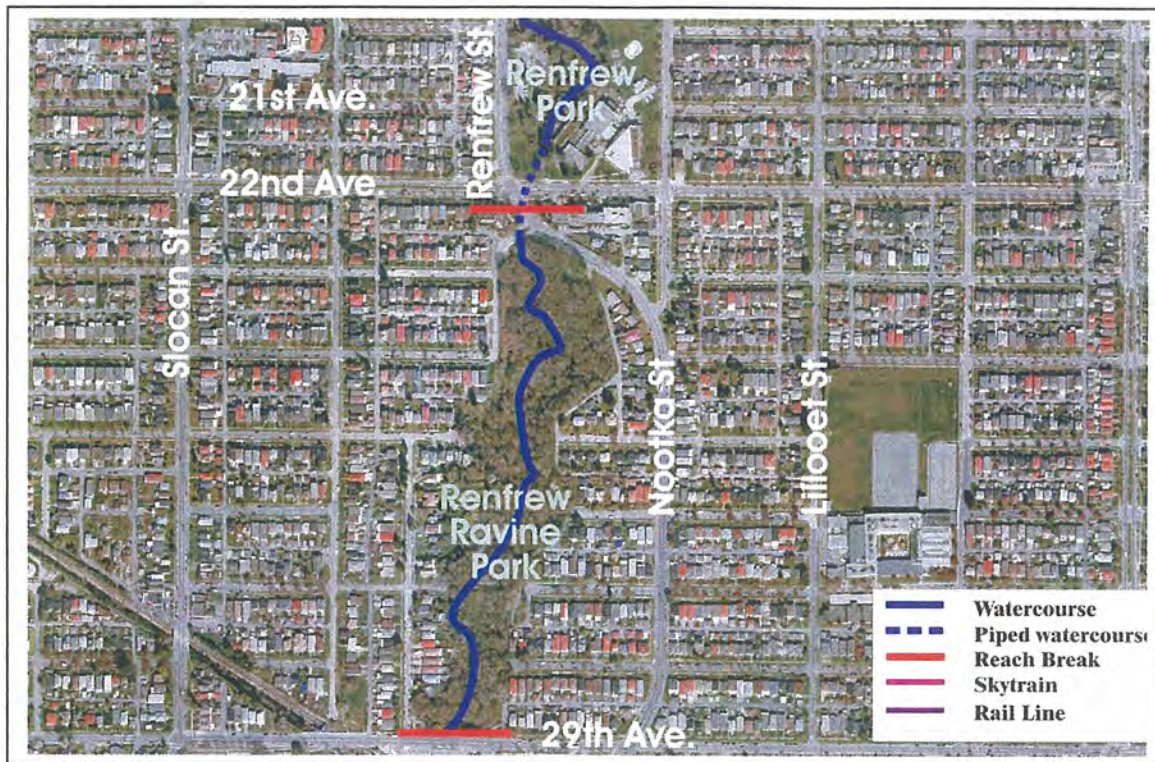


Figure 3-2 Key Map of Still Creek and Main Tributaries



## Section 1: Renfrew Ravine Park (29<sup>th</sup> Avenue to 22<sup>nd</sup> Avenue)



<b>Total Length:</b>	796m
<b>Length Culverted:</b>	75m (9% of section)
<b>Length Open:</b>	721m (91% of section)
<b>Zoning:</b>	Residential
<b>Vegetation Types:</b>	Mixed, Alder, Cedar
<b>Issues:</b>	Illegal dumping, poor public access, bank instability





## Section 2: Renfrew Community Park (22<sup>nd</sup> Avenue to 19<sup>th</sup> Avenue)

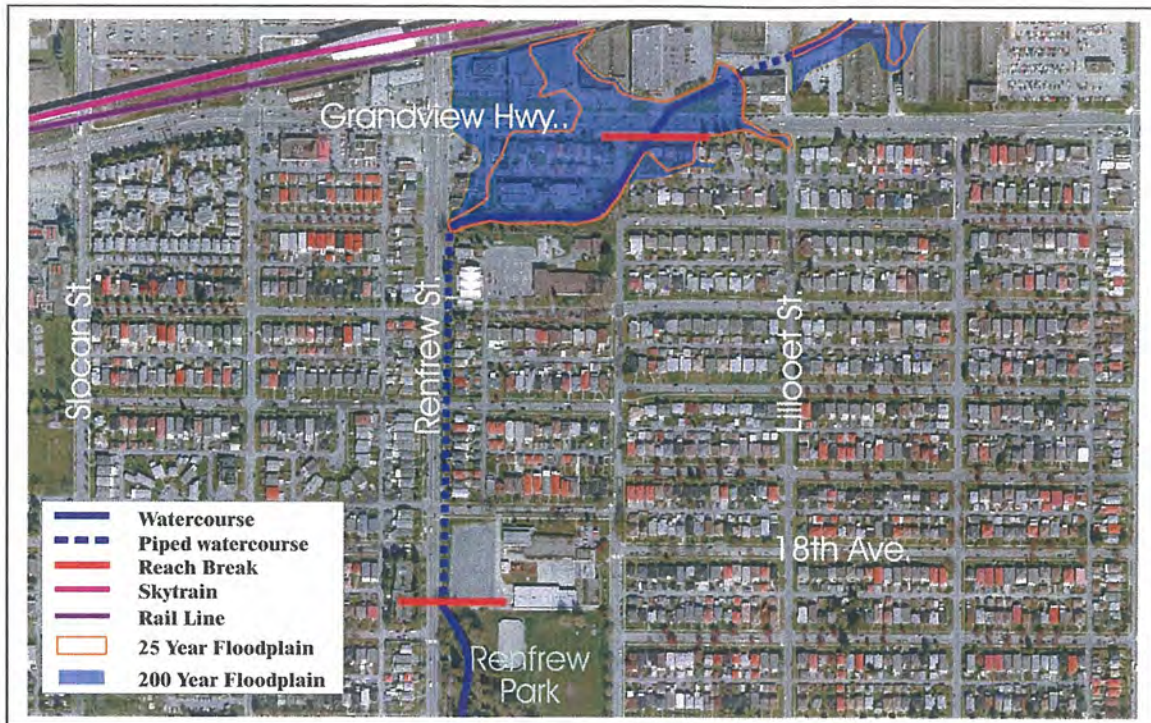


<b>Total Length:</b>	515m
<b>Length Culverted:</b>	150m (29% of section)
<b>Length Open:</b>	365m (71% of section)
<b>Zoning :</b>	Residential
<b>Vegetation Types:</b>	Mixed
<b>Issues:</b>	Channelized, high velocity flows, lack of substrate, no complexity.

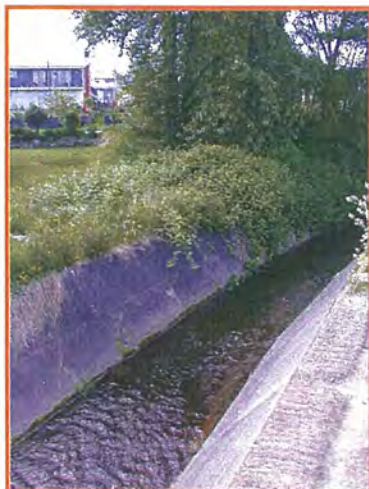




### Section 3: 19<sup>th</sup> Avenue to Grandview Highway

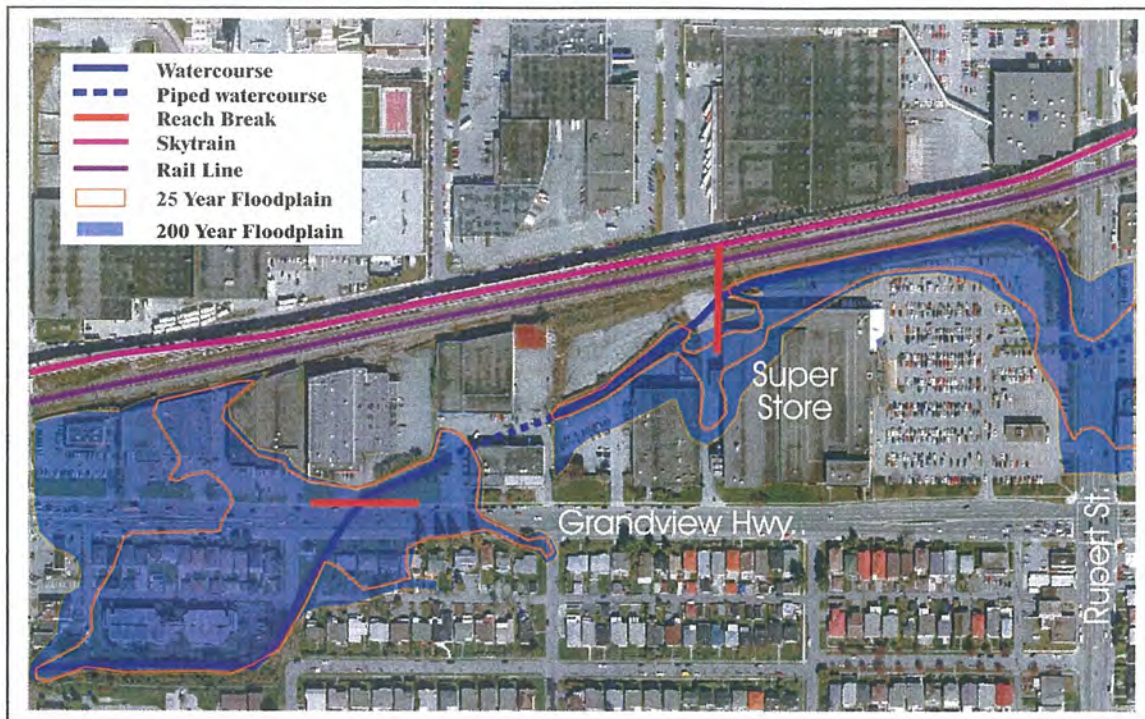


<b>Total Length:</b>	564m
<b>Length Culverted:</b>	300m (53% of section)
<b>Length Open:</b>	264m (47% of section)
<b>Zoning:</b>	Residential
<b>Vegetation Types:</b>	Limited alder, blackberry
<b>Issues:</b>	Concrete flume, lack of streamside area, lengthy steep culvert.





## Section 4: Grandview Highway to Lillooet Street

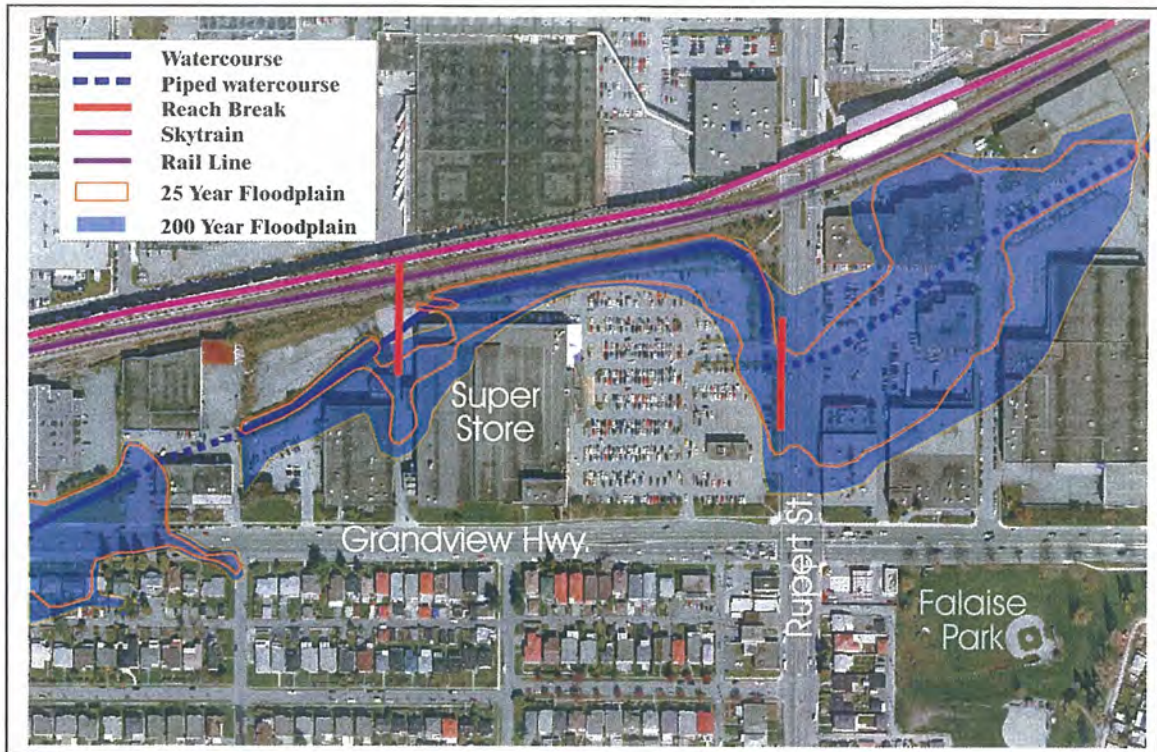


<b>Total Length:</b>	285m
<b>Length Culverted:</b>	105m (37% of section)
<b>Length Open:</b>	180m (63% of section)
<b>Zoning:</b>	Industrial
<b>Vegetation Types:</b>	Blackberries, weeping willows
<b>Issues:</b>	Channelized, low complexity, concrete weirs and walls, high impervious cover, limited rights-of-way.





## Section 5: Lillooet Street to Rupert Street

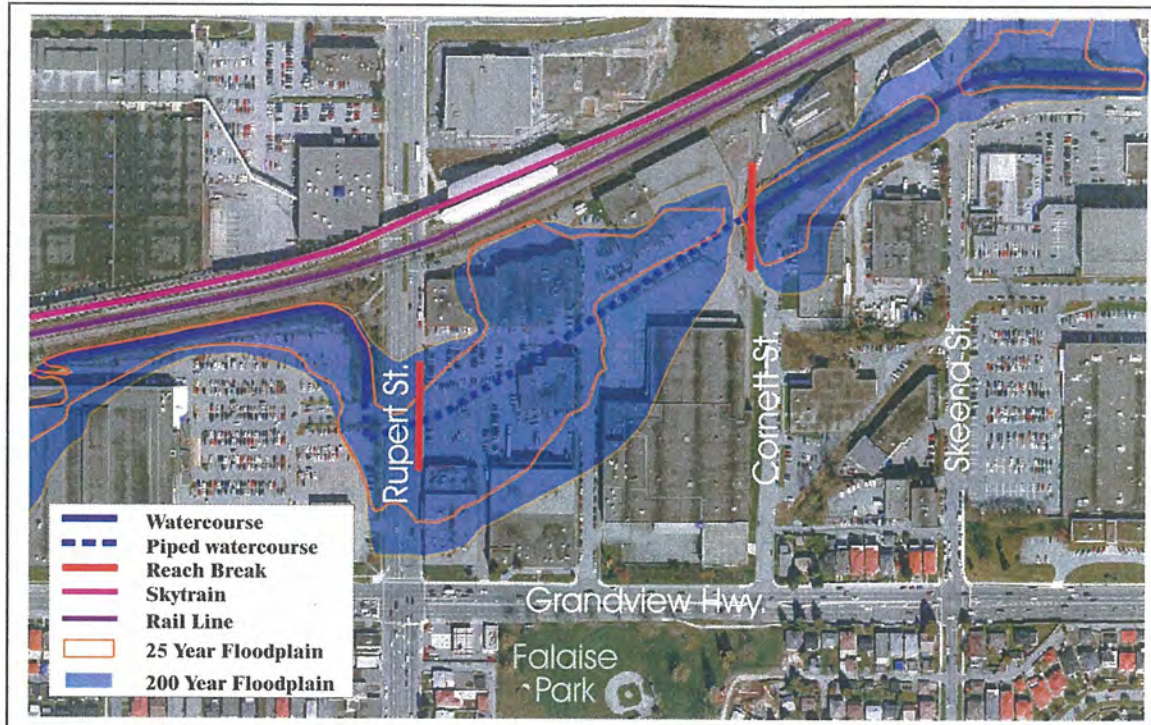


<b>Total Length:</b>	316m
<b>Length Culverted:</b>	35m (11% of section)
<b>Length Open:</b>	281m (89% of section)
<b>Zoning:</b>	Industrial
<b>Vegetation Types:</b>	Black cottonwood, red alder, poplars, willows
<b>Issues:</b>	Litter, low complexity, high impervious cover, unnatural banks.





## Section 6: Rupert Street to Cornett Street

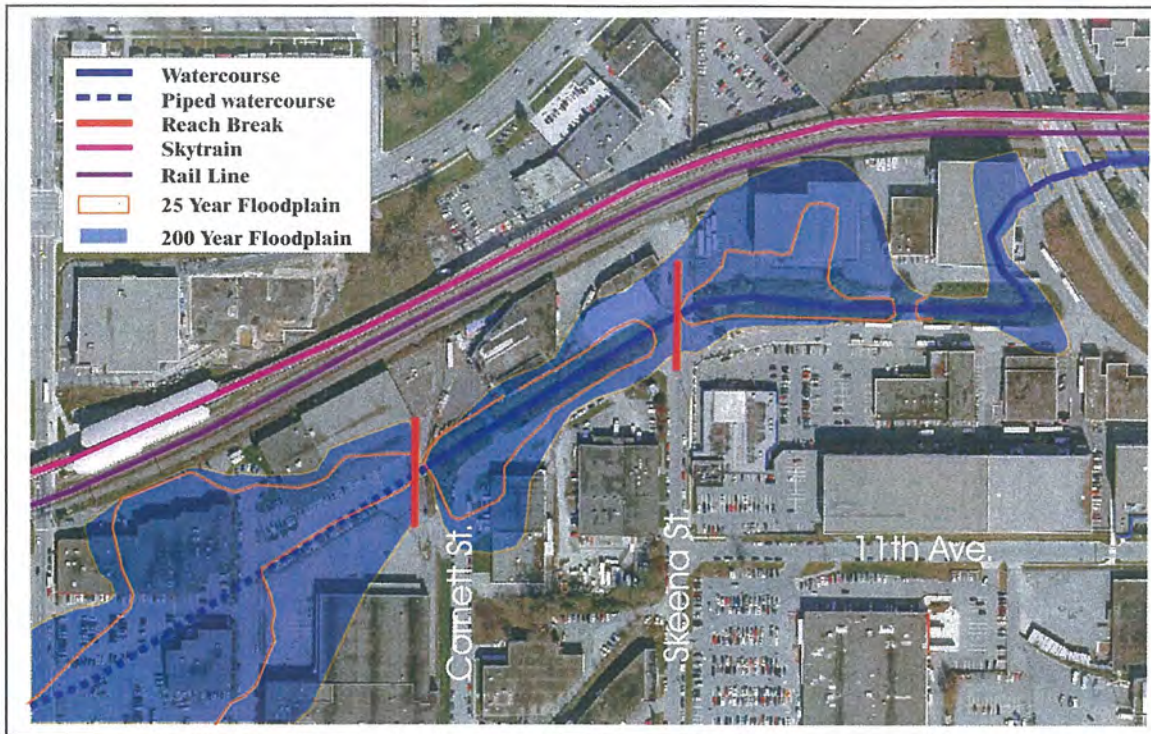


<b>Total Length:</b>	264m
<b>Length Culverted:</b>	264m (100% of section)
<b>Length Open:</b>	0m (0% of section)
<b>Zoning:</b>	Industrial, retail, commercial
<b>Vegetation Types:</b>	None
<b>Issues:</b>	Completely culverted

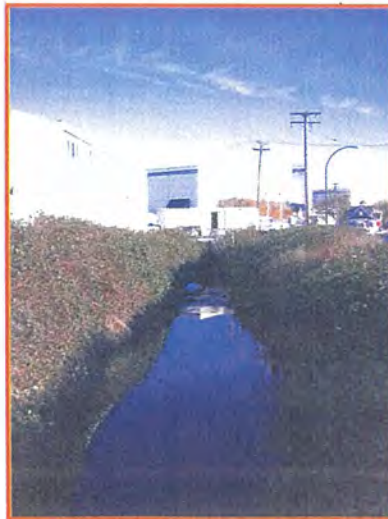




## Section 7: Cornett Street to Skeena Street

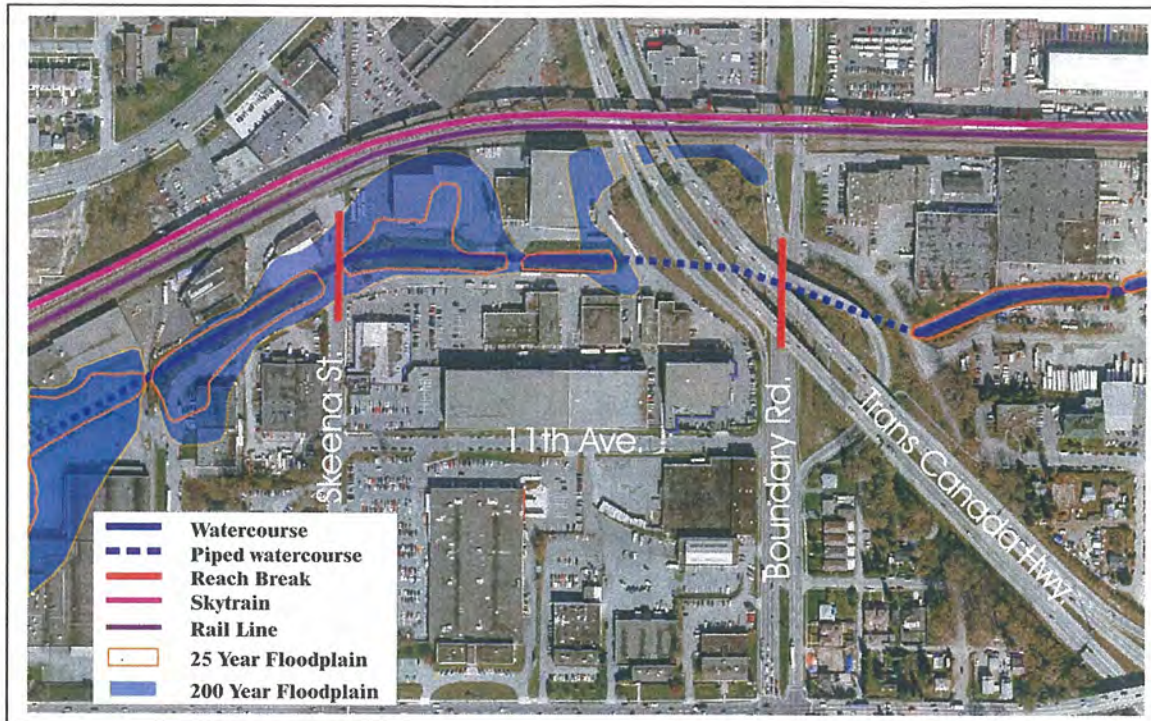


<b>Total Length:</b>	161m
<b>Length Culverted:</b>	7m (3% of section)
<b>Length Open:</b>	156m (97% of section)
<b>Zoning:</b>	Industrial
<b>Vegetation Types:</b>	Himalayan blackberry
<b>Issues:</b>	Lack of streamside area, highly channelized, encroachment of buildings, limited access, no complexity.





## Section 8: Skeena Street to Boundary Road

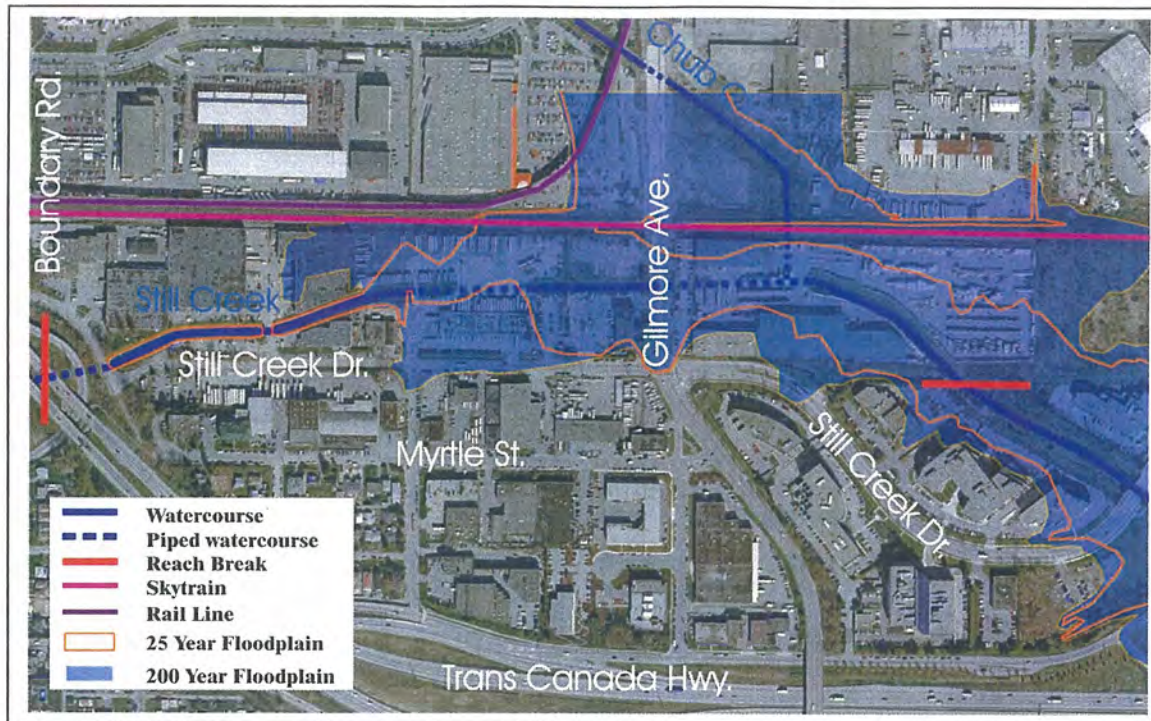


<b>Total Length:</b>	351m
<b>Length Culverted:</b>	157m (45% of section)
<b>Length Open:</b>	194m (55% of section)
<b>Zoning:</b>	Industrial
<b>Vegetation Types:</b>	Weeping willow trees; Himalayan blackberry
<b>Issues:</b>	No public access, channelized, bank stability, little streamside area, no complexity, creek enclosure under roads.

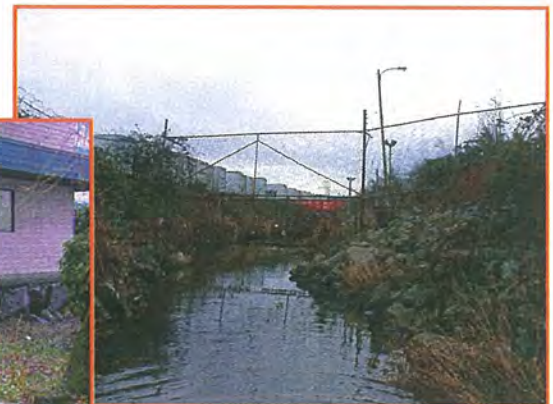




## Section 9: Boundary Road to East of Gilmore Avenue

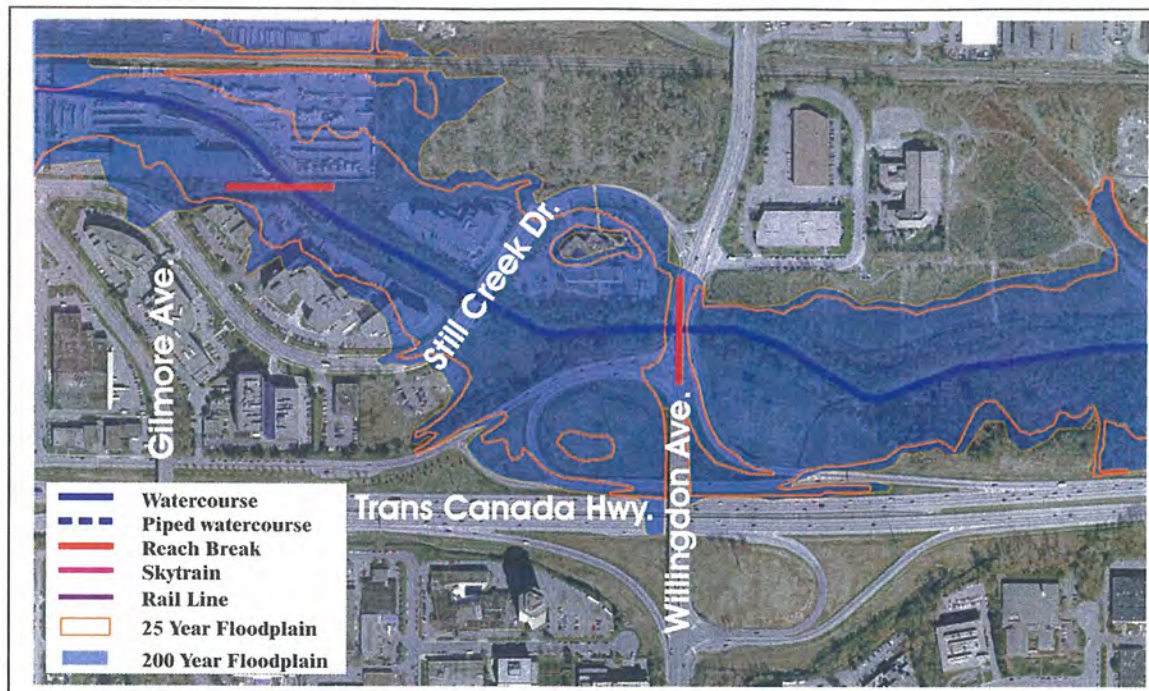


<b>Total Length:</b>	910m
<b>Length Culverted:</b>	300m (33% of section)
<b>Length Open:</b>	610m (67% of section)
<b>Zoning Designation:</b>	Industrial
<b>Vegetation Types:</b>	Himalayan blackberry, alder, cedar
<b>Issues:</b>	Channelized, enclosures, flooding, lack of available streamside area, beavers, invasive species, encroachment, land subsidence.





## Section 10: East of Gilmore Avenue to Willingdon Avenue

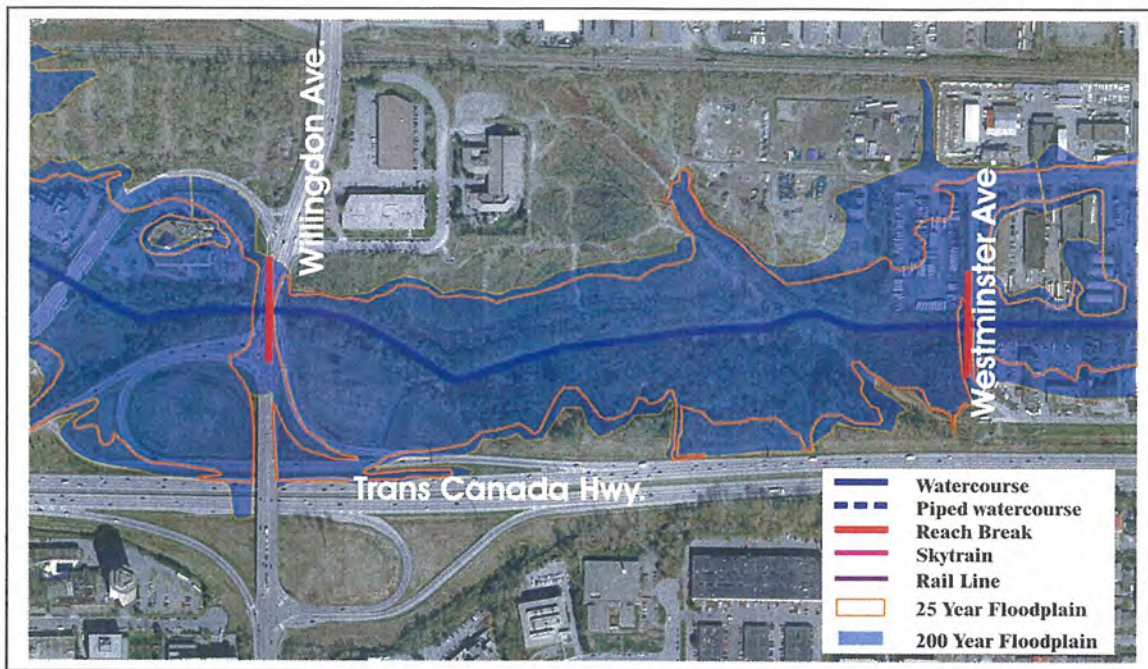


<b>Total Length:</b>	810m
<b>Length Culverted:</b>	165m (45% of section)
<b>Length Open:</b>	645m (55% of section)
<b>Zoning Designation:</b>	Industrial (18%), Commercial (82%)
<b>Vegetation Types:</b>	Grass-Sedge, Mixed Wetshrubs, Deciduous Forest
<b>Issues:</b>	Flooding, sediment build-up, land subsidence, invasive species.





## Section 11: Willingdon Avenue to Westminster Avenue

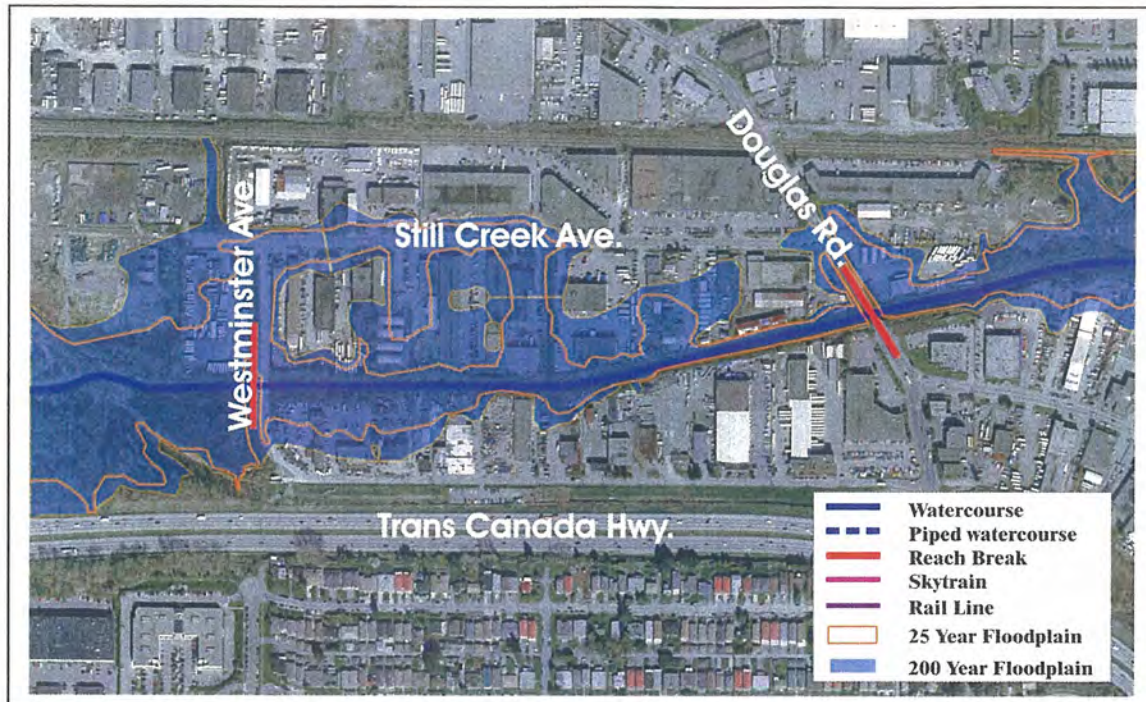


<b>Total Length:</b>	820m
<b>Length Culverted:</b>	0m (0% of section)
<b>Length Open:</b>	820m (100% of section)
<b>Zoning Designation:</b>	Industrial north of the creek and to be designated conservation area south of the creek (land primarily City owned).
<b>Vegetation Types:</b>	Blackberry, Grass-Sedge, Mixed Wet shrubs, Deciduous Forest
<b>Issues:</b>	Land subsidence near creek, limited public access.

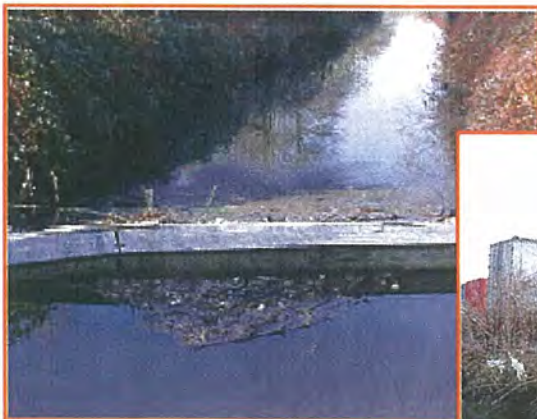




## Section 12: Westminster Avenue to Douglas Road

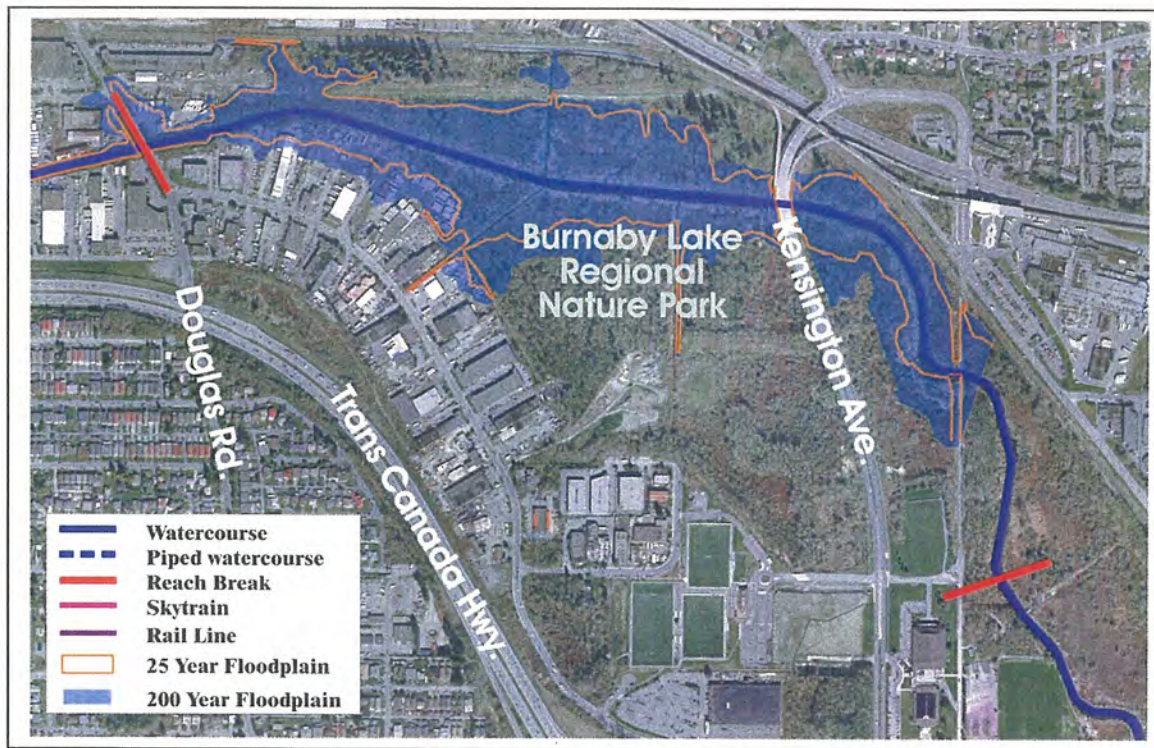


<b>Total Length:</b>	695m
<b>Length Culverted:</b>	0m (0% of section)
<b>Length Open:</b>	695m (100% of section)
<b>Zoning Designation:</b>	Industrial
<b>Vegetation Types:</b>	Mixed Wet shrubs, Deciduous Forest, Himalayan Blackberry
<b>Issues:</b>	Limited streamside area, no public access, invasive species, nuisance flooding, land subsidence.





## Section 13: Douglas Road to Burnaby Lake



<b>Total Length:</b>	2900m
<b>Length Culverted:</b>	0m (0% of section)
<b>Length Open:</b>	2900m (100% of section)
<b>Zoning Designation:</b>	Industrial (24%), Parks (90%)-overlap
<b>Vegetation Types:</b>	Grass-Sedge, Mixed Wet shrubs, Deciduous Forest
<b>Issues:</b>	Streamside area encroachment western end.



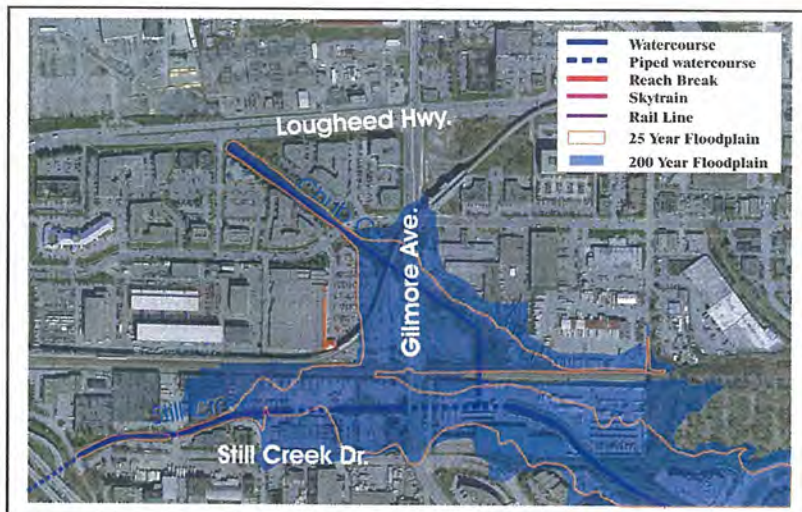


## Tributary 1: Spring Brook – Still Creek to Avondale Park

Spring Brook has been largely enclosed except for that portion above and below Canada Way; this remnant habitat could be rehabilitated and reconnected to provide fish and wildlife habitat linkages. The stream channel could potentially be reconstructed by simulating a meandering stream around buildings in the commercial/industrial area between Still Creek and the Trans Canada Highway; the culvert could be left in place as a high flow diversion. Daylighting would reconnect fish and wildlife habitat to Still Creek. Stormwater treatment facilities could be constructed in Avondale and Broadview parks to improve water quality entering the Still Creek mainstem.



## Tributary 2: Chub Creek – Still Creek North Branch



Chub Creek has also been known as the north arm of Still Creek. Formally a major tributary to the Creek, it has been piped for almost all its length through Vancouver and Burnaby. It emerges as an open watercourse south of the Lougheed Highway in Burnaby. The watercourse joins Still Creek via a culvert underneath the railway and 2580 Gilmore Avenue. Environmental enhancements are planned for the Chub Creek corridor as part of the Dawson and Madison developments, including an 8 acre conservation area - focused around the newly created Jim Lorimer Park.



### Tributary 3: Sumner Creek



Sumner Creek has been almost entirely enclosed, opening up for just a few metres before its confluence with Still Creek. The main open section flows within Discovery Place.

### Tributary 4: Guichon Creek – Trans Canada Highway to Wesburn Ravine



Guichon Creek is open through the Still Creek flood area, but culverted under the Trans Canada Highway, and open again through a restricted blackberry lined ditch to Canada Way. Then, it flows under the BCIT campus in a 676 m long culvert, considered impassable to fish. This culvert effectively isolates the lower reach from the upper reaches and fragments terrestrial and riparian habitats between Still Creek and the Wesburn Ravine system.



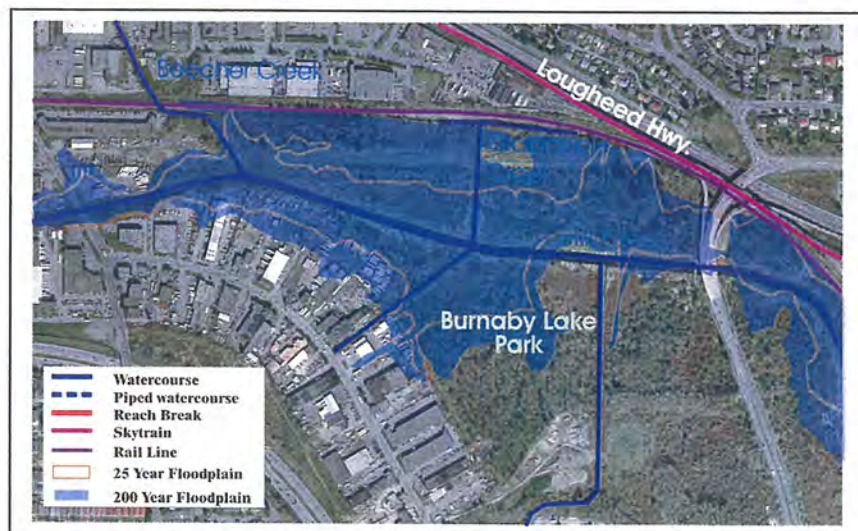
### Tributary 5: Beecher Creek – Still Creek to Parker Street

Several obstacles (culverts and weirs) exist between the railway and Lougheed Highway. These impediments to fish passage could be removed in order to improve fish habitat and access. The lower reach could be reconstructed into a stream channel and greenspace corridor that would re-create habitat continuity. The upper section is contained within a vegetated ravine, but gradient barriers and debris jams present obstacles to fish movement. Properly engineered cascades and pools could allow resident trout and other fish to better utilize the existing habitat.



### Tributary 6: Crabapple Creek - Still Creek to Lougheed Highway

Crabapple Creek drains the Sperling neighbourhood in Burnaby. The Creek is piped for much of its length, before opening up at the Lougheed Highway. The mainstem received instream enhancement work as part of the Sky Train project, and cutthroat trout and juvenile coho salmon have



been found in the creek. There are plans for further enhancements - directing the creek away from the railway ditches and into its own naturalized channel. The Creek is named after the wild crabapple trees historically found at this site. Historical records describe the stream as a favoured spot for boaters who admired the blossoms in the springtime.



## The Watershed Vision

*To protect or enhance the aquatic and terrestrial ecosystem and the human populations they support in an integrated manner that accommodates growth and development.*

### Chapter 4: Watershed Vision

By integrating the visionary aspects of rainwater management, environmental protection, and recreational enhancement, the ISMP lays out a road map for the municipalities to follow when considering the future of the watershed. Located in the heart of the Lower Mainland, the Still Creek watershed will continue to experience the impacts of population growth and development pressure. There will be numerous challenges to overcome in order to balance growth with sensitive development allowing the Vision for Still Creek to proceed. Yet redevelopment provides opportunities to address current problems through reconfiguration of sites incorporating designs that respect the Creek, and to apply best management practices for rainwater throughout the watershed.



Achieving the integrated approach advanced in this plan requires a conscious recognition by those who



build, regulate and live in the watershed that Still Creek is an important community resource, and that we are all connected to Still Creek.

The following sections provide an overview of the 3 key areas: rainwater management; environmental protection; and recreational enhancement, and their associated goals. The images attempt to capture the ISMP vision and provide an indication of what the watershed may one day become.

Figure 4-1 provides a summary of the watershed vision for the year 2055.

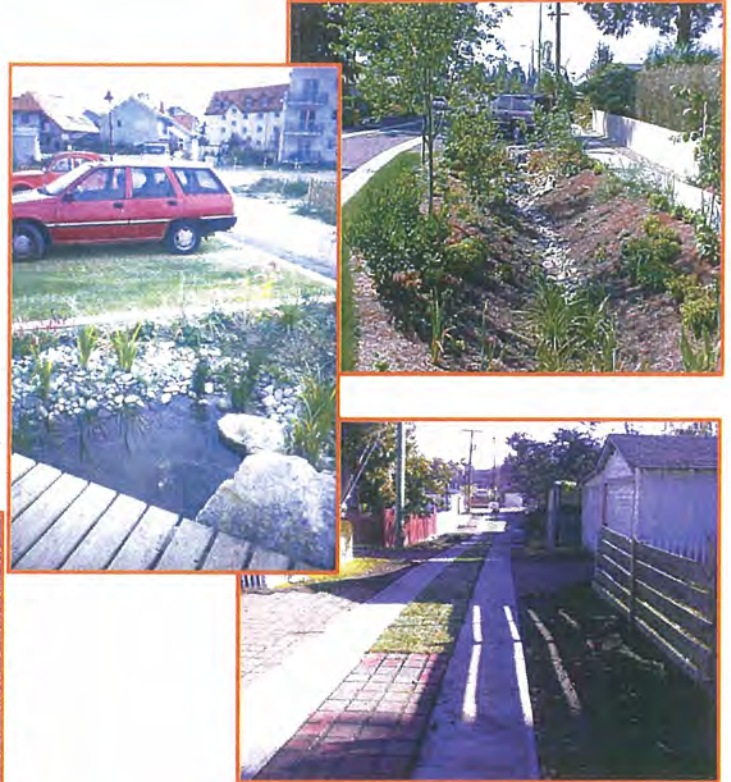




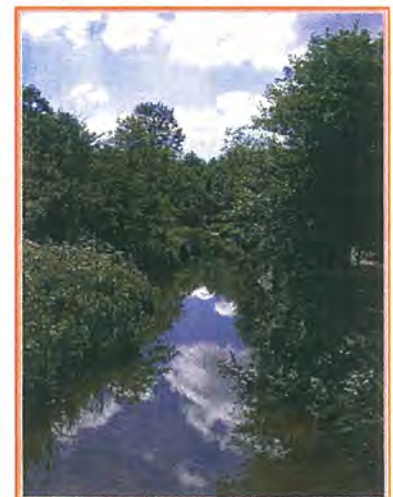
## ***Rainwater Management***

During heavy rainfall, hard (or impervious) surfaces in the watershed contribute to high flows and erosion in the waterways. Flooding in areas adjacent to the main stem occurs as runoff from parking lots and roads is rapidly flushed into the Creek. The Plan outlines a strategy to address these conditions by reversing the trend of increasing hard-surfacing, mitigating the impact of hard surfaces where they are required and managing future new building locations and grade heights within the flood area to reduce flood damage and inconvenience when flooding occurs.

**Goal 1: Reduce flood impacts on people, property and the stream channel and strive to restore a more natural flow regime.**



**Goal 2: Reduce stream erosion and downstream sedimentation to levels approaching a more natural system.**





## Environmental Protection

Effective rainwater management recognizes that all water is part of the natural rainwater cycle and is a community resource. The Plan focuses on preserving, enhancing and extending the natural environment in the watershed, limiting and advancing alternatives to further hard surfacing, and continuing to improve water quality through public education and best management practices.

### Goal 3: Protect and enhance streamside and aquatic habitats



### Goal 4: Protect and enhance urban forest and terrestrial habitats.



### Goal 5: Protect and improve water quality.



### Goal 6: Maintain and augment native species biodiversity.





## Recreational Enhancement

Still Creek and its tributaries present many opportunities for varied recreational experiences that will promote a public connection and appreciation of the creek while raising awareness of its importance in our region. The Plan seeks to reconnect people with these hidden resources by greatly increasing the varied recreational and learning opportunities currently available to its roughly 100,000 residents.

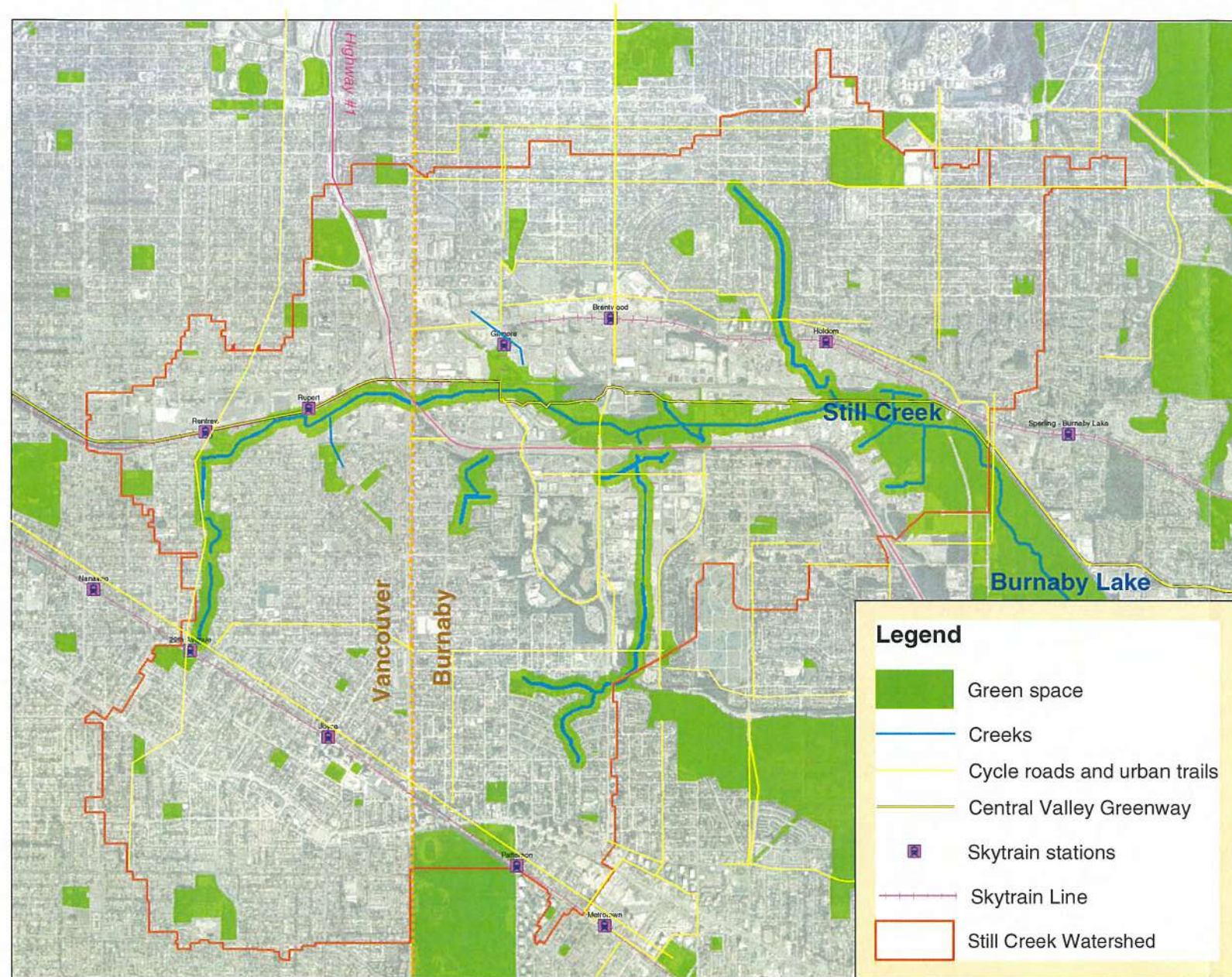
**Goal 7: Connect people with the watershed and its streams.**

**Goal 8: Provide stream related education.**





# Figure 4-1: Still Creek Watershed ... A Vision for 2055



## RECREATIONAL ENHANCEMENT

Watershed residents will access excellent active and passive recreation resources, including parks, recreation centres, and natural areas. Residents will be able to travel by foot, bike, or roller blade along the Central Valley Greenway and other connecting paths and urban trails. Those seeking more leisurely detours will be able to walk along streamside footpaths, or down to viewpoints to enjoy the peaceful waters and wildlife around Still Creek and Beecher Creek. More adventuresome residents may wish to launch their kayaks in the lower reaches of Still Creek and float down to Burnaby Lake.



## COMMUNITY GROWTH

In 2055, the Still Creek Watershed will look much different from today. The population living in the watershed is expected to increase by 50% to 150,000 residents, and employment will have doubled. Bustling, high density town centres and business centres will be firmly established around skytrain stations and other transit hubs. Old industrial sites will have been redeveloped into more intensive land uses. There will be a greater mix of housing types in varying densities to meet the needs of the growing population. Mature business centres and shopping will be easily accessible by transit, and the BCIT campus will have grown into a more intensively used, integrated academic centre.



## THE STILL CREEK CORRIDOR

By 2055, Still Creek will be a park corridor providing recreational trails, conservation lands, and adequate space for conveying rainwater runoff during major storms. Development will be setback from the creek and safely raised up above floodplain levels. The Still Creek Conservation Corridor will be a highly-prized asset for both Burnaby and Vancouver residents, stretching from Renfrew Heights to Burnaby Lake.



## ENVIRONMENTAL PROTECTION

In addition to Still Creek mainstem, other creeks, parks, and urban greenspaces will provide a network of habitats for native fish and wildlife species. Nature lovers will cherish the ability to observe herons, hawks, and trout thriving in the greenspace so close to the heart of the Greater Vancouver urban core.

Flagship environmental improvement projects will include the 8 acre Chub Creek conservation lands around Jim Lorimer Park. Residents walking along the meadows and wetlands to the neighbourhood park will be astounded to find out that in 2004 these lands were old industrial properties that leached pollutants into the Still Creek system.

Throughout all neighbourhoods, trees and landscaped areas will provide wildlife habitat, air quality, shade, rainwater management, and aesthetic benefits.



## RAINWATER MANAGEMENT

Development throughout the watershed will be constructed with rainwater management in mind. Absorbent soils, vegetation, wetland, and detention facilities will be integrated into the urban landscape providing rainwater and aesthetic improvements. These measures will reduce flooding problems in the Still Creek Corridor and also improve water quality and habitat for fish and wildlife. Flow rates in all creeks will be slightly more natural than in 2005, due to the on-site rainwater management measures, and reduction in impervious surfaces in the watershed.





## Chapter 5: Rainwater Management-Goals and Strategies

***Goal 1: Reduce flood impacts on people, property and the stream channel and strive to restore a more natural flow regime.***

The overall rainwater management goal is twofold: 1) reduce flood impacts due to storms, and 2) manage all rainwater throughout the watershed in a way that mimics the natural hydrologic cycle. The broad scope of the goal requires effective strategies to deal effectively with all rainwater resulting from the entire spectrum of rainfall events from small showers to large storms, and over a range of scales from individual lots to entire neighborhoods. This is challenging in a fully developed watershed given the large area of impervious (hard) surfaces throughout the watershed and with significant development already located or planned on the flood area.

**Technical Group Input:** Given the highly technical nature of the flooding issue and the potentially large costs involved, the ISMP Steering Committee requested that a technical group of senior engineering staff from each of the member municipalities comprising the Brunette River basin (Vancouver, Burnaby, Port Moody, Coquitlam, and New Westminster) review a consultant report (Assessment of Flood Reduction Alternatives for the Still Creek – Brunette River System, December 2003) to provide guidance to the Steering Committee.

The technical group reviewed the various structural and non-structural

options, including costs, benefits, and risks. The group decided that it could not recommend large capital projects with negative net present valuations i.e. estimated costs much greater than potential benefits. Further, the group concluded that given the constraints and uncertainties of limited land availability, ongoing land subsidence, environmental impacts, and extremely poor ground conditions within the flood area, a structural solution (such as major diking or channel widening) would be very difficult to construct and maintain, and would likely be fail.

Based on the best available information, the technical group recommended that an appropriate overall strategy to reduce flood impacts is to convey as much flood flow as practical within the existing main channel, convey larger flood flows within the existing floodway, and implement a long-term land-use planning strategy to minimize flood impacts on development within the flood area (i.e., those areas within the flood area comprising the flood fringes and outside the floodway). This recommended strategy is consistent with ISMP Strategy 1-3.

More specifically, the group recommends a multi-faceted approach to reduce the risk of flooding and flood impacts in this watershed basin as follows:

- To reduce the risk of **minor flooding** (particularly frequent small floods) along Still Creek and Still Creek North Branch, proceed with cost-effective operations and maintenance activities within the main channel corridors (e.g., removal of excess sediment and removal of obstructive



vegetation). Measures to reduce runoff volumes from the upland areas would also be helpful and are addressed in other strategies within the ISMP (see Strategies 1-1 and 1-2).

- To reduce flood impacts from **large floods** along Still Creek, proceed with a long-term non-structural solution (i.e. land-use planning) for the flood-prone land near Still Creek (e.g., recommend flood construction elevations for buildings and roads, regulate future flood area development and redevelopment through bylaws or zoning, purchase specific high-risk property, assist with relocation of flood-prone homes and businesses, recommend flood-proofing of buildings and sensitive utilities).
- To reduce the risk of **downstream flooding** in parts of New Westminster, proceed with design and construction of minor dikes on lower Brunette River as recommended in the 2003 Assessment report.

Despite the obvious challenges, the following sections outline a series of strategies and recommended actions follow that strive to achieve Goal 1. It is important to note that the strategies are intended to be complementary, and not mutually exclusive. Table 8-1 presents a summary of the rainwater management goals, strategies and actions.

**Strategy 1-1: Implement on-site source control measures to reduce peak runoff rates and volumes, increase base flows, and improve water quality.**

**Rationale:** The rationale for strategy 1-1 is to minimize runoff by retaining and infiltrating most of the rainfall where it lands on site, thereby lessening the negative impacts of runoff and increasing the positive benefits of infiltration. Rainfall that does not infiltrate into the ground results in rainwater runoff with potentially negative impacts on the stream and groundwater. More hard (impervious) surface results in more and faster rainwater runoff, transportation of pollutants from road surfaces to streams, more frequent flooding and channel degradation, and less groundwater available to sustain low (base) flows in our streams. In this watershed, based on rainfall records, about 90% of annual rainfall occurs during frequent low-intensity events i.e. small storms such as drizzle and light showers; only 10% of annual rainfall occurs during infrequent high-intensity events i.e. large storms such as large pacific fronts (e.g., 'pineapple express') and convective downpours. In a natural system, some runoff is common – especially from saturated or frozen ground – and typically only occurs from large storms. In a built environment, however, runoff can occur even from drizzle or light showers.

Strategy 1-1 is targeted at smaller storms and the first 20 mm of larger storms, which accounts for about 90% of all rainwater in a typical year. The effectiveness of this strategy is directly proportional to the number of sites upon which source controls are implemented throughout the watershed.





*Street Trees and bio-swale*

**Actions for Strategy 1-1:**

- a) Reduce area of hard surface in the watershed by 10% by year 2025.
- b) Continue and increase implementation of appropriate on-site runoff source control practices, for example:
  - oil interceptors in commercial/industrial parking lots
  - proper material storage
  - spill management.
- c) Promote on-site infiltration practices such as absorbent landscaping and permeable surfaces where possible for development projects, for example:
  - Vegetated swale and grassed channel
  - Vegetated filter strip
  - Off-line infiltration basin
  - Porous pavement and modular pavers
  - Trees and shrubs.

Also, refer to the Greater Vancouver Regional District "Stormwater Design Guidelines 2005".

- d) Develop detailed rainwater management guidelines and criteria for on-site rainwater storage/infiltration facilities, for example:
  - for development projects with site area of 0.4 ha or larger, reduce post development flow to 50% of pre-development condition flow.
  - For smaller development and redevelopment including residential, allow use of alternative rainwater source control design guidelines.
- e) Develop educational opportunities/materials (e.g. brochures on best on-site rainwater management practices for builders and developers).
- f) Investigate alternate street and sidewalk infrastructure design and maintenance standards to reduce runoff volumes and improve quality from the street corridor (eg. use bio-swales before catchbasins on streets where practical).
- g) Utilize water reuse/diversion such as rain barrels and disconnections of roof leader drains where feasible to reduce rainwater discharges.



*Residential Rain Barrel*

- h) Review related bylaws and revise as needed to encourage and ensure appropriate rainwater management practices.



**Strategy 1-2: Develop and implement neighbourhood-scale rainwater management facilities and plans to further reduce runoff, increase base flows and improve water quality.**

**Rationale:** The rationale for strategy 1-2 is to lessen the impact of the rainwater that cannot be infiltrated or detained on site by delaying it from reaching the stream. In a highly urbanized watershed like Still Creek, it is unrealistic to expect 90% of the rainwater to be infiltrated on site (per strategy 1-1), so some rainwater runoff will need to be managed. This strategy must be flexible enough to allow for the consolidation of smaller individual systems into a larger neighbourhood facility to gain operation and maintenance efficiency, and to further enhance site measures. This strategy may also be employed in existing developed areas to reduce existing flows and to partially restore the natural flow regime. This strategy is targeted at any storms (smaller to larger) that exceed 20mm – about 10 times a year on average.

The following actions are recommended to delay the resulting rainwater runoff, thereby providing additional opportunity for infiltration, and may improve rainwater runoff quality.

**Actions for Strategy 1-2:**

- a) Investigate the feasibility of neighbourhood scale rainwater management facilities to reduce peak flood discharges and volumes and to improve general water quality. Possible locations include:
  - Falaise Park (Rupert and Grandview)
  - Beecher Park

- Kensington Pitch and Putt).
- Bio-retention facilities for freeway runoff (e.g., Willingdon exchange area).

See strategies 2-1 and 3-1 for other possible locations.

- b) Investigate the feasibility of peak flow diversion in the vicinity of the Nation Way right-of-way to downstream of Broadway to reduce peak discharges in the Beecher Creek Ravine.

**Strategy 1-3: Develop and implement watershed-scale rainwater facilities and plans to reduce flooding and flood impacts within the Still Creek Corridor.**

**Rationale:** Floods happen – it's only natural. Infrequently, every year or so on average, a large or extreme storm hits the Still Creek watershed. The result is that the on-site infiltration measures (Strategy 1-1) fill and overflow, and the neighbourhood-scale rainwater management facilities (Strategy 1-2) fill and overflow, thus there is no option left but to convey the rainwater away and reduce flood impacts on people and buildings, while considering possible downstream impacts on other areas of the Brunette basin. In essence, a flood management strategy includes one or both of the following approaches: keep water away from people and property, or keep people and property away from water. To that end, the rationale for Strategy 1-3 is to develop a flood management strategy that ensures adequate flow conveyance capacity for large storms and, where that is not feasible, to move people and structures away from the floodwater.



Building on the recommendations from the technical group, Strategy 1-3 is targeted at large storms that exceed the infiltration capacity of on-site source controls and exceed the neighbourhood-scale flood storage/infiltration facilities. To that end, the actions are focused on the flood area area, which consists of



*Neighbourhood flood storage/infiltration facility*

two hydraulically defined zones – the floodway and the flood fringe. The floodway is defined as the main channel and portions of the flood area which are needed to convey the design flood (currently 25 year return period flood flow within the main channel), where floodwater tends to be deepest and fastest. The flood fringe is defined as the portion of the flood area outside of the floodway, where floodwater tends to be shallower and slower.

#### **Actions for Strategy 1-3:**

- a) Pursue channel conveyance and stability improvements as needed during development and redevelopment as appropriate (e.g.: channel maintenance/restoration, daylighting, removing and replanting encroaching vegetation).

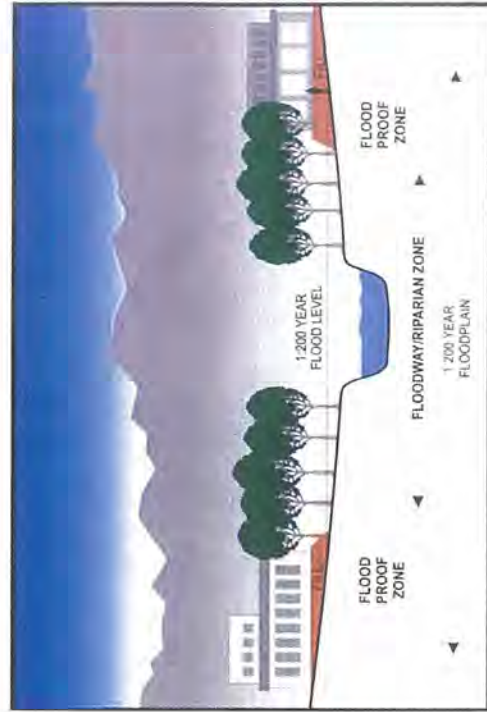


*Channel Maintenance - Still Creek*

- b) Acquire high-risk land within the flood area where appropriate and feasible to preserve flood conveyance capacity and flood storage.
- c) Implement appropriate land-use control within the flood area (see Figure 5-1), for example:
  - map the detailed location of the Floodway/Riparian Zone and the Flood Proof Zone. This establishes setback dimensions along the streams to allow the passage of the design floodwaters and to demark the probable extent of flooding.
  - do not permit new development within the Floodway/Riparian Zone (amend zoning bylaws as necessary).
  - implement flood proofing bylaws for development within the Flood Proof Zone (e.g. establish flood construction levels).
  - regulate infilling of property within the Flood Fringe Flood Proof Zone.



	Description	Development Restrictions	Flood Management Goal	Environmental Goal	Recreational / Maintenance Access Goal
<b>Floodway / Riparian Zone</b>	<p>Lands within 5-30m of the Creek, to be undeveloped and fully vegetated.</p> <p>General zone widths reflect flooding and environmental requirements and lot constraints. Zones are measured from top of bank:</p> <ul style="list-style-type: none"> <li>West of Boundary Road = minimum 5m</li> <li>Boundary Road to 2580 Gilmore = 10 - 15m</li> <li>2580 Gilmore to Burnaby Lake = 15 - 30m</li> </ul> <p>Exact mapping of lands to be determined through development process.</p>	<p>No buildings or structures permitted within Floodway/Riparian Zone.</p> <p>Lands to be protected / restored to natural vegetation.</p> <p>Maintenance access routes and trails should be combined wherever possible. For undeveloped lands, keep these facilities at least 15m from top of bank. Access directly to the creek can be through dead-end trails to view points or shrub-covered maintenance access points that could be used for emergency access. Signage along trails should indicate flood risk.</p>	<p>Undeveloped land that can be used to safely convey floodwaters through the corridor.</p>	<p>Vegetated streamside areas to provide fish and wildlife habitat, and meet regulatory requirements.</p>	<p>Safe, connected trails and maintenance access routes that do not negatively impact streamside vegetation.</p>
<b>Flood Proof Zone</b>	<p>Lands outside the Floodway / Riparian Zone that are subject to flooding during major flood events. These lands are the outer edges of the natural floodplain, but are not deemed essential to allow flood conveyance. They may be used for buildings, structures, parking, loading and development purposes.</p>	<p>Any buildings on these lands must be constructed above the 1:200 year flood elevation. Signage along trails should indicate flood risk.</p>	<p>Buildings safely constructed above flood elevation.</p>	<p>No additional environmental requirements</p>	<p>Safe, connected trails and maintenance access routes</p>



**FIGURE 5-1: LAND USE CONTROLS  
WITHIN THE STILL CREEK  
CORRIDOR**

This cross-section and table show land use controls within the Still Creek corridor to meet flood management, environmental and recreational requirements. The controls will be implemented through land stewardship and long-term initiatives (e.g. land redevelopment). The concepts are illustrated in plan view in Figures 8-2, 8-3 and 8-4.



- d) Providing guidelines to assist developers establish structural and building location strategies within the flood area e.g., parking/building location, material storage.
- e) Encourage landowners to provide stewardship in protecting and enhancing stream side areas and areas within the flood zone in the Still Creek corridor.
- f) Assess and upgrade inadequate hydraulic structures as they near the end of their serviceable life, for example:
  - Boundary Road/Still Creek culvert
  - Willingdon Avenue/ Still Creek culvert
  - Gilmore Avenue/ Still Creek culvert



*Example of well designed hydraulic structure - Still Creek Drive Bridge*

**Strategy 1-4: Improve integration of drainage infrastructure management and maintenance practices among Vancouver, Burnaby, and the GVRD.**

**Rationale:** In general, the drainage infrastructure within the Still Creek – Brunette River basin is the joint responsibility of the riparian municipalities and the GVRD. Within the Still Creek watershed, Burnaby and

Vancouver have responsibility for the municipal drainage system and the tributary streams, while the GVRD has responsibility for the main channel of Still Creek and Still Creek North Branch (a.k.a. Chub Creek). The rationale for Strategy 1-4 is to ensure that the drainage infrastructure in the watershed is managed and maintained in a coordinated and integrated manner.

**Actions for Strategy 1-4:**

- a) Develop a joint stream and culvert maintenance practices and inspection program.
- b) Assess and implement appropriate design standards/level of service for Still Creek and its tributaries for facility operations and replacement.
- c) Develop a watershed GIS drainage inventory map.
- d) Streamline drainage infrastructure maintenance practices for debris management, sediment removal, flushing, catch basin cleaning, street sweeping, etc.
- e) Maintain channel conveyance by monitoring and assessing impacts of land subsidence, channel instability and sedimentation on Still Creek & tributaries between Gilmore Avenue and Burnaby Lake.
- f) Formalize a coordinated flood preparedness plan for Still Creek (in coordination with Brunette Basin Coordinating Committee).
- g) Improve stream access for operations and maintenance.
- h) Coordinate stream monitoring and improve data accessibility.
- i) Assess possible impacts on flow conveyance of operations and maintenance impediments (eg. invasive riparian vegetation, bank



slumps, sediment islands, culvert entrances).

- j) Establish rainwater management system performance, monitoring and maintenance programs.



*Water Quality Sampling*

**Goal 2: Reduce stream erosion and downstream sedimentation to levels approaching a more natural stream.**

The overall goal is to reduce the amount of excess sediment within the stream, both from rainwater runoff throughout the upland areas, and from erosion within the main channel and tributaries. A series of strategies and recommended actions follow that strive to achieve the second goal. It is important to note that the strategies are intended to be complementary, and not mutually exclusive.

**Strategy 2-1: Reduce excessive stream erosion and sedimentation.**

**Rationale:** Some channel erosion and sedimentation is natural. However, urbanization has increased runoff resulting in increased and excessive

channel erosion and sedimentation. This can result in reduced channel stability and flow capacity, increased flood frequency, and impaired fish and wildlife habitat.

**Actions for Strategy 2-1:**

- a) Identify and prioritize areas of high erosion and possible remedial measures.
- b) Investigate the feasibility of neighbourhood detention/flow attenuation measures at the following locations:
  - Beecher Park upstream of Springer Avenue
  - Kensington Pitch and Putt – Holdom/Curtis
- c) Identify areas of concern and employ bio-engineering measures where appropriate to repair and/or protect problem stream banks.



*Bioengineering of stream bank*

- d) Investigate the feasibility of a large-scale sedimentation facility or facilities for the Still Creek corridor



(e.g., between Boundary Road and Willingdon).

- e) Implement flow reduction strategies as described under Goal 1.

**Strategy 2-2: Reduce sediment-laden discharges from construction sites.**

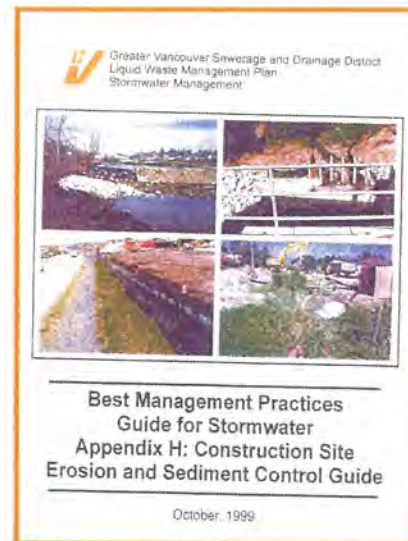
**Rationale:** Sediment from construction sites is not a natural stream process and can cause accelerated channel infilling, harm fish and impair habitat. As the discharges come from a limited number of identifiable sources, the problem is relatively manageable, particularly when the problem is solved at the source before it enters the stream.

**Actions for Strategy 2-2:**

- a) Harmonize sedimentation management and best practices among GVRD, Vancouver and Burnaby.
- b) Review the federal discharge criteria of 75 mg/ml Total Suspended Solids (TSS) above background level for

wet weather flow condition from construction and development sites, and determine whether it is stringent enough for Still Creek and its tributaries.

- c) Develop and publish educational opportunities/materials (e.g. erosion and sediment control information pamphlets for land developers and builders).









## Chapter 6: Environmental Protection - Goals and Strategies

### Goal 3: Protect and Enhance Streamside and Aquatic Habitats.

Watercourses have been called "veins of life" within a landscape, as they provide rich ecological habitats and connect different parts of a watershed. The Still Creek watershed is heavily urbanized, with only 20% of the land covered in vegetation (Axys 2004). The largest vegetated portions of the watershed are mostly focused near watercourses.

#### Strategy 3-1: Maintain Open-Channel Watercourses.

**Rationale:** Piping watercourses eliminates habitat for fish and wildlife, and decreases water quality



*Lower Still Creek*

improvements through natural filtration. A minimum step for environmental protection is to maintain open-channel



*Repairing Still Creek after a major failure, 1978*

watercourses. Further watercourse enclosures should be avoided. Daylighting a watercourse may produce significant ecological benefits, but can be very expensive and land consumptive. The plan calls for daylighting sections where it is practical and significant environmental or aesthetic gains can be achieved. Key locations include the Still Creek mainstem, Guichon Creek through BCIT, and Beecher Creek at Goring Ave.

#### Actions for Strategy 3-1:

- a) Daylight enclosed sections of Still Creek, especially where significant environmental or aesthetic gains can be achieved. The long-term vision is to maintain Still Creek in an open channel up to 29th Avenue.
- b) Daylight enclosed sections of tributary creeks, especially where significant environmental gains can be achieved. Potential locations include Still Creek at Falaise Park, Guichon Creek at BCIT and Beecher Creek at Goring Avenue.



### Strategy 3-2: Improve Fish Access and Instream Habitat Quality for Fish and Wildlife.

**Rationale:** Fish and wildlife habitat around watercourses have been severely degraded through vegetation loss, stream channelization, and lack of channel complexity. Fish access and passage is limited due to habitat being isolated by lengthy culverts, flumed sections, and various man-made barriers. Despite installation of a fishway, the Cariboo Dam in the Brunetter River is believed to be an obstacle to migrating anadromous salmon. Native species

found in the watershed include cutthroat trout and threespine stickleback with other warm-water species likely to be accessing some reaches from Burnaby Lake. Detailed mapping of fisheries improvement projects are presented in the Environmental Support document for the ISMP.

#### Actions for Strategy 3-2:

- a) Improve all culverts within the mainstem of Still Creek and its major tributaries and remove fish obstacles, where needed, to improve fish access.
- b) Add in-stream habitat complexity



*Beecher Creek Weirs*



and off-channel rearing and refuge habitat to create more natural and biodiverse stream systems, as appropriate, with flood management. Locations may include Crabapple Creek, Chub Creek, Darnley ditch, Beecher Creek, Spring Brook at Cascade Park, Ardley at Still, Pollywog at Still, Guichon at Still Creek and Wesburn Park, Sumner at Still, Still Creek at Cornett Rd, Still at 3700 Still Creek Ave, Still Creek within Burnaby Lake Regional Nature Park.

- c) improve summer dissolved oxygen levels in Still Creek through aeration structures, such as simple aeration devices and baffle systems.
- d) Assess need to improve fish access over Cariboo Dam.

**Strategy 3-3: Provide Continuous Streamside Vegetation to Protect and Enhance Habitat for Aquatic and Terrestrial Species.**

**Rationale:** A wide buffer of streamside (riparian) vegetation is critical for providing food and nutrient to the stream, keeping the water cool through shading, providing habitat for aquatic and terrestrial species, and filtering contaminants from entering the stream from adjacent properties. Streamside vegetation has been severely degraded in the watershed. For the remaining open sections of the Still Creek mainstem only 26% of the length has streamside vegetation (riparian forest), and only 4.6% has streamside vegetation greater than 30m wide. Streamside vegetation is also degraded in Still Creek's tributaries,

with least disturbed areas being within the Guichon Creek and Beecher Creek ravines.

For the mainstem of Still Creek, streamside habitat protection must be integrated with flood protection and provision of recreational corridors. Chapter 8 shows an integrated vision for the corridor.



*Trails and viewpoints will be sensitively designed to minimize environmental impacts*

**Actions for Strategy 3-3:**

- a) Prevent encroachments onto City / GVRD-owned streamside areas within the corridor.
- b) West of Boundary, development around Still Creek should follow the guidelines as set out in the *Still Creek Rehabilitation and Enhancement Study (2002)*
- c) Designate a Still Creek Floodway Riparian Zone on either side of Still Creek, through zoning bylaws to prevent any new construction of buildings into the floodway or riparian corridor (see Figure 5-1 and strategy 1-3c). This Flood Zone should be a minimum of 5m from top of channel bank west of Boundary Road; a minimum of 10m



between Boundary and 2580 Gilmore; and a minimum of 15m for the remainder of Still Creek to Burnaby Lake.

- d) Conduct local area plans for the Still Creek - Gilmore Ave, and Still Creek - Douglas Road areas to clarify land use, greenspace, watercourse management, and neighbourhood connection issues
- e) Pursue long-term acquisition/dedication to re-establish a vegetated greenway along Still Creek for flood control, conservation, and recreation purposes. The greenway would be 5-30m in width from top of bank west of Boundary and 15-30m in width east of Boundary on either side of the watercourse, and may include trails, flood management, creek maintenance and environmental features (see Section 8 - an integrated vision for the corridor).
- f) On all streams protect or enhance stream setback areas as per requirements in local area plans (e.g. Holdom Station Plan, Grandview Boundary Plan), municipal bylaws, provincial and federal regulations, or plans approved through the City Environmental Review Committee.
- g) Encourage landowners to “adopt a stream” by protecting and enhancing streamside vegetation.
- h) Develop an overall streamside vegetation and planting plan for the Still Creek mainstem to guide landscaping and stewardship initiatives.
- i) Use existing access points to creeks as much as possible to limit further riparian encroachment. Ensure adequate access locations to

minimize riparian degradation during maintenance works.

### **Strategy 3-4: Encourage Watershed Stewardship.**

**Rationale:** Landowners, businesses, and residents adjacent to streams may significantly affect the quality and extent of streamside vegetation and overall stream health. In addition, landowners, businesses, and residents throughout the watershed impact the quality of water running into streams through their use of lands and control of pollutants entering drains. Similarly the amount and quality of habitat in the watershed is affected by landowners choice of landscaping and planting. Watershed stewardship is therefore a critical element for the success of the plan.

#### **Actions for Strategy 3-4:**

- a) Create public educational programs for watershed stewardship, including:
  - Protecting streamside vegetation.
  - Planting of native species
  - Eliminating deposition and discharge of deleterious substances into the drainage system
  - Protection of pervious areas
  - Lawn management to maximize infiltration.
  - Improved source control practices for both rain run-off quantity and quality.



## **Goal 4: Protect and Enhance Forest and Trees in the Watershed.**

In urban areas, trees provide important environmental values, by intercepting and detaining rainwater, providing habitat, filtering contaminants from the air, removing carbon dioxide from the air and storing it in their biomass, and shading and cooling the urban environment.

### **Strategy 4-1: Maximize Tree Cover in Watershed**

**Rationale:** An analysis of the benefits of treed areas in the Still Creek Watershed assessed that the trees annually remove over 73,000 lbs (33,500 kg) of pollutants from the air, including carbon monoxide, ozone, nitrogen dioxide, particulate matter and sulphur dioxide (City Green Analysis in Axys 2005). The Still Creek trees also store a total of 35,600 tons of carbon. Maximizing tree cover will maintain these and other "ecological services" such as providing habitat, stormwater management through transpiration, and curtailing the urban heat island effect. An analysis of stormwater benefits indicated trees provide over \$900,000-worth of flow detention benefits in the Still Creek watershed (City Green Analysis in Axys 2005) as well as significant water quality benefits.

### **Actions for Strategy 4-1:**

- a) Plant and maintain street trees and boulevards throughout the watershed, including using a diversity of species.
- b) Encourage tree-planting and creation of new greenspace in land redevelopment.
- c) Encourage private landowners to plant native trees and vegetation on their properties. (These lands may include residences, commercial lots, cemeteries, etc)
- d) Encourage schools to add planting to school yards.
- e) Develop and implement an urban forest strategy for the watershed.

## **Goal 5: Protect and Improve Water Quality.**

Water quality in Still Creek is poor and is deemed to be a main limiting factor to aquatic life (Coast River 2004). Nonetheless water quality has improved significantly in recent decades, due to more stringent environmental standards and monitoring. Further significant water quality improvements are expected through implementing actions in this plan. Hydrocarbons and heavy metals are major pollutants, due in large part to the high automobile and truck traffic in the watershed. From residential areas, household detergents (car washing activities) and lawn care products (herbicides, fertilizers etc) and sanitary-storm sewer cross connections contribute to the poor water quality.



### Dawson and Madison - A case-study of recreating greenspace

This redevelopment is occurring south of Gilmore Sky Train Station, as part of the Brentwood Town Centre Plan.

**1992**

Industrial land use  
around Chub Creek



**2002**

City starts to remediate  
lands



**2005**

Approved development plan, including remediation of all industrial lands, creation of 3.15 acre City Park (Jim Lorimer Park – including streamside and wetland enhancement, trails, and play area), dedication of five acres of private land as natural greenspace (including meadows, biofiltration ponds, and trails within BC Hydro Right of Way). The development includes seven high rise towers surrounded by formal gardens some of which are built as greenroofs over parking structures. By early 2005, four towers were under construction, and the remaining three were under within plan review.





In addition, lack of streamside vegetation cover, channelization and fluming have led to high water temperatures, which contribute to low dissolved oxygen. Long enclosed sections of the channel restrict biophysical processes that could improve water quality.



*Streets are directly connected through pipes to watercourses*

### **Strategy 5-1: Prevent Contaminants from Entering Watercourses or Stormdrains.**

**Rationale:** The most effective means of protecting water quality is to prevent contaminants from entering watercourses and stormdrains in the first place.

#### **Actions for Strategy 5-1:**

- a) Establish non-point source pollution control for private land owners.
- b) Continue with cross connection inspection (CCTV, smoke testing and dye testing).
- c) Enhance major culvert inspection and maintenance program.
- d) Improve and increase frequency of catch basin cleaning and street sweeping practices.
- e) Research benefits and challenges of infiltrating catchbasins.
- f) Continue to encourage landowners to adopt “cosmetic herbicide/pesticide-free landscaping” on a watershed-wide basis.
- g) Conduct targeted and coordinated pollution-prevention education programs (i.e., industry-specific education materials prepared for the Byrne Creek program).
- h) Continue to provide training programs for City staff and private contractors on best management practices for maintenance and construction operations.
- i) Encourage landowners to use stormwater BMPs with multiple benefits (e.g. green roofs and trees for reducing heat island effect, swales to promote groundwater infiltration).
- j) Continue to enhance existing source control programs
- k) Limit street flushing to emergency and special situations
- l) Develop neighbourhood-scale water quality treatment ponds at strategic locations in the watershed that will also provide improved runoff quantity control. Potential locations include Chaffey Burke School (Guichon), Wesburn Park (Guichon), Broadview Park (Spring Brook), Avondale Park (Spring Brook), Falaise Park, Crabapple Creek.
- m) Seek opportunities to integrate biofiltration and water quality improvement facilities within existing land uses (i.e., parks, landscaping, etc.) - e.g. Burnaby Lake Sports Complex.



- n) Develop an approach and standards for disposal of rainwater run off from contaminated sites or sites under remediation.



*In Bridge Business Park, Burnaby, this constructed wetland filters water before it enters Chub Creek, a tributary to Still Creek. The wetland also provides aesthetic and habitat benefits for the area.*

- o) Continue to educate private land owners on spill management best practices.

### Strategy 5-2: Monitor Water Quality and Respond to Results.

**Rationale:** Monitoring will highlight trends in water quality and can show the benefits of water quality improvement programs.

- a) Continue with the GVRD and municipal fecal coliform monitoring program.
- b) Use measures of benthic invertebrate presence and abundance to monitor stream health.
- c) Coordinate chemical analysis of water quality (including sediment, pH, heavy metals and oils and grease).

### Goal 6: Maintain and Increase Native Species Biodiversity.

As human communities have grown in the Still Creek watershed, native ecology and biodiversity has declined. Impacts include:

- loss of habitat (only 20% of the watershed is currently vegetated);
- changes in habitat quality (only 6% of the watershed is vegetated with 'natural' vegetation - the rest is human-impact landscapes such as street trees, playing fields, and cemeteries);
- loss of species that need large or undisturbed habitats (e.g. northern harrier, red-legged frog, pileated woodpecker, deer, bear, and other large mammals) to be replaced by species that are more tolerant to human disturbances or can live in smaller habitat fragments (e.g. coyotes, crows, spotted towhee); and
- increases in the amount of non-native "invasive" vegetation (e.g. Himalayan blackberry, policeman's helmet, Japanese Knotweed).

Despite the significant urbanization, the watershed still has a role to play from a regional biodiversity perspective. Goals for regional biodiversity planning include protecting large intact areas of habitat (reservoirs and refuges); protecting and creating linkages and corridors between these areas, maintaining the quality of the habitats within these areas, and preventing contaminants from entering adjacent areas. Protecting and enhancing these values is challenging in an urbanized



watershed, but the following strategies seek to maximize opportunities for biodiversity.

To date, provincial Species at Risk Act work has focussed on the Pacific Water Shrew. Mapping of potential Shrew habitat (Axys 2005) has been integrated into the actions below.

### Strategy 6-1: Protect and Enhance Remaining Habitat Reservoirs and Refuges.

**Rationale:** The watershed is close to several large *habitat reservoirs* (habitats over 30 hectares in size) that are important for regional biodiversity - Burnaby Lake, Central Park, Deer Lake, and Burnaby Mountain. Edges of the first two of these reservoirs are within the watershed. The habitat reservoirs are important as they are large enough to contain both edge and interior habitats and are home to a wide diversity of plants, wildlife, birds and other species. The Still Creek watershed also contains smaller habitat patches - or *refuges* (habitats that are 2-30 hectares in size). These refuges will experience disturbance from adjacent urban areas due to their small size and lack of interior habitat, but they will provide habitats for some native species that are resilient to disturbance, do not need large habitat areas, and / or may be able to migrate to other refuge or reservoirs (e.g. spotted towhee).

Figure 6-1 shows Still Creek habitat in a sub-regional context, identifying habitat reservoirs and refuges. Most of the reservoirs and refuges are within existing park and conservation areas, but some parcels are undergoing development (e.g. lands east of Willingdon and north of Still Creek).



*Wildlife living within the watershed includes beaver, red-tailed hawk, bald eagles, Douglas squirrel and great blue heron.*

#### Actions for Strategy 6-1:

- a) Investigate designating remaining habitat reservoirs and refuges as parks or conservation areas. Lands to be considered for conservation area designation include lands south of Still Creek between Westminster and Willingdon, and the Beecher Creek corridor.
- b) Conduct a land use plan for the area around Douglas Road, and consider the concept of extending the Still Creek Conservation Area west to Royal Oak right of way, through habitat restoration for environmental and flood cell purposes.
- c) Enlarge habitat reservoirs and refuges through land restoration sites (e.g. eight acres of rehabilitated industrial lands around Chub Creek at the Madison sites).



- d) Focus recreation in existing disturbed areas, in order to minimize further habitat fragmentation
- e) Encourage the BC Ministry of Transportation to consider habitat values in management of lands adjacent to the Trans Canada Highway (e.g. replace grass embankments with native shrubs and trees, wildflowers, meadows).

### **Strategy 6-2: Connect habitat reservoirs and refuges**

**Rationale:** Urban areas such as Still Creek are characterized by severe habitat fragmentation, with habitat reservoirs and refuges isolated from each other. Linkages between reservoirs and refuges are critical to allow for interbreeding and genetic diversity. The more plentiful the linkages, the easier species can connect and interbreed. In urban areas, species movement is constrained by both the distance between habitat patches and

urban infrastructure (i.e., roads, rail-lines, pipes, etc) that cross habitat patches, limiting the ability of terrestrial species to migrate. The most successful species will therefore be those that can fly between patches or who can travel across the urban landscape (e.g. coyotes).

Restoring corridors within an urban landscape is very challenging, as the land has already been closely subdivided and designated for specific private and public land uses. Key opportunities for creating corridors are outlined below.

#### **Actions for Strategy 6-2:**

- a) Focus restoration efforts on creating a 40 - 60m-wide (primary/secondary/tertiary corridor) along Still Creek as a Greenway to connect the Burnaby Lake habitat reservoir with the habitat refuges around Willingdon Avenue. Develop the concept within a land use plan for Douglas Road area, and integrate corridor creation with flood management and recreation works.

#### **Habitat Connectivity**

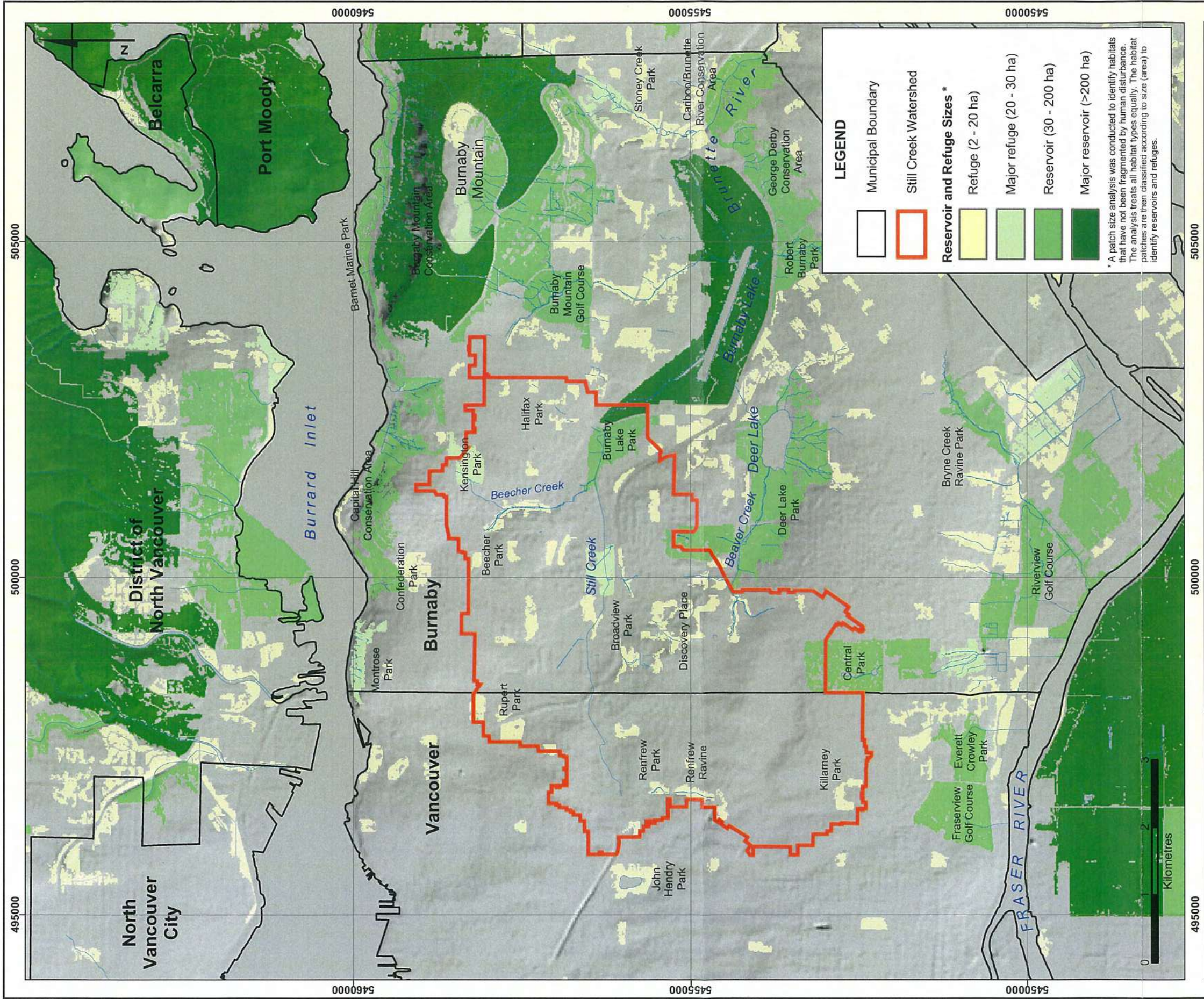
Connections are critical between habitat reservoirs and refuges. Width requirements for corridors will vary among species, but studies for the GVRD Biodiversity Conservation Strategy suggests the following hierarchy of corridors:

**Primary corridors** - over 50m in width (providing routing for a variety of species)

**Secondary corridors** - 20-50m wide (providing some routing, but not optimal conditions)

**Tertiary corridors** - small fragmented areas that are tied together by street trees, backyards, etc. While tertiary corridors will not serve all species, they can play a role. For example, bird movement can be enhanced by provision of habitat through the urban landscape (e.g. uncut meadow areas at highway interchanges, backyard habitat, vegetation within stream corridors and ravines, hedgerows, etc).





**Figure 6-1**  
**Habitat Reservoirs and**  
**Refuges in lands**  
**around Still Creek**  
**Watershed**

Map prepared by:

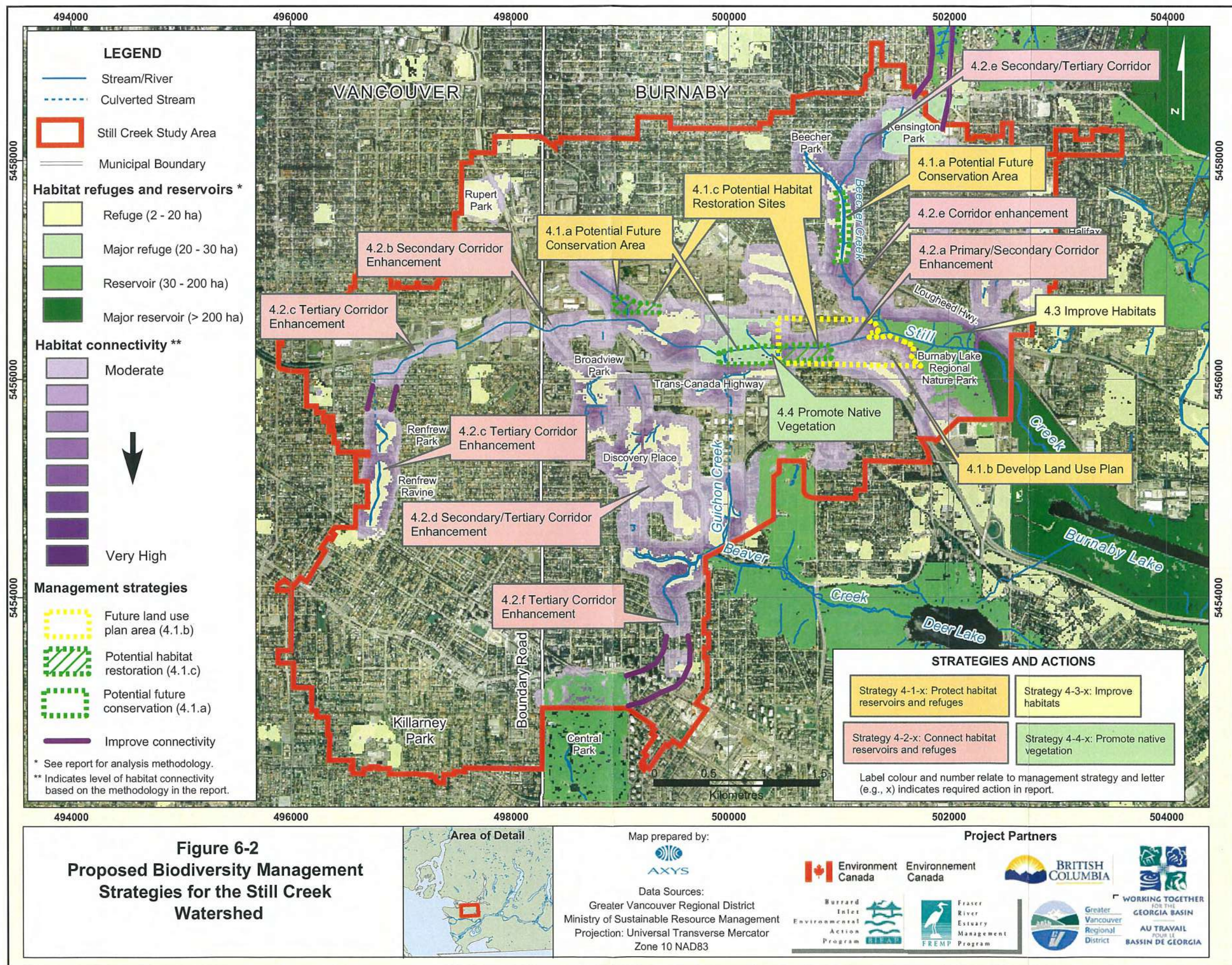


Data Sources:  
 Greater Vancouver Regional District  
 Ministry of Sustainable Resource Management  
 Projection: Universal Transverse Mercator  
 Zone 10 NAD83

Project Partners









- b) Extend the Still Creek habitat corridor west to Vancouver as a secondary corridor to connect with other greenspaces (e.g. the Chub Creek parklands).
- c) Create a tertiary corridor connecting Still Creek with Renfrew Ravine, Trout Lake Park, Central Park, Champlain Heights, Everett Crowley Park, and the East Side Crosscut through watercourse enhancement projects, backyard habitat programs and street tree plantings.
- d) Create a secondary/tertiary corridor between Still Creek and Deer Lake Park (through BCIT, Discovery Park and Guichon Ravine). Potential projects include:
  - habitat creation as part of the BCIT land use plan,
  - forest enhancement works at Discovery Park,
  - street tree planting, and
  - backyard habitat programs in adjacent neighbourhoods.
- e) Create a secondary/tertiary corridor along Beecher Creek up towards Burrard Inlet Potential projects include:
  - stream restoration as part of the Holdom Area Plan implementation,
  - habitat enhancement works in Beecher Creek ravine and Kensington Park,
  - street tree planting, and
  - backyard habitat programs in adjacent neighbourhoods.
- f) Create a tertiary corridor connecting Beaver Creek to Central Park, through backyard habitat programs and street tree planting.

- g) Encourage utility companies (e.g., BC Hydro, Terasen) to maximize habitat potential of lands within utility corridors (e.g. locating bioponds in Rights of Way).

### **Strategy 6-3: Improve Habitat Quality and Complexity for Wildlife**

**Rationale:** The quality of habitat will dramatically affect the types and quantities of species using natural areas. Key opportunities for improving habitat quality are outlined below.

#### **Actions for Strategy 6-3:**

- a.) Study and inventory natural areas to better understand species usage (i.e. rare and endangered species, such as the Pacific Water Shrew).
- b) Manage natural and urban areas to maximize value for native biodiversity (e.g. vegetation management, bird boxes, bat boxes, bee houses).
- c) Designate protected refuge areas for native wildlife breeding and rearing purposes (e.g. some parts of Burnaby Lake Regional Nature Park). Restrict access to the areas (seasonally or permanently).
- d) Assess potential problem wildlife species (e.g. beaver, mosquitoes, Canada geese) and develop appropriate management strategies. For example, to control mosquitoes (and West Nile Virus concerns), use integrated pest management approaches.
- e) During forest management, promote diversity of native forest tree species and age structures. Retain stumps, snags (wildlife trees), and coarse



woody debris for cavity nesting birds.

- f) Minimize conflict between dog off-leash areas and critical habitat areas.
- g) Increase areas of wetland in watershed.

#### **Strategy 6-4: Promote Native Vegetation and Control Non-native Species.**

**Rationale:** Like many urban areas, Still Creek Watershed is rife with non-native invasive vegetation. This vegetation can smother native plants and biodiversity and may not provide suitable habitat for native wildlife species. However, dealing with invasive vegetation can be a significant challenge as control is extremely resource intensive and needs to occur over a long period of time. The following actions are proposed to start to address this problem:

##### **Actions for Strategy 6-4:**

- a) Assess extent of invasive vegetation and create priorities for removal based on potential habitat benefits, available resources (e.g. partnerships with streamkeepers and the public), and long-term planning.
- b) Create a Management Plan for invasive species removal (e.g. Japanese Knotweed in Southern Discovery Parks, Himalayan blackberry, Beacon silver, and purple loosestrife in Burnaby Lake).
- c) Support streamkeepers' efforts at native planting and invasive weed removal initiatives (i.e. policeman's helmet, purple loose strife, polygonum, blackberry, Scotch broom) in order to support native vegetation and wildlife.
- d) Develop an integrated land stewardship program for landowners to raise issues of biodiversity in the watershed and provide training on:
  - Native planting for backyards instead of ornamental species, particularly on lands adjacent to watercourse ravines.
  - Control dumping of yard waste (including non-native species) within ravines.
  - Promote integrated pest management and reduce public dependency on chemical lawn care products.



## Chapter 7: Recreational Enhancement-Goals and Strategies

### ***Goal 7: Connect people with the watershed and its streams.***

The key recreation goal is to provide recreational opportunities for a broad range of people within the Still Creek watershed, in a manner that is compatible with the overall diversity of needs within the watershed. The watershed provides a unique opportunity for the community to benefit from easy access to a naturally vegetated aquatic environment with forested areas, trails and a refuge for wildlife. Through access to and enjoyment of the watershed area, the human health and well being of the community will increase. The watershed area also offers key linkages for community bikeway and commuter trails to promote the use of alternative modes of transport. While recreation is a vital component of the watershed area, its



Public access trails

needs must be balanced with the diverse needs of preserving areas as environment refuges, protecting natural vegetation and wildlife, accommodating

drainage infrastructure and offering education to watershed users.

Recreation within the watershed will range from passive activities such as relaxing at a viewpoint to more active pursuits such as jogging, roller blading and cycling. Recreation also includes stewardship and public art within the watershed.

The series of recreational strategies that are listed in this document are to be viewed as complementary to the rainwater and environmental strategies.

### ***Strategy 7-1: Create a variety of experiences along the stream corridor and their tributaries.***

**Rationale:** The Still Creek watershed has a great variety of topography and types of adjacent development within its boundaries. This provides opportunities to create a range of recreational “activities” that fit with the natural surroundings. Typically a viewpoint would be situated at an outlook surrounded by a vegetated landscape while a roller-blading trail would be better located on flat terrain adjacent to more urban types of development.

#### **Actions for Strategy 7-1:**

- a) Build gathering places and nodes at or near the creek edge to facilitate community celebrations and mixed use recreation. (e.g. Renfrew Ravine Park, Wesburn Park, Douglas Road, Still Creek Avenue, Gilmore Avenue).
- b) Create an “opportunity map” that identifies key locations that naturally lend themselves to future recreation sites such as viewing corridors,



active recreation areas, passive recreation areas, off-leash dog areas, environmental preserves or commercial areas.



Public rest stops and view points

- c) Create linear recreational corridors from Renfrew Ravine Park in Vancouver to Burnaby Lake Park in Burnaby that accommodates the needs of pedestrians and joggers and possibly cyclists and roller bladers. Around environmentally sensitive areas, there may be two routes where pedestrians could be accommodated closer to the stream and higher impact activities could be accommodated away from sensitive areas. The corridor's main character should be natural, yet recognizing that it is in an urban setting.

**Strategy 7-2: Provide multiple opportunities for people to access the streams (including on-water activities).**

**Rationale:** While the watershed covers a large area, one of the most visible and identifiable features are the creeks themselves. The focus of this strategy is to create opportunities for people to access and enjoy the natural amenities that these streams offer.

### Actions for Strategy 7-2:

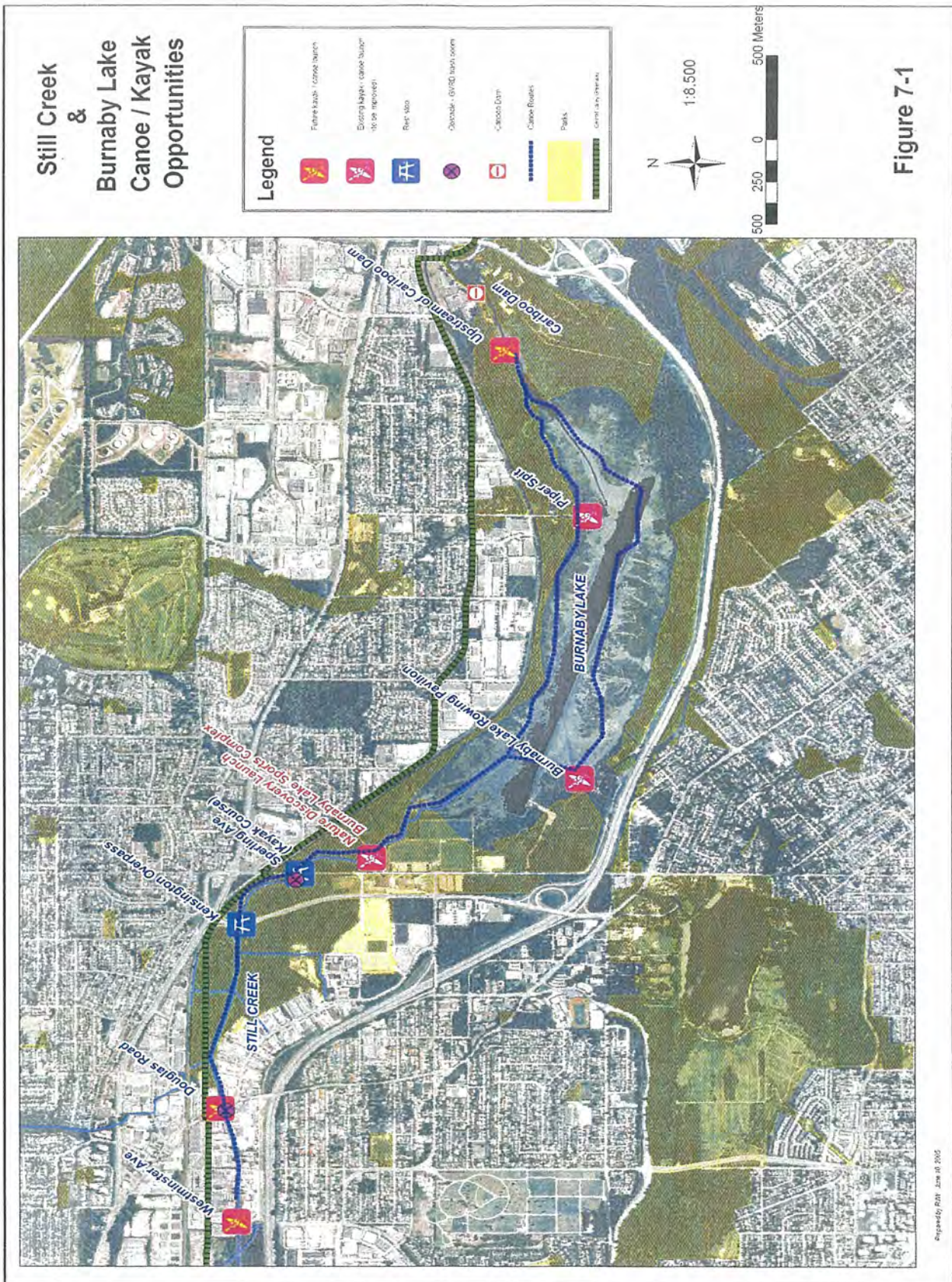
- a) Integrate the trail network with the streamside corridors.
- b) Create stairs, terraces, landscaped benches, boardwalks, view corridors or slopes to enhance the potential enjoyment of Still Creek and its tributaries (e.g. Grandview - Boundary Industrial Area, Renfrew Ravine Park, Beecher Park, Avondale Park, Crabapple Creek).



Access stairway to the creek

- c) Provide direct access to the open sections of Still Creek and its tributaries at specified and controlled locations (e.g. Douglas Road, Still Creek Street, Gilmore Avenue).
- d) Create opportunities for kayakers and canoeists to access Still Creek between Gilmore Avenue and Burnaby Lake (e.g. Douglas Road, Willingdon Avenue, Still Creek Street, Gilmore Avenue – see Figure 7-1).
- e) Negotiate rights-of-ways or acquire the necessary necessary property to facilitate a continuous public access corridor along Still Creek (e.g. Vancouver: Grandview Boundary Industrial Area, St. Jude's School/ GVRD Housing Site. Burnaby: Properties addressed on Still Creek Street and Regent Street).







**Strategy 7-3: Develop an integrated watershed-wide bike and pedestrian system, trail policy and strategy.**

**Rationale:** Providing an integrated and well developed trail system in the watershed will allow all user groups relatively easy access to different areas of the watershed as well as minimize conflicts between the needs of different groups, for example, the conflicts between dogs and sensitive animal habitat or between pedestrians and cyclists.

**Actions for Strategy 7-3:**

- a) Create linkages between town centres and urban trails to Still Creek and its tributaries through distinctive streetscapes and public art.
- b) Complement the Central Valley Greenway by creating additional links to other trail systems and town centres.
- c) Work with appropriate stakeholder groups on “walking school bus routes” that link with greenways, urban trails and Still Creek and its tributaries.



Urban trail system

- d) Enhance pedestrian and cycle safety in the catchment area at the time of infrastructure improvement.

- e) Remove physical and policy barriers to promote more efficient and safe cycling.

**Strategy 7-4: Identify opportunities for land owners to optimize the public and private benefits along the streams.**

**Rationale:** Owners of lands adjacent to the creek can play a key role in developing a healthy and attractive watershed. Adjacent to the stream, property owners can create an environment that is an asset to their business and employees while complementing the ongoing vibrant development of recreation in the watershed.

**Actions for Strategy 7-4:**

- a) Identify built-out locations where the limited integration of restaurants, coffee shops, green spaces and similar uses could be achieved, and encourage that type of use (e.g. Burnaby: Still Creek/Eastbrook Keg Building; Still Creek/Westminster; Still Creek/Douglas Road. Vancouver: Grandview Boundary Industrial Area – Danier Leather
- b) Encourage land owners to rehabilitate and daylight, to the greatest extent possible, Still Creek, its tributaries and the adjacent areas.
- c) Create a “Still Creek Integration” competition for adjacent business owners with awards every two years.
- d) Encourage landowners to create or allow public amenities and recreation enhancements in specified locations; (Grandview Boundary Industrial Area; Still Creek “industrial” area).



### **Goal 8: Provide stream-related education**

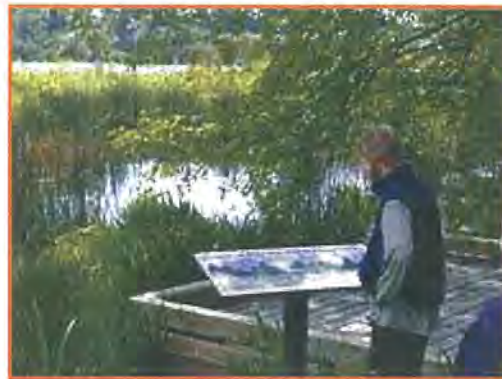
Education is a vital tool to raise awareness and to promote the protection and rehabilitation of the Still Creek watershed. Much of the general public is not aware of the existence of Still Creek or the impacts that they may have on it and its tributaries. Education, including public art, as well as this ISMP, can be used to create this awareness of Still Creek. The target audience includes residents, businesses, school children, hikers, cyclists and kayakers in the Still Creek watershed. Through access to the watershed area, the community will gain a better understanding and appreciation of the interrelationship between the rainwater from each individual street and property and the health of the watershed.

Partnerships with streamkeepers, schools and other community and environmental groups are also needed to ensure that a consistent message is delivered throughout the watershed. Because Burnaby, Vancouver and the GVRD are involved in the Still Creek ISMP, comprehensive educational initiatives can be developed in partnership with these organizations.

#### **Strategy 8-1: Create and enhance environmental education opportunities throughout the watershed**

**Rationale:** Public support is required to achieve many of the goals identified in this report—one method is to provide educational programs in the communities. Various communication methods can increase the awareness of

Still Creek and the Still Creek Watershed along with the goals and actions of this Plan. Behavioural changes related to waste disposal and community development can be encouraged through education. The following actions are in addition to actions identified in Chapters 5 and 6 (e.g. 1-3e, 2-2c, 3-4a, 5-1a, 5-1f, 5-1g).



Public education along trail systems

#### **Actions for Strategy 8-1:**

- a) Develop educational walking tours for hikers, cyclists, school children, and the public with markers and plaques along the way. Link the walk with existing Greenways. Develop a geographic watershed understanding by creating planted gateways, public art and educational strategies, and ongoing stormwater, creek and tributary markings/signage/art.
- b) Develop specific educational activities for school children throughout the watershed.
- c) Develop brochures to raise awareness amongst residents and businesses of the watershed, its



Still Creek sign at Rupert Street



- history, importance, and the plans to enhance and restore it. Focus on recreational beautification and restoration aspects of the creeks when communicating with residents. Develop slogans and visual themes for all Still Creek communication materials.
- d) Integrate signage and interpretive panels with ongoing city street and park signs. Every crossing of Still Creek and its tributaries should be signed in an obvious, artful way.
- e) Implement a public art program that traces all enclosed and open sections of Still Creek and its tributaries that includes two and three dimensional art installations, performance art and participatory community gatherings. (see Historic Streams map).
- f) Integrate the landscape, geology and First Nation's history in the interpretation theme along Still Creek and its tributaries.
- g) Integrate aeration structures and public art initiatives.

## Let's keep Renfrew Ravine natural and healthy

我們怎樣可以幫助蘭菲小溪回復自然和清潔



**Healthy Water**  
We can minimize vehicle leaks and avoid pouring toxins into storm drains, as these flow directly into the ravine and cause water pollution.

We can replace pavement with garden to let rain water seep naturally through the soil instead of causing flash floods in the ravine.

**Healthy Land**  
We can compost yard waste instead of throwing it into the ravine, as garden cuttings introduce invasive plant species to the ravine.

We can reduce, recycle and take excess garbage to the dump, as garbage in the ravine attracts rats and causes landslides.

**Healthy Communities**  
We can work together to keep the ravine healthy! By working together, we get to know our community and make it a safe and healthy place to live.

(1) 如發現汽車漏油，請趕快修理。不要將有毒物質（汽油、柴油等）倒入溪林，有毒之液體，請勿引入排水渠，因雨水會將溪林附近有毒物質帶入溪中，所漏之廢水，將繼續流入水壓比渠，經溪流、海峽或、最終令無數人及生靈均會受害。

(2) 當你清理花園中之枝葉及剪草時，請勿將這些樹枝小葉、因這會引致野草、竹花亂生，影響原有植物之生長。並且，我們不要把垃圾拋棄在小溪內，若小溪因雜草垃圾而會吸引很多老鼠和引起泥土崩塌，我們可把垃圾運往過期，或把多出的垃圾，運往垃圾收集站。

(3) 讓我們共同努力，保持小溪的清潔，透過大家共同努力，使我們能認識更多有關我們的社區，及讓她成為我們的安樂地。







## Chapter 8: The Integrated Plan

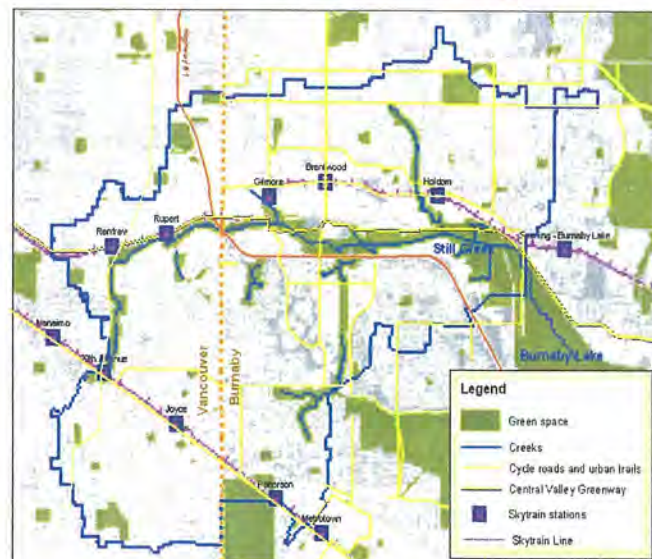
In Chapters 5-7 the different strategies to achieve the watershed vision are listed under the key areas of rainwater management, environmental protection, and recreational enhancement. Table 8-1 provides a collective list of all activities, including identification of possible lead agencies and partners, the range of costs to implement the action items, and an estimated timeline.

The list of strategies is extensive and several of the strategies are interdependent. An integrated approach to implementation is therefore essential – to ensure effective use of resources and land uses that are safe, well-used, well-maintained, and environmentally sensitive. Figure 8-1 illustrates the tools available to Plan partners and others to implement the Plan. Chapter 9 outlines in more detail how the strategies can be turned into action.

As a watershed plan, many of the strategies require actions far from the watercourses themselves, including on-site management of rainwater and potential pollutants, planting trees and vegetation, and creating an integrated network of multi-use trails.

In addition, the Still Creek corridor itself is a significant focus for Plan strategies. Figures 8-2, 8-3 and 8-4 focus on the Still Creek corridor and illustrates in detail how strategies can be integrated to reduce flood risk, improve habitat values, and allow the public to enjoy the watercourse at safe and strategic locations.

### Still Creek Watershed ... An Integrated Plan



*The plan acknowledges that the health of Still Creek and its tributaries is directly affected by land use activities within the watershed – that is all lands that drain to the Creek. Good management of rainwater run-off in places like northwest Metrotown, Brentwood, and Renfrew neighbourhood is critical for water quality and stream health.*



Figure 8-1: Tools for Implementing the Plan

## Still Creek Integrated Watershed Management Plan





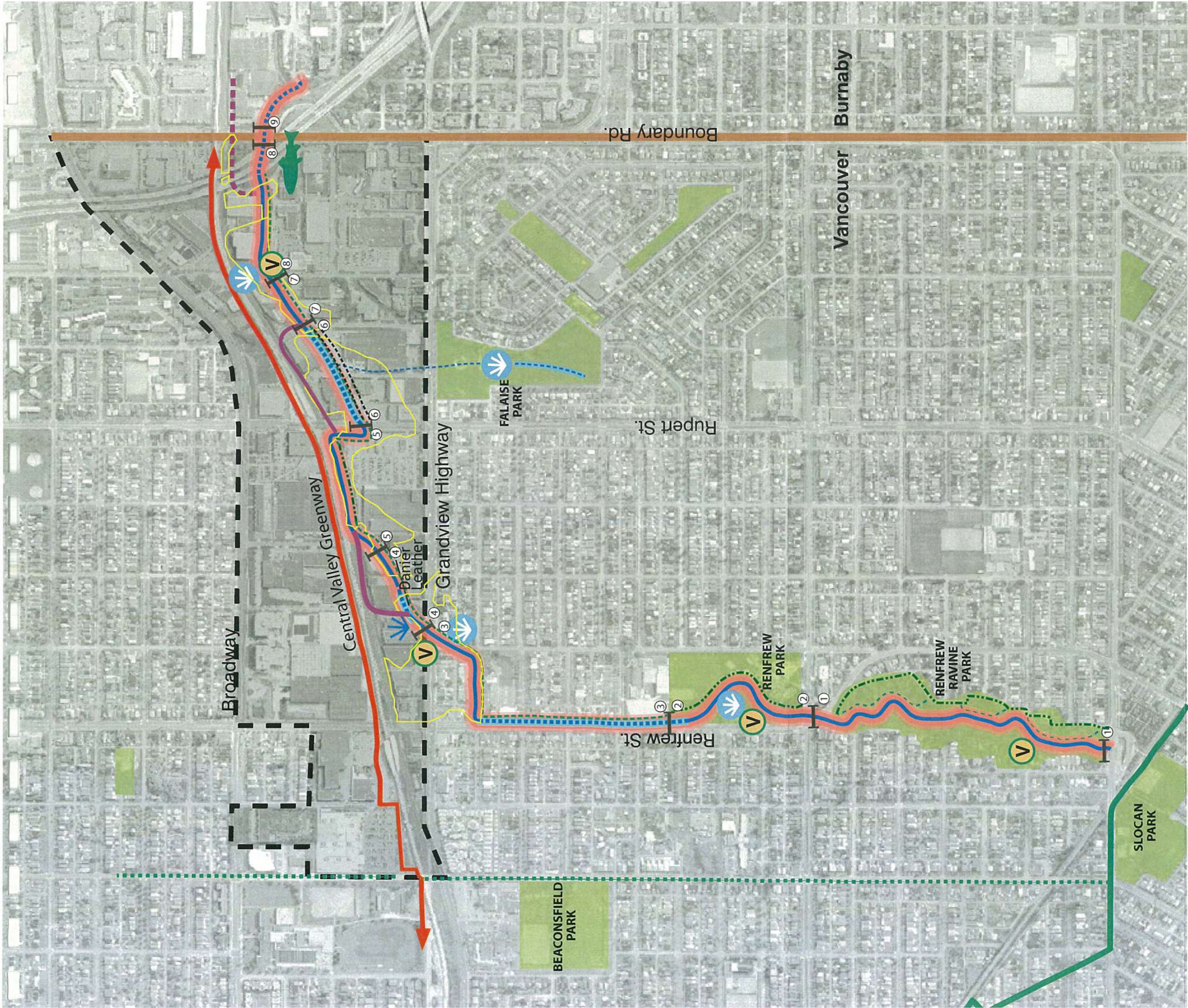


Figure 8-2 Still Creek Integrated Corridor Plan - Vancouver

**Corridor designations**

- Floodway/Riparian Zone
- Flood Proof Zone (1-200 year flood area)
- Potential Still Creek Conservation Area

**Watercourses**

- Still Creek
- Tributary
- Culverted Creek
- Reach Breaks

**Rainwater Management**

- Culvert upgrades
- Trash booms (GVRD)
- Potential Sedimentation Facility

**Proposed Local Area Plans**

- Grandview Boundary Industrial Area

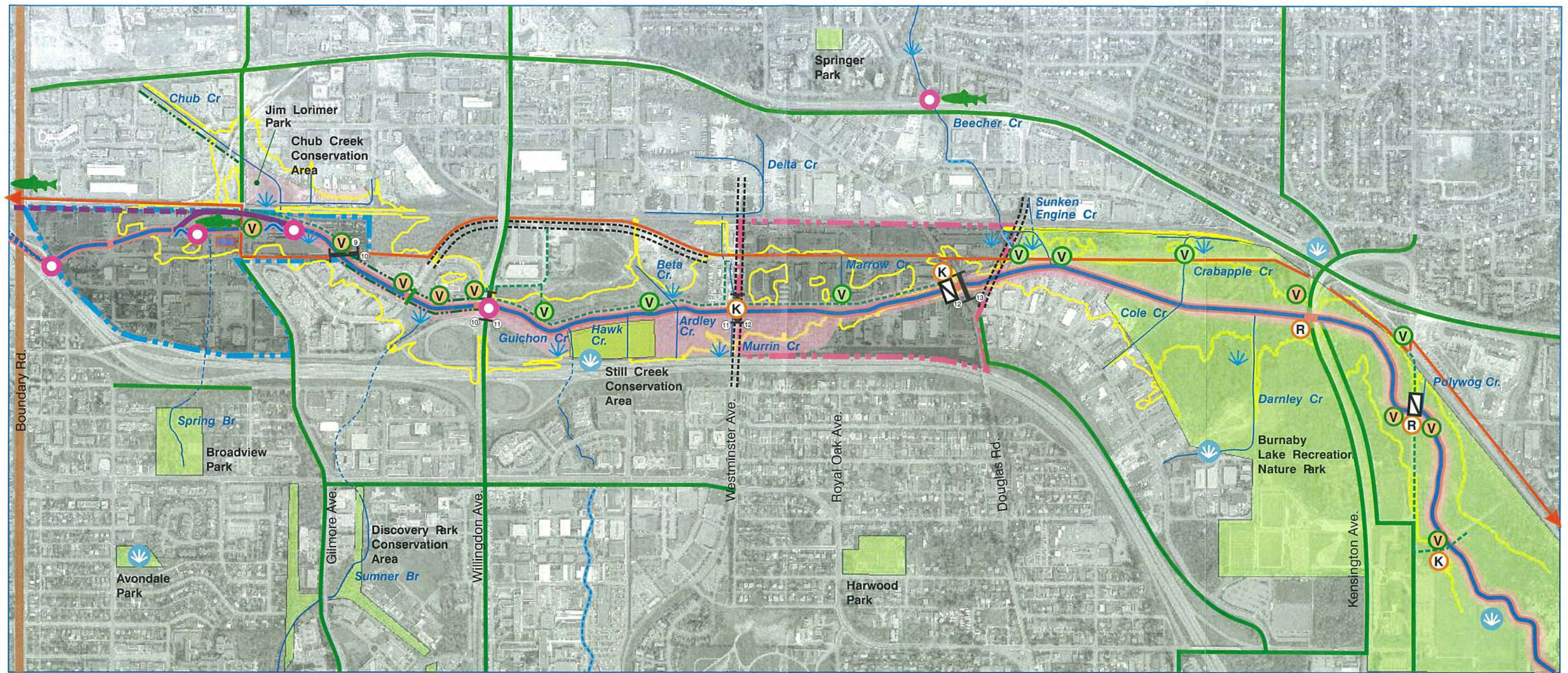
**Environment**

- Existing Park and Conservation Area
- Future Park and Conservation Area
- Potential in-stream habitat enhancements
- Potential water quality treatment ponds
- Potential Daylighting
- Potential Still Creek relocation Option 1
- Potential Still Creek relocation Option 2
- Fish access improvements

**Recreation + Transportation**

- Existing Viewing opportunities
- Potential Viewing opportunities
- Potential kayak/canoe launch
- Potential kayak/canoe rest stop
- Proposed roads
- Proposed Central Valley Greenway
- Proposed pedestrian trails
- Existing pedestrian trails
- Urban trails





**Figure 8-3 Still Creek Integrated Corridor Plan - Burnaby**

#### Corridor designations

- Floodway/Riparian Zone
- Flood Proof Zone (1:200 year flood area)
- Potential Still Creek Conservation Area

#### Watercourses

- Still Creek
- Tributaries
- Culverted Creek
- Reach Breaks

#### Rainwater Management

- Culvert upgrades
- Trash booms (GVRD)
- Potential Sedimentation Facility

#### Proposed Local Area Plans

- Gilmore
- Douglas Rd.

#### Environment

- Existing Park and Conservation Area
- Future Park and Conservation Area
- Potential in-stream habitat enhancements
- Potential water quality treatment ponds
- Potential daylighting
- Potential Still Creek relocation Option 1
- Potential Still Creek relocation Option 2
- Fish access improvements

#### Recreation + Transportation

- Existing Viewing opportunities
- Potential Viewing opportunities
- Potential kayak/canoe launch
- Potential kayak/canoe rest stop
- Proposed roads
- Proposed Central Valley Greenway
- Proposed pedestrian trails
- Existing pedestrian trails
- Urban trails





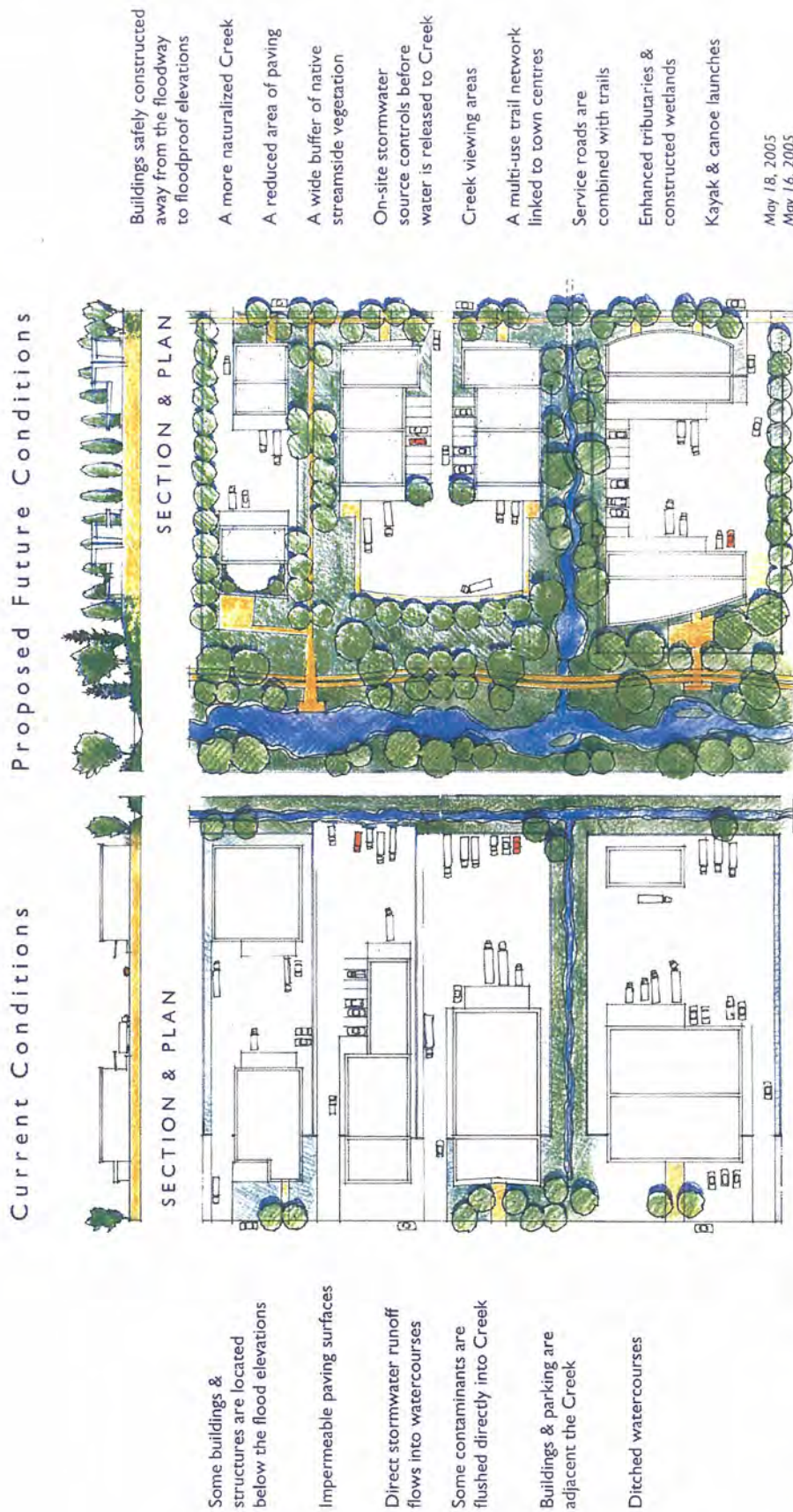


FIGURE 8-4: STILL CREEK CORRIDOR ENHANCEMENT CONCEPTS



LEES + ASSOCIATES  
Landscape Architecture  
Environmental Planning







**Table 8-1: Summary of Possible Actions**

The following table summarizes all actions proposed in this plan, including cost range, proposed timeline, and potential lead agency. A strategy for plan implementation is laid out in Chapter 9 and includes plan adoption, partnership building, and strategic and financial planning. Due to the complexity of the jurisdictions involved, an interagency coordinating committee is recommended to assist with and monitor the plan implementation.

**KEY****Potential Lead Agency**

Municipality
Municipalities / GVRD
Municipalities / Landowners
GVRD
Landowners
Schools
Streamkeepers / GVRD / Municipality
Utility Companies
Ministry of Transportation and Highways
BCIT

**Timeline**

L = 15+ years  
M = 5 - 15 years  
S = 0 - 5 years

**Cost**

\$ = \$0 to 25,000  
\$\$ = \$25,000 to \$250,000  
\$\$\$ = over \$250,000

Actions		Cost	Timeline	Potential Lead / Partner
1-1a	Reduce area of hard surface	\$	M	Municipalities/Landowners
1-1b	Implement on-site runoff source controls	\$	M	Municipality
1-1c	Implement on-site infiltration practices	\$	M	Municipality
1-1d	Develop detailed stormwater management guidelines and criteria for storage/infiltration facilities	\$	S	Municipality
1-1e	Develop educational opportunities/materials for developers on Best Management Practices	\$	S	Municipality
1-1f	Investigate alternative street and sidewalk infrastructure design and maintenance standards	\$	S	Municipality
1-1g	Use water reuse/diversion such as rain barrels and disconnections of roof leader drains	\$	S	Municipality
1-1h	Review related bylaws and revise as needed	\$	S	Municipality
1-2a	Investigate the feasibility of neighbourhood scale stormwater management facilities	\$	M	Municipality
1-2b	Investigate the feasibility of peak flow diversion to reduce peak discharges in the Beecher Creek Ravine.	\$	M	Municipality
1-3a	Pursue channel conveyance/stability improvements	\$\$	M	Municipalities / GVRD
1-3b	Acquire high-risk land within the flood area where appropriate and feasible	\$\$\$	M	Municipalities / GVRD
1-3ci	Map Floodway/Riparian Zone and Flood Proof Zone	\$\$	M	Municipalities/Landowners
1-3cii	Do not permit new development within the Floodway/Riparian Zone	\$	M	Municipalities/Landowners
1-3ciii	Implement flood proofing bylaws for development within the Flood Proof Zone	\$	M	Municipalities/Landowners



	<b>Actions</b>	<b>Cost</b>	<b>Timeline</b>	<b>Potential Lead / Partner</b>
1-3civ	Regulate infilling of property within the Flood Proof Zone	\$	M	Municipalities/Landowners
1-3d	Develop guidelines to assist landowners to protect and enhance streamside areas and appropriately locate buildings	\$	S	Municipality
1-3e	Encourage landowners to provide stewardship within the flood zone	\$	S	Municipality
1-3f	Assess and upgrade inadequate hydraulic structures as they near the end of their serviceable life	\$\$	ongoing	Municipalities / GVRD
1-4a	Develop joint stream and culvert maintenance practices and inspection program	\$	S	Municipalities / GVRD
1-4b	Assess and implement design standards for Still Creek and its tributaries for facility operations and replacement	\$	S	Municipalities / GVRD
1-4c	Develop a watershed GIS drainage inventory map	\$	M	Municipalities / GVRD
1-4d	Streamline drainage infrastructure maintenance practices	\$	S	Municipalities / GVRD
1-4e	Maintain channel conveyance	\$	ongoing	GVRD
1-4f	Formalize a coordinated flood preparedness plan	\$	S	Municipalities / GVRD
1-4g	Improve stream access for operations and maintenance.	\$	ongoing	Municipalities / GVRD
1-4h	Coordinate stream monitoring and improve data accessibility.	\$	S	Municipalities / GVRD
1-4i	Assess impacts on flow conveyance of channel impediments	\$	ongoing	GVRD
1-4j	Establish stormwater management system performance, monitoring and maintenance programs.	\$	M	Municipalities / GVRD
2-1a	Identify and prioritize areas of high erosion and possible remedial measure.	\$	S	Municipalities / GVRD
2-1b	Investigate the feasibility of neighbourhood detention/flow attenuation measures	\$	M	Municipality
2-1c	Identify areas of erosion concern and employ bio-engineering measures where appropriate	\$	S	Municipalities / GVRD
2-1d	Investigate the feasibility of a large-scale sedimentation facility or facilities	\$	M	Municipalities / GVRD
2-1e	Implement flow reduction strategies	\$\$	M	Municipalities / GVRD
2-2a	Harmonize sedimentation management and best practices among GVRD, Vancouver and Burnaby.	\$	M	Municipalities / GVRD
2-2b	Review the federal discharge criteria for construction sites and adjust as necessary	\$	S	Municipality
2-2c	Develop educational opportunities/materials on sediment and erosion control	\$	S	Municipality
3-1ai	Daylight Still Creek mainstem E and W of Gilmore Ave (may include diversion)	\$\$\$	L	Municipalities / GVRD
3-1aii	Daylight Still Creek mainstem West of Cornett Road	\$\$\$	S	Landowners
3-1aiii	Daylight Still Creek mainstem South of 14th Ave	\$\$\$	L	Landowners
3-1aiv	Daylight Still Creek mainstem North of 20th Ave	\$\$\$	L	Landowners
3-1av	Daylight Still Creek mainstem 2900 Grandview Hwy	\$\$\$	L	Landowners
3-1bi	Daylight tributaries at Guichon Creek at BCIT	\$\$\$	L	Landowners
3-1bii	Daylight tributaries at Beecher Creek at Goring	\$\$\$	L	Landowners
3-2ai	Improve culverts and remove channel obstacles. Potential site Still Creek at Boundary	\$\$\$	L	MoTH
3-2aii	Improve culverts and remove channel obstacles. Potential site Still Creek E and W of Gilmore	\$\$\$	L	Streamkeepers / GVRD / Municipality



	<b>Actions</b>	<b>Cost</b>	<b>Timeline</b>	<b>Potential Lead / Partner</b>
3-2aiii	Improve culverts and remove channel obstacles. Potential site Guichon Creek at Moscrop	\$\$	L	BCIT
3-2aiv	Improve culverts and remove channel obstacles. Potential site Guichon Creek at Willingdon	\$\$\$	L	Municipality
3-2av	Improve culverts and remove channel obstacles. Potential site Beecher Creek at Loughheed	\$	S	Streamkeepers / GVRD / Municipality
3-2bi	Add instream habitat. Potential site Still Creek E and W of Gilmore	\$\$\$	L	Municipalities / GVRD
3-2bii	Add instream habitat. Potential site Still Creek at Bby Lake Park Lake Park	\$\$	M	Municipalities / GVRD
3-2biii	Add instream habitat. Potential site Still Creek at Cornett	\$\$	S	Municipality
3-2biv	Add instream habitat. Potential site Still Creek at 3700 Still Creek Ave	\$\$	S	Municipality
3-2bv	Add instream habitat. Potential site Guichon Creek joining Still Creek	\$\$	L	Municipalities / GVRD
3-2bvi	Add instream habitat. Potential site Chubb Creek at Gilmore	\$\$	S	Municipalities / GVRD
3-2bvii	Add instream habitat. Potential site Crabapple Creek d/s of Loughheed	\$\$	S	Municipalities/Landowners
3-2bviii	Add instream habitat. Potential site Guichon Creek at Wesburn	\$\$	M	Municipality
3-2bix	Add instream habitat. Potential site Guichon Creek within BCIT	\$\$	S	BCIT
3-2bx	Add instream habitat. Potential site Beecher Creek mainstem	\$\$	S	Streamkeepers / GVRD / Municipality
3-2bxi	Add instream habitat. Potential site Beecher Creek at Still Creek	\$\$	L	Municipality
3-2bxii	Add instream habitat. Potential site Sumner Creek at Still Creek	\$\$	L	Landowners
3-2bxiii	Add instream habitat. Potential site Spring Brook Creek at Cascade	\$\$	L	Municipality
3-2bxiv	Add instream habitat. Potential site Pollywog Creek d/s of Loughheed	\$\$	L	Municipalities / GVRD
3-2bxv	Add instream habitat. Potential site Ardley Creek d/s of TransCanada Hwy	\$\$	S	Municipality
3-2c	Add aeration structures to Still Creek	\$	M	GVRD
3-2d	Assess need to improve fish access at Cariboo Dam	\$	S	GVRD
3-3a	Prevent encroachments onto City / GVRD-owned streamside areas	\$	S	Municipalities / GVRD
3-3b	Follow Still Creek Rehabilitation and Enhancement Study (2002) guidelines within Vancouver	\$\$\$	L	Landowners
3-3c	Designate a Still Creek Floodway/Riparian Zone on either side of Still Creek	\$	S	Municipality
3-3d	Conduct local area plans for Still Creek - Gilmore Ave, and Still Creek - Douglas Road areas	\$	M	Municipality
3-3e	Pursue long-term acquisition / dedication of a Still Creek integrated greenway along the stream corridor	\$\$\$	L	Municipalities / GVRD
3-3f	Apply streamside setbacks on all streams	\$	S	Landowners
3-3g	Encourage landowners to "adopt a stream"	\$	S	Municipality/Landowners
3-3h	Develop an overall streamside planting plan	\$	S	Municipalities / GVRD
3-3i	Use existing access points to creeks	\$	S	Municipalities / GVRD
3-4a	Create public educational programs for basin stewardship	\$	S	Municipalities / GVRD



	<b>Actions</b>	<b>Cost</b>	<b>Timeline</b>	<b>Potential Lead / Partner</b>
4-1a	Plant and maintain street trees, boulevards and green streets	\$	S	Municipality
4-1b	Encourage tree-planting and greenspace in land redevelopment.	\$	S	Municipality/Landowners
4-1c	Encourage private landowners to plant native trees and vegetation	\$	S	Municipality/Landowners
4-1d	Encourage schools to add planting to school yards.	\$	S	Schools/Municipality
4-1e	Develop and implement an urban forest strategy for the watershed.	\$\$	M	Municipality
5-1a	Identify non-point source pollution control for private property.	\$\$\$	S	Municipalities / GVRD
5-1b	Continue with cross connection inspection	\$	S	Municipalities / GVRD
5-1c	Enhance major culvert inspection and maintenance	\$	S	Municipalities / GVRD
5-1d	Improve catch basin cleaning and street sweeping programs	\$	S	Municipality
5-1e	Research benefits and challenges of infiltrating catchbasins	\$\$	S	Municipalities / GVRD
5-1f	Encourage landowners to adopt "cosmetic herbicide/pesticide-free landscaping"	\$	S	Municipality/Landowners
5-1g	Conduct targeted and coordinated pollution-prevention education programs	\$	S	Municipality
5-1h	Provide training and education programs for City staff and work crews on best management practices	\$	S	Municipality
5-1i	Encourage landowners to use stormwater BMPs with multiple benefits	\$	S	Municipality
5-1j	Continue with existing source control programs	\$	S	Municipalities / GVRD
5-1k	Limit street flushing to emergency situations	\$	Ongoing	Municipality
5-1li	Investigate potential neighbourhood-scale water quality treatment ponds - Falaise Park	\$\$	L	Municipalities / Landowners
5-1lii	Investigate potential neighbourhood-scale water quality treatment pond - Chaffey Burke School (Guichon Creek)	\$\$	L	Municipality
5-1liii	Investigate potential neighbourhood-scale water quality treatment pond - Wesburn Park (Guichon Creek)	\$\$	L	Municipality
5-1liv	Investigate potential neighbourhood-scale water quality treatment pond - TransCanada Hwy and Still Creek (near Guichon Creek)	\$\$	L	Municipality
5-1lv	Investigate potential neighbourhood-scale water quality treatment pond - outfall at Damley St and Norland Ave	\$\$	M	Municipalities / GVRD
5-1lvi	Investigate potential neighbourhood-scale water quality treatment pond - Crabapple Creek upstream / in Burnaby Lake Park	\$\$	S	Municipality
5-1lvii	Investigate potential neighbourhood-scale water quality treatment pond - Broadview Park	\$\$	L	Municipality
5-1lviii	Investigate potential neighbourhood-scale water quality treatment pond - Avondale Park	\$\$	L	Municipality
5-2a	Continue fecal coliform monitoring	\$	S	Municipalities / GVRD
5-2b	Use benthic invertebrates to measure stream health	\$\$	S	Municipalities / GVRD
5-2c	Coordinate chemical analysis of water quality	\$	S	Municipalities / GVRD
6-1ai	Protect remaining habitat reservoirs/refuges at Still Creek (N of TransCanada and E of Willingdon)	\$	S	Municipality
6-1aii	Investigate conservation area designation of Beecher Creek ravine	\$	S	Municipality
6-1b	Conduct a land use plan around Douglas Road	\$	M	Municipality



	<b>Actions</b>	<b>Cost</b>	<b>Timeline</b>	<b>Potential Lead / Partner</b>
6-1c	Enlarge habitat reservoirs and refuges through land restoration	\$\$\$	M	Municipalities / Landowners
6-1d	Focus recreation in existing disturbed areas	\$	S	Municipalities / GVRD
6-1e	Maximise habitat potential of lands adjacent to TransCanada Hwy	\$	S	MoTH
6-2a	Restore a Still Creek Greenway as a primary/secondary habitat corridor	\$\$\$	L	Municipalities / GVRD
6-2b	Link Still Creek Greenway to other greenspaces (e.g. Chubb Creek)	\$\$	L	Municipalities / GVRD
6-2ci	Create a secondary / tertiary corridor between Still Creek and Deer Lake Park through BCIT	\$\$	L	BCIT
6-2cii	Create a secondary / tertiary corridor between Still Creek and Deer Lake Park through street tree planting	\$	S	Municipality
6-2ciii	Create a secondary / tertiary corridor between Still Creek and Deer Lake Park through backyard programs	\$	S	Municipality
6-2civ	Create a secondary/tertiary corridor through enhancements in Guichon Creek ravine	\$	L	Municipality
6-2d	Create a secondary / tertiary habitat corridor along Beecher Creek up towards Burnard Inlet	\$\$	L	Municipalities / Landowners
6-2e	Create a tertiary habitat corridor connecting Beaver Creek to Central Park	\$\$	L	Municipalities / Landowners
6-2f	Create a tertiary corridor connecting Still Creek with Renfrew Ravine, Trout Lake, & Central Park	\$\$	L	Municipalities / Landowners
6-2g	Maximize habitat potential within utility corridors	\$	S	Utility Companies
6-3a	Study and inventory species usage	\$\$	M	BCIT
6-3b	Manage natural and urban areas for biodiversity	\$	M	Municipalities / GVRD
6-3c	Designate refuge areas for wildlife breeding and rearing purposes	\$\$	S	Municipalities / GVRD
6-3d	Assess potential problem wildlife species	\$\$	S	Municipalities / GVRD
6-3e	Include biodiversity measures in forest management.	\$	S	Municipalities / GVRD
6-3f	Minimize conflict between dog off-leash areas and critical habitat areas.	\$	S	Municipalities / GVRD
6-3g	Increase areas of wetland in watershed.	\$\$	M	Municipalities / GVRD
6-4a	Assess extent of invasive vegetation and create priorities for removal	\$	S	Municipality
6-4b	Create long-term pilot projects for invasive species removal	\$\$	S	Municipalities / GVRD
6-4c	Support streamkeepers' efforts at native planting and invasive weed removal initiatives.	\$	S	Streamkeepers / GVRD / Municipality
6-4d	Develop an integrated land stewardship program for landowners	\$	S	Municipality
7-1a	Build gathering places	\$\$	M	Municipality
7-1b	Create a recreation opportunity map	\$	S	Municipality
7-1c	Create linear recreational corridors	\$\$\$	S-M	Municipality
7-2a	Integrate trail network with streamside corridors	\$\$	S-M	Municipality
7-2b	Create stairs terraces, landscaped benches, view corridors and slopes	\$\$	M	Municipality
7-2c	Provide public access to enjoy watercourses at strategic locations	\$	M	Municipality
7-2d	Create opportunities for canoe access to Still Creek	\$\$	M	Municipalities / GVRD
7-2e	Negotiate rights of way for public access	\$	S-M-L	Municipalities / GVRD
7-3a	Create trail connections from town centres to watercourses	\$\$	S	Municipalities / GVRD



	<b>Actions</b>	<b>Cost</b>	<b>Timeline</b>	<b>Potential Lead / Partner</b>
7-3b	Create additional loop trails off the Central Valley Greenway	\$\$	M	Municipalities / GVRD
7-3c	Work with stakeholder groups for "walking school-bus routes"	\$	S-M-L	Municipalities / GVRD
7-3d	Enhance pedestrian and cycle safety	\$\$	S-M-L	Municipality
7-3e	Remove barriers to efficient and safe cycling	\$	S-M-L	Municipality
7-4a	Within local area plans, identify locations for integrated uses	\$	S	Municipality
7-4b	Encourage landowners to rehabilitate and daylight Still Creek	\$	S-M-L	Municipalities / GVRD
7-4c	Create a "Still Creek Integration" Competition	\$	M	Municipalities / GVRD
7-4d	Encourage landowners to use stormwater management features for aesthetic benefits	\$	M	Municipality/Landowners
7-4e	Encourage landowners to allow public access to watercourses at strategic locations	\$	S	Municipality/Landowners
8-1a	Develop educational walking tours	\$	S	Municipality
8-1b	Develop specific educational activities for school children	\$	S	Municipality
8-1c	Develop brochures to raise awareness amongst residents and businesses of the watershed, its history, importance and future plans	\$	S	Municipality
8-1d	Integrate signage and interpretive panels with ongoing City street and park signs	\$	S	Municipality
8-1e	Implement a public art program tracing lost and open streams	\$	S	Municipality
8-1f	Integrate the landscape, geologic and First Nations history	\$	S	Municipality
8-1g	Integrate in-stream aeration structures/public art initiatives	\$	S	Municipality



## Chapter 9: Implementation Strategy

It is not an easy task to transform strategies and goals into a successful implementation program. Many organizations struggle to translate the theory and goals into an actual plan that will enable the strategy to be successfully implemented and sustained.

The purpose of this chapter is to outline how the ISMP will turn the strategies, goals and action items into programs to produce a successful watershed program.

The Still Creek ISMP covers a range of complex and competing initiatives. The watershed includes drainage areas in both the cities of Vancouver and Burnaby where the main Still Creek corridor falls within the jurisdiction of the GVRD. Therefore, the implementation plan will have to be well coordinated requiring the cooperation of the regional and local governments, stewardship groups, the general public and the business community in order to achieve the plan's vision, goals and objectives.

To assist the GVRD and the cities of Vancouver and Burnaby in developing an effective implementation plan and strategies that will provide the necessary flexibility to meet the financial and development constraints, the ISMP will make use of the following guiding principles and methods for effective strategic implementation.

### Guiding Principles for the Implementation Plan

The implementation plan for the Still Creek ISMP will be built on the following principles:

- Champion the watershed vision
- Build political, public and business support of the Still Creek stormwater management plan
- Strengthen community and corporate environmental and sustainability responsibility
- Provide flexibility in the implementation process to meet financial and development constraints and changing community needs and priorities.

### Key Elements of the Implementation Plan

To successfully implement the recommended strategies and initiatives identified in the Still Creek ISMP, the following supporting factors should be considered:

- Effective communication and education on the watershed vision and values
- Political acceptance and commitment to the watershed plan
- Generation of enthusiasm and buy-in at all levels
- Financial planning for program implementation
- Detailed project prioritizing and programming
- Program monitoring and performance measurement
- Linkage of the Still Creek ISMP to other City/GVRD strategies and plans.



### Key Steps of the Implementation Plan

Building on these guiding principles and elements, Figure 9-1 summarizes the seven the steps to complete the implementation process.

To fulfill the vision and goals of the Still Creek ISMP, an effective implementation plan based on sound and practical principles must be developed.

These recommended components provide the basic framework for the Still Creek ISMP implementation plan.

Based on the recommended process, each jurisdiction within the Still Creek watershed can choose and advance the appropriate action items and initiatives identified in the plan and incorporate the programs into their corporate plans.

**Figure 9-1: Key Implementation Steps for the Still Creek ISMP**

Step 1	<b>Plan Adoption by Council, Committee &amp; Board</b>	Present the Still Creek ISMP report to Councils, Committees and the Board for approval in principle.
Step 2	<b>Build Partnership with Staff, the Public and the Business Community</b>	Prepare pamphlets/displays and conduct workshops to present the plan and report to staff, the general public and the business community to provide a better understanding of the watershed vision, goals and strategies and to collaborate with potential partners to pursue opportunities for the advancement of watershed initiatives. In addition, participate in public events such as Rivers Day, Environmental fairs, and other community events.
Step 3	<b>Strategic and Financial Planning</b>	Begin a financial planning process that includes refining and developing ballpark estimates for the recommended projects in the plan and adjust work program priorities to meet financial and land use related constraints.
Step 4	<b>Program Alignment</b>	Align the Still Creek ISMP with corporate plans and integrate the rainwater management related issues into the City's and GVRD's corporate policies and initiatives.
Step 5	<b>Projects Evaluation</b>	Advance the projects for budget consideration by GVRD, Vancouver, Burnaby and the Brunette Basin Coordinating Committee based on the priority identified in the plan and explore potential funding grants and financial partnerships.
Step 6	<b>Plan Coordination and Feedback</b>	Establish regular meetings of the Still Creek Steering Committee to review program progress, schedule, and action steps and to identify any strategic changes that may be necessary.
Step 7	<b>Plan Monitoring and Adaptive Management</b>	Develop a plan monitoring program through the Still Creek Steering Committee to monitor work progress and performance and to continue to promote the plan and it's vision and work program.